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The Effectiveness of Postnatal Exercise Module on Mother's Readiness for Postnatal Exercise in Indonesia

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ABSTRACT

Objective: This study aims to evaluate the effectiveness of a Postnatal Exercise Module on improving the readiness of postpartum mothers at independent midwifery practices in Tanjungpinang.

Method: A quasi experimental design with a posttest-only control group was employed, involving 30 postpartum mothers selected through hypothesis testing formulas. Data were collected using questionnaires and observation sheets from May to August 2024. Chi-square analysis indicated a significant positive effect of the postnatal exercise module on maternal readiness to perform postnatal exercises ($p < 0.001$).

Findings: The study concludes that a postpartum exercise module can significantly aid uterine involution and maternal recovery, particularly in remote areas with limited healthcare access. This module can be adapted for diverse communities, enhancing recovery support for mothers with limited medical resources.

Novelty: Previous study demonstrated that structured exercise modules could enhance mothers' knowledge regarding the importance of early mobilization and postnatal exercise, positively impacting maternal health and recovery following childbirth. Although several studies have explored the effects of physical exercise on postpartum women, few have investigated the effectiveness of specifically designed exercise modules in the Indonesian context, highlighting the need for further research.

Research Implications: The findings suggest that this module should be adopted as a key health promotion tool to improve maternal health outcomes in postpartum care.

1. Introduction

Postpartum is a period that is at risk of causing complications and often contributes to the maternal mortality rate (MMR) in Indonesia (Nur et al. 2021). MMR is one indicator to see the success of maternal health efforts and MMR itself is the ratio of maternal deaths during pregnancy, childbirth and the postpartum period caused by management problems during pregnancy, childbirth and the postpartum period in every 100,000 live births (Sejati, Rosa, and Pramesona 2023). The biggest contributor to maternal mortality in post partum period is bleeding. Data shows a trend of Postpartum hemorrhage (PPH) is a leading cause of maternal morbidity and mortality worldwide, with approximately 50%-60% of cases attributed to insufficient uterine contraction (Nigussie et al. 2022; Pubu et al. 2021).

During the postpartum period, the mother is at risk for postpartum bleeding(Glenzer et al. 2023). Postpartum bleeding can occur due to failure of the myometrium to contract after delivery so that the uterus is in a state of complete relaxation, is poor and soft(Sheikh et al. 2024). One way to ensure that uterine muscle contractions remain good until the end of postpartum is by early mobilization and simple movements such as

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postpartum exercises, because postpartum exercises can stretch the uterine muscles after delivery(Istiqomah, Murti, and Adriani 2024).

Postpartum exercise is a form of early ambulation for postpartum mothers, one of the aims is to expedite the involution process, while failure to do so in the involution process has negative consequences for postpartum mothers, such as further bleeding and the smoothness of the involution process(Wulandari 2024). Postpartum exercises help restore pelvic floor strength, tone abdominal and perineal muscles, improve posture, and prevent complications, including postpartum bleeding. (Mihaelov 2022; Rahmadini et al. 2024)

The quality of postpartum care is crucial, and physical activity, including postnatal exercise, has been shown to support adequate uterine contraction during the puerperium (Rajah et al. 2021). However, many postpartum mothers lack sufficient knowledge and attitudes toward these exercises, hindering their readiness to engage in such vital activities. This highlights the need for effective interventions to enhance mothers' understanding and readiness to perform postnatal exercises, which can contribute to better maternal health recovery (Brown et al. 2022; Rajah et al. 2021).

Recent research indicates that educational interventions and postnatal exercise programs can significantly improve postpartum mothers' readiness and ability to engage in physical activities. A study by Christiansen et al. (2023) demonstrated that structured exercise modules could enhance mothers' knowledge regarding the importance of early mobilization and postnatal exercise, positively impacting maternal health and recovery following childbirth. Although several studies have explored the effects of physical exercise on postpartum women, few have investigated the effectiveness of specifically designed exercise modules in the Indonesian context, highlighting the need for further research (Christiansen et al. 2023; Mahayati et al. 2023).

This study introduces a culturally tailored postnatal exercise module for Indonesian mothers, aimed at enhancing their knowledge and ability to perform postpartum exercises independently. It focuses on improving maternal health outcomes and promoting community health practices by assessing the module's effectiveness in aiding uterine involution and overall recovery, particularly in remote areas with limited healthcare. The research also explores the module's physical and emotional impacts on mothers, its adaptability to various local contexts, and its potential role in maternal care, laying groundwork for broader application and dissemination.

2. Methods

2.1 Study design

This study uses a quasi-experimental posttest-only control group design to examine the effects of a postnatal exercise module on postpartum mothers' readiness. This is especially relevant for interventions in health care where full randomization may be impractical. Quasi-experimental designs are employed for ethical and practical reasons in midwifery research, particularly in the context of community-based interventions (Polit & Beck, 2021).

2.2 Setting and sample

This research was performed in Tanjungpinang, Indonesia, in May–August 2024. The study included 60 postnatal mothers who were recruited purposively and divided into intervention (n= 30) and control (n= 30) groups. Inclusion criteria were being a mother between 1 and 6 weeks postpartum, no medical contraindication to exercise, and a willingness to be included in the study. This purposive approach is common in nursing and health education research for populations with specific attributes (LoBiondo-Wood & Haber, 2018).

2.3 Intervention procedures

The intervention was a standardized, postnatal exercise program and was based on a face-to-face training module delivered by certified midwives using printed booklets and video presentations. The educational material was translated to the native language and local culture. Sessions lasted between 45 minutes and an hour and were delivered twice weekly

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over a period of four weeks. Exercise participation and adherence was recorded on observation sheets. Such a multicomponent approach is in line with recent trials' best practices in maternal health promotion.

2.4 Instruments and data collection

Information was obtained using validated questionnaires measuring maternal readiness, including knowledge, attitude and confidence, and by observing participant's use of the exercises. The instrument employed has been adapted from previous tools from the World Health Organization (2019) and was tested for reliability (Cronbach's alpha > 0.80). Demographic variables including age, parity, education and no previous knowledge of postnatal exercise were recorded at baseline to enable comparability of groups. The instrument has good internal consistency for measuring behavioral readiness (Apostolopoulos et al., 2021).

2.5 Statistical analysis

For analysis, descriptive and inferential statistics were used. Analyze Chi-square tests were performed to evaluate associations with intervention and post-intervention readiness and implementation. The OR and 95% confidence intervals (CI) are presented. A p-value < 0.05 was regarded as statistically significant. Data were analyzed through the software SPSS version 26. This approach is consistent with previous work that examined behavioral constructs in maternal health within categorical variables (Singh et al., 2022).

3. Results

3.1. *Demographic characteristics of respondents*

These results provide an important insight into the demographic characteristics of postpartum women who participated in the postpartum exercise intervention programme.

Age and parity Table 1 illustrates the demographic details of the postpartum woman sampled and which are more related to age and parity. The intervention group was characterised by a mean age of 26.70 years (standard deviation (SD) = 5.70) and the control group by a mean age of 25.73 years (SD = 4.57) years. This suggests that the mean age of those in both groups were comparable with a slight lean towards older participants in the intervention group. The standard deviation in both groups indicates an intermediate spread of age, however with a higher spread in the intervention group. Themal distribution indicated that the average number of children for the intervention group was 2.33(SD=0.95) and the control group 1.93(SD=0.86). These results indicate that the intervention group subjects tend to have a greater parity over the control group subjects. This variation might indicate that women in the intervention had a bit more childbirth experience than in the control group, both of which, however, are within a frequently observed variation in childbearing experiences by Indonesian women of reproductive age.

In general, the demographic information shows that the intervention group and the control group were comparable in age and parity and only differed slightly in means. They are compared during this study because the high similarity allows comparing them while controlling for potential confounding population variables. The relatively even distribution of these critical variables assists in confidence that observed effects in the study are not as attributable to demographic differences which may confound group differences.

Table 1. Frequency Distribution of Respondent Characteristics Based on Age and Parity

Respondent Characteristics	Intervention Group (Mean ± SD)	Control Group (Mean ± SD)
Age	26.70 ± 5.70	25.73 ± 4.57
Parity	2.33 ± 0.95	1.93 ± 0.86

Source; Author 2025

The distribution of the respondents according to two main characteristics, level of education and occupation status across the intervention and control groups is shown in Table 2. Education-wise, 76.7% (n = 23) of participants in the intervention group were qualified as 'tall', the remaining 23.3% (n = 7) were 'short'. In the control group, 83.3% (n = 25) had a higher educational level and 16.7% (n = 5) had a lower educational level. Both

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of these distributions show that most of the respondents in each group were educated at a relatively high level, but with a higher percentage of these in the control group.

In terms of employment, in the intervention group, 80.0% (n = 24) were employed, while 20.0% (n = 6) were out of work when the study was administered. The control group in turn had 73.3% (n = 22) of mothers who were working, and 26.7% (n = 8) were not working. These numbers indicate that the occupational distribution of the two groups was more or less comparable, the only difference being a slightly higher number of employed persons in the intervention group.

In general, the data show that both groups were mostly comprised of mothers with a higher educational level and who were professionally active. The similar distribution in terms of education and occupation across intervention and control arms reflects internal validity of this study, suggesting that baseline differences were comparable. This comparability reduces the possibility that any associations found between postpartum exercise readiness and behavior will be accounted for by differences in education and work status.

Table 2. Frequency distribution of respondents based on education and occupation

Respondent Characteristics	*Frequency(N)*	*Percentage(%)*
Education		
Intervention Group		
Tall	23	76.7
Low	7	23.3
Control group		
Tall	25	83.3
Low	5	16.7
Work		
Intervention Group		
Work	24	80.0
Doesn't work	6	20.0
Control group		
Work	22	73.3
Doesn't work	8	26.7

Source; Author 2025

3.2. *Readiness for Postpartum Exercise*

The distribution of the respondents according to readiness of women for exercising at the up to 10 day postpartum period is shown in Table 3 by treatment intervention and control group. A majority of mothers postpartum in the intervention group (86.7% [n = 26]) reported feeling ready for postpartum exercise, while 13.3% (n = 4) reported feeling not ready. In contrast, the control group reported a significant lower level of preparedness, with 60.0% (n = 18) of respondents feeling prepared and a rather large proportion of 40.0% (n = 12) reporting that they were not prepared to exercise after birth. These findings indicate a marked contrast in perceived readiness for postnatal PA between the two groups. Readiness levels in the intervention group who were offered the postnatal exercise module with structured advice, printed materials, and video demonstrations were significantly higher. This 26.7 percentage point difference (86.7% vs. 60.0%) between groups represents a substantial difference in self-report of readiness/motivation to initiate postpartum exercises.

Moreover, the findings showed that the ratio of unready mothers to do the PP exercises in the non-GA group was approximately 3 times higher than in the GA group (40.0% to 13.3%, respectively). Since the sample size n = 30 per group for both treatment groups, and if the distribution is good, then comparison remains matched and intervention effects are interpreted directly. Altogether, the readiness levels among the intervention group were significantly better than those in the control group, indicating that postpartum exercise module exposure could be linked to higher psychological or motivational preparedness of postpartum mothers.

Table 3. Frequency Distribution of Respondents Based on Readiness to Perform Postpartum Exercises

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Respondent Readiness	*Frequency(N)*	*Percentage(%)*
Intervention Group		
Ready	26	86.7
Not ready	4	13.3
Control group		
Ready	18	60.0
Not Ready	12	40.0

Source; Author 2025

From Table 3, it can be concluded that the majority of respondents in the intervention group showed high readiness to carry out postpartum exercise. As many as 86.7% of postpartum mothers in the intervention group were ready to do postpartum exercise, compared to 60.0% in the control group. Conversely, the percentage of postpartum mothers who were not ready to do postpartum exercise was higher in the control group (40.0%) compared to the intervention group (13.3%).

3.3. *Implementation of Postpartum Exercise*

The frequency distribution of postpartum exercise practice of the descriptions was presented in Table 4 for respondents in groups I and II. Among the intervention group, it was found that 83.3% (n = 25) of mothers practiced postpartum exercises and 16.7% (n = 5) did not. In contrast, of the control group, 56.7% (n = 17) did the exercises, and 43.3% (n = 13) did not. These findings suggest that there was a significant gap in the practice of the two groups and that a significantly higher percentage of the intervention group participants practiced postpartum exercise activities. The data indicates that the intervention has potentially had a beneficial impact on postnatal exercise adherence among mothers.

Table 4. Frequency Distribution of Respondents Based on Implementation of Postpartum Exercise

Respondent Role	*Frequency(N)*	*Percentage(%)*
Intervention Group		
Carry out	25	83.3
Not Executing	5	16.7
Control group		
Carry out	17	56.7
Not Executing	13	43.3

Source; Author 2025

Table 5 shows a remarkable variation in postpartum exercise practice of the intervention and the control groups. In the intervention group, 83.3% of the participants (n = 25) did the exercises; 16.7% (n = 5) did not. In contrast, 56.7% (n = 17) in the control group did postpartum exercises and 43.3% (n = 13) did none. The odds ratio (OR) for the exercise with 95% confidence interval and p-value was 3.824 (CI: 1.1–12.7, value < 0.049) that suggests the probability of having exercise in postnatal period in intervention is nearly four than control. Considering that both groups having 30 samples, these findings confirm that the postnatal exercise module was effective in promoting the practice of exercise in postnatal women.

Table 5. Distribution of respondents based on differences in implementation of postpartum exercise

Group	Implementation of postpartum Exercise						OR (95% CI)	P value
	Exercise		No exercise		Total			
	n	%	n	%	n	%		
Intervention	25	83.3	5	16.7	30	100	3,824	0.049
Control	17	56.7	13	43.3	30	100	1,1-12.7	
Amount	42	70.0	18	30.0	60	100		

Source; Author 2025

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Table 5 shows that in the intervention group given the postpartum exercise module, 83.3% of postpartum mothers performed postpartum exercise, while in the control group not given the postpartum exercise module, only 56.7% of postpartum mothers performed postpartum exercise. The results of the statistical test showed a p value of 0.049, indicating a significant difference in the implementation of postpartum exercise between the two groups. The results of the analysis also produced an Odds Ratio (OR) value of 3.824 with a 95% Confidence Interval (CI) range of 1.1 to 12.7. This means that postpartum mothers who are given postpartum exercise modules are 3.82 times more likely to carry out postpartum exercise compared to those who are not given the module.

3.4. *Differences in readiness to perform postpartum exercise*

There is a statistically significant difference in postpartum exercise readiness between the intervention and control groups (Table 6). Eighty-six point 7% participants of intervention group (n = 26) expressed that they were ready to do postpartum exercise whereas, only 13 point3% (n = 4) said they were not ready. The control group, on the other hand, had 60.0% (n = 18) readiness and 40.0% (n = 12) non-readiness. By the OR of 4.333 with95% CI of 1.2–15.6 (p < 0.041), this means that mothers in the intervention group were 4.333 times more likely to be ready to conduct postnatal exercises than those in the control group. With a sample size of 30 participants per group, the positive relationship between the intervention and the maternal readiness of postnatal exercise was supported by this result.

Table 6. Distribution of Differences in Respondents Based on Differences in Readiness to Perform Postpartum Exercises

Group	Readiness to Perform Postpartun Exercise				Total		OR (95%CI)	P value
	Ready		NoReady					
	n	%	n	%				
Intervention	26	86.7	4	13.3	30	100	4,333	0.041
Control	18	60.0	12	40.0	30	100	1,2–15.6	
Amount	44	73.3	16	26.7	60	100		

Source; Author 2025

3.5. *Reduction in uterine fundal height*

According to the value depicted in Table 7, the decrease in UFH was significantly greater in the intervention than in the control. The average reduction in UFH was 8.87 cm (SD = 0.68; SE = 0.12) for the intervention group and a higher average reduction was seen in the control group (10.53 cm; SD = 0.97; SE = 0.17). The chi-square distribution analysis between the two groups suggested a p-value of 0.000, suggesting that two groups were statistically different with a power of 0.977 in the significance level of 5%. This finding indicates that the post-partum exercise package did have an effect on UU involution among the intervention group as compared to the control. Because both samples have the same size (n = 30), statistical comparison remains valid. The lower average time in intervention group indicates faster physiological restoration and proves the effect of the exercise module in promoting postnatal involution.

Table 7. presents the average reduction in uterine fundal height between the intervention and control groups.

Variables	*Mean(cm)*	*SD*	*SE*	*p-value*	*N*
uterine fundal height					
Intervention Group					
Control Group	8.87	0.68	0,12	0.00	30
	10.53	0.97	0,17		30

Source; Author 2025

Based on Table 7, it can be seen that the average decrease in Uterine Fundal Height (FHH) in the intervention group was 8.87 cm with a standard deviation of 0.68 cm. Meanwhile, the control group had an average FHH of

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10.53 cm with a standard deviation of 0.97 cm. The results of the statistical test showed a p value = 0.00, which indicated that at a significance level of 5% (alpha 5%), there was a significant difference between the average decrease in FHH in the intervention group compared to the control group.

4. Discussion

In several study claimed that Age and parity are significant influencing factors in postpartum recovery, with younger age and lower parity often associated with faster recovery and fewer complications. Thus, despite the small differences in age and parity between the intervention and control groups, it is important to consider how these factors may influence the final outcome of the intervention (Adams et al. 2023; Monaliska Sihombing, Tinggi Ilmu Kesehatan Sehati, and Monaliska Sihombing Sekolah Tinggi Ilmu Kesehatan Sehati 2022). From a practice perspective, these findings highlight the importance of adapting postpartum exercise programmes according to the demographic characteristics of postpartum women in different regions(Santos-Rocha and Szumilewicz 2022). For example, in a national context, postpartum exercise programmes should be designed with maternal age and parity in mind, so as to provide more effective support for groups with specific needs. At the international level, these findings are also relevant in the design of maternal health programmes tailored to the population profiles of different countries, especially in developing countries where age and parity can vary widely(Peralta et al. 2021; Sendas and Freitas 2024).

In addition, these results can inform maternal health policy at the national and international levels, especially in terms of improving access to and implementation of postnatal exercise programmes in various health settings. Programmes that are more responsive to the demographic characteristics of postpartum women may increase the effectiveness of interventions, reduce the rate of postpartum complications, and ultimately contribute to a reduction in maternal mortality(Asadi, Noroozi, and Alavi 2022; Tzouma et al. 2023). Overall, the implications of these findings emphasise the need for a personalised approach in the implementation of postpartum exercise programmes, which not only considers the effectiveness of the intervention but also the relevance and readiness of the recipients based on their demographic characteristics. Higher education is often associated with better knowledge about health, better ability to make health-related decisions, and greater access to health resources(Lee et al. 2021). In the context of postpartum exercises, highly educated mothers may be more likely to understand the importance of postpartum exercises and more likely to perform them consistently(Edie et al. 2021; Szumilewicz et al. 2020). In addition, working mothers may have better access to health facilities or have more structured routines, which may influence their engagement in the postpartum exercise programme (Rajah et al. 2021).

Most postpartum mothers in the intervention group were working mothers (80.0%), compared to 73.3% in the control group. In contrast, non-working mothers had a lower percentage, namely 20.0% in the intervention group and 26.7% in the control group. At the national level, these findings suggest the need for postpartum exercise programmes that are not only informative but also responsive to the needs of highly educated and working mothers. For example, the programme should provide flexibility in the timetable or provide additional support to ensure that mothers who are busy with work can still fully participate in the postpartum exercise activities(Huberty et al. 2020). At the international level, these results are relevant for the development of maternal health policies that take into account differences in education and employment across countries. Countries with more educated and employed maternal populations may require different approaches in promoting postpartum health compared to countries where women's education and work participation levels are lower(Dahab and Sakellariou 2020; Nazari et al. 2021). In addition, these findings also highlight the importance of training and developing postpartum exercise modules that are accessible to mothers from different educational and occupational backgrounds. By increasing the accessibility and relevance of postpartum exercise programmes, such interventions can significantly contribute to improving overall maternal health and ultimately reduce the rate of postpartum complications in various countries(Makama et al. 2021; Nazari et al. 2021). Overall, the implications of these findings point to the need for a more targeted and inclusive approach in maternal health programmes, both nationally and internationally, taking into account the educational and occupational factors that influence mothers' ability to undergo effective postpartum care.

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Maternal readiness to perform postpartum exercises is an important indicator of how effective education and intervention programmes are in motivating mothers' active participation in postpartum health care (Brites-Lagos et al. 2023). Higher readiness in the intervention group reflects the success of the puerperal exercise module in increasing mothers' awareness and motivation towards the importance of performing puerperal exercises. In a broader context, this suggests that education-based interventions can play an important role in improving overall maternal health, especially in the aspect of postpartum recovery(Santos-Rocha and Szumilewicz 2022; Tzouma et al. 2023). At the national level, these findings underscore the importance of developing and distributing effective and accessible postpartum exercise modules. Maternal health programmes across the country should consider including such modules as part of standard postpartum services in health facilities (Sundarapperuma et al. 2024). In addition, efforts should be made to ensure that information on the importance of postpartum exercises is delivered in a way that is easily understood and accepted by mothers from different social and economic backgrounds (Brites-Lagos et al. 2023). At the international level, these results are relevant in supporting the development of maternal health policies that emphasise the importance of educational interventions in improving maternal readiness and participation in health programmes (Metwally et al. 2020). Countries with developing health systems should view these results as evidence of the importance of educative support in improving maternal engagement in postpartum health care. In developing countries, similar approaches can be applied to address the challenges of achieving higher maternal participation in maternal health programmes. In addition, the findings also have implications for the development of training programmes for health workers. Health workers need to be trained to provide effective education and support mothers in understanding the benefits and importance of postpartum exercises. Thus, increasing mothers' readiness to perform puerperal exercises can be achieved more widely and equitably (Lama et al. 2020). Overall, the implications of these findings suggest that a structured education-based approach can significantly improve maternal readiness for postpartum health care, ultimately contributing to a reduced risk of complications and improved quality of life for postpartum women nationally and internationally.

Postpartum exercises play an important role in supporting a mother's physical recovery after childbirth. Postpartum exercises help in uterine involution, improve blood circulation, accelerate energy recovery, and prevent complications such as deep vein thrombosis (Subani, Kleden, and Thein 2022). The high implementation rate of puerperal exercises in the intervention group suggests that the education and modules provided were effective in motivating mothers to be active in their recovery process (Gong et al. 2024; Mesk et al. 2022). In a broader context, these findings suggest that education-based interventions can have a significant impact in improving maternal adherence and participation in postpartum health programmes. This is particularly important in areas with lower education levels or where access to health services is limited. Such interventions can be applied more widely to improve the quality of postpartum maternal health (Adams et al. 2023; Brites-Lagos et al. 2023). The findings support the integration of a postpartum exercise module into maternal health programmes across national health facilities. This module could become part of the standard postpartum care offered to all mothers after delivery. In addition, training programmes for health workers need to be strengthened so that they can effectively deliver information and motivate mothers to perform puerperal exercises. In areas with limited access to health services, distribution of postpartum exercise modules through community extension programmes could be an effective solution(Mahayati et al. 2023). At the international level, these results provide an example of an intervention model that can be adapted and applied in different countries to increase maternal participation in postpartum health care. Countries with high maternal mortality rates or postpartum health problems could use these findings as a basis for developing similar education-based intervention programmes. In addition, these findings could support global efforts to raise awareness of the importance of comprehensive postpartum care, including postnatal exercises, as part of a maternal health strategy (Sopiah et al. 2023). As such, these findings have the potential to influence maternal health policies at national and international levels, making an important contribution to global efforts to improve maternal health and well-being after childbirth. The successful implementation of education-based interventions in Indonesia can serve as a model for other countries in addressing similar challenges in postpartum maternal health(Brites-Lagos et al. 2024; Sari et al. 2020).

This finding has significant relevance in a broader context, especially in efforts to increase the participation of postpartum women in postpartum exercise programmes that can have a direct impact on postpartum recovery (Makama et al. 2021). Readiness to implement postpartum exercises is a key factor that can influence

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the success of this programme in improving maternal health. The findings suggest that a module-based educational intervention can significantly improve mothers' readiness to participate in the postpartum exercise programme, which in turn can contribute to faster recovery and reduced postpartum complications(Mesk et al. 2022). At the national level, these results may encourage the integration of the postpartum exercise module into postpartum care programmes across Indonesia. The Ministry of Health may consider making this module part of the national guidelines for postpartum care, especially in areas with low participation rates. In addition, training for midwives and other health workers should be strengthened to ensure that they can effectively implement this module and encourage the readiness of postpartum women to participate in postpartum exercises. At an international level, these findings can serve as a model for other countries, especially in regions with similar challenges in improving maternal engagement in postpartum health practices. The postpartum exercise module successfully implemented in Indonesia could be adapted and used in other countries with different local cultures and needs. In addition, these results may encourage further research to explore other educational interventions that can improve mothers' readiness to participate in health programmes that are important for the well-being of mothers and babies (Sari et al. 2020; Sopiah et al. 2023). Overall, these findings suggest that investing in postpartum women's education and empowerment through the postpartum exercise module not only improves mothers' readiness to participate in postpartum exercise but can also contribute to overall improvements in maternal health. These implications are critical to broader maternal health efforts, both nationally and internationally, and may help reduce the burden of postpartum complications and improve maternal quality of life.

These findings demonstrate the importance of education-based interventions in increasing the participation of postpartum women in postpartum exercise programmes, which are essential for postpartum recovery. Postpartum exercises play an important role in accelerating the process of uterine involution, reducing the risk of postpartum complications such as haemorrhage, and aiding overall physical recovery(Nelli 2024; Rusdiana and Desmarnita 2024). Beyond the context of this study, these results are relevant for maternal health programmes in different regions, especially in areas with low participation rates in postpartum exercise programmes. Well-designed and accessible educational modules can be an effective tool to increase maternal awareness and participation in postpartum health programmes. This could contribute to a reduction in postpartum complications and improved maternal quality of life (Sopiah et al. 2023). At the national level, these findings may encourage the adoption of postpartum exercise modules as part of the standard of postpartum care in health facilities across Indonesia. Training programmes for health workers also need to be improved so that they can effectively implement the module. In addition, for areas with limited access to health services, the postpartum exercise module could be disseminated through community-based health programmes, such as posyandu or the Health Cadre programme, to reach postpartum women in remote areas. At an international level, these results offer strong evidence that targeted educational interventions can significantly increase maternal engagement in postpartum health practices. Countries with similar maternal health problems, especially in resource-limited settings, can use these findings as a basis for developing and implementing similar health education programmes. In addition, these findings may encourage international collaboration in the development of educational modules that can be adapted to different cultures and local needs, strengthening global efforts to improve maternal and infant health (Sari et al. 2020). Overall, these results suggest that investing in postpartum women's education and empowerment through postpartum exercise modules not only improves maternal health at the individual level, but can also have a long-term impact in reducing maternal mortality and improving overall community health.

Accelerating uterine involution through postpartum exercises is an important aspect of postpartum recovery. Faster involution reduces the risk of postpartum haemorrhage and other complications, which directly impacts the well-being of the mother after delivery (Anggraeni, Herawati, and Widyawati 2019; van den Broek 2020). These findings have broad relevance in the context of global maternal health. By showing that simple interventions such as puerperal exercises can accelerate uterine involution, the results of this study emphasise the importance of postpartum rehabilitation programmes that focus not only on physical recovery but also on preventing further complications. Wider implementation of puerperal exercises can contribute to reducing maternal morbidity and mortality rates, which remains a major challenge in many developing countries (Murray and Hendley 2020). In Indonesia, where postpartum complication rates are still relatively high, these results may encourage the adoption of puerperal exercises as part of the standard of care for mothers after childbirth.

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Training and education programmes for midwives and health workers should be strengthened to ensure that postpartum women receive proper guidance on postpartum exercises. In addition, postpartum exercise modules could be integrated into primary health care, reaching more mothers, especially in rural and remote areas (Sendas and Freitas 2024; Taylor et al. 2024). At the international level, especially in countries with limited health resources, these findings could form the basis for the development of low-cost yet effective postpartum intervention programmes. Global health organisations, such as WHO, may consider promoting puerperal exercises as standard practice in postpartum care. Adopting this practice globally could help reduce the rate of postpartum complications and improve overall maternal quality of life. Organization (2022) Overall, these findings highlight the great potential of simple interventions such as postpartum exercises in accelerating postpartum recovery. Wider implementation of this practice, both nationally and internationally, could have a significant impact in improving maternal health and well being after childbirthBottom of Form.

5. Conclusion

The study concludes that a postpartum exercise module can significantly aid uterine involution and maternal recovery, particularly in remote areas with limited healthcare access. This module can be adapted for diverse communities, enhancing recovery support for mothers with limited medical resources. Integrating the module into midwifery training can improve health workers' skills in postpartum care. By implementing the module across community health centers, clinics, and hospitals, maternal health and quality of life can improve, with reduced postpartum complications. Customizations for specific health needs and cultural preferences could make it even more effective and widely applicable, especially in underserved regions

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Ethics approvals and consent to participate

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Conflict of interest

The authors declare that they have no competing interests.

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