



Effectiveness of a Structured Postnatal Exercise Module in Enhancing Maternal Independence During the Postpartum Recovery Period

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ABSTRACT

Objective - This study aimed to evaluate the effectiveness of a structured postnatal exercise module in enhancing maternal independence during the postpartum recovery period.**Methods** - A quasi-experimental study with a posttest-only control group design was conducted among 30 postpartum women in Indonesia. The intervention group received a structured postnatal exercise module, while the control group received standard postpartum care. Maternal independence was assessed using a questionnaire and observation checklist. Data were analyzed using Chi-square tests and logistic regression analysis.**Findings** - Maternal independence was significantly higher in the intervention group than in the control group. The module increased the likelihood of maternal independence and demonstrated a strong effect on postpartum self-care capacity. The findings suggest that structured educational support improves mothers' confidence and ability to perform essential postpartum care independently.**Research limitations/implications** - The relatively small sample size, purposive sampling technique, and single-site quasi-experimental design may limit the generalizability of the findings. Future studies should employ larger multicenter samples, randomized controlled designs, and longer follow-up periods to assess the sustainability of maternal independence and the broader effectiveness of the intervention.**Practical implications** - The findings support integrating structured postnatal exercise modules into routine postpartum care programs to strengthen maternal self-care capacity and independence, particularly in resource-limited and geographically dispersed settings.**Originality/value** - This study provides evidence on the effectiveness of a structured postnatal exercise module in improving maternal independence in Tanjungpinang, Indonesia. Unlike previous studies emphasizing predominantly clinical outcomes, this research positions maternal autonomy and functional independence as important indicators of postpartum recovery.

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1. Introduction

The postpartum period represents a critical transition in the maternal health continuum, involving concurrent physiological recovery, psychological adjustment, changes in family and social roles, infant feeding, newborn care, and substantial disruption of usual sleep and activity patterns. Contemporary maternal-health frameworks increasingly recognize that recovery and support needs may extend beyond the conventional six-week postnatal period and that postnatal health should be conceptualized in terms of physical, emotional, and social well-being rather than the absence of morbidity alone (Souza et al., 2024; Wojcieszek et al., 2023). Zhao et al. (2023) demonstrated across 23 countries that the quality of maternal and neonatal postnatal care remains highly heterogeneous and is strongly associated with the continuity and quality of care received across the maternal-health continuum. These concerns are particularly important in Indonesia. A systematic review by Syairaji et al. (2024) documented persistent maternal mortality and pronounced regional disparities despite substantial long-term reductions, indicating that preventable maternal morbidity and mortality remain important health-system challenges. Nationally representative evidence further indicates that although contact with skilled health professionals during the immediate postnatal period is relatively common, postnatal care following discharge remains substantially less consistent and is associated with dimensions of women's knowledge and empowerment (Sebayang et al., 2022). Consequently, postnatal interventions should extend beyond clinical surveillance and strengthen women's capacity to participate actively and safely in their own recovery and newborn care.

A growing body of evidence identifies physical activity and appropriately prescribed exercise as potentially important components of comprehensive postpartum recovery. Postpartum women may experience substantial fatigue and reduced participation in physical activity, with perceived fatigue negatively associated with moderate and vigorous activity (Baattaiah et al., 2022). At the broader evidence level, DiPietro et al. (2019) concluded that physical activity during pregnancy and the postpartum period provides important maternal-health benefits, while a meta-analysis by Liu et al. (2020) found that exercise can reduce pregnancy- and postpartum-related fatigue, particularly when postpartum programmes are sufficiently sustained and supervised. More recent syntheses provide additional evidence across multiple health domains. Postpartum physical activity has been associated with improvements in depressive and anxiety symptoms (Deprato et al., 2025), maternal

anthropometric outcomes (Gervais et al., 2025), and cardiometabolic health without evidence of detrimental effects on breast-milk quality or quantity, infant growth, or maternal injury (Jones et al., 2025). Earlier systematic reviews similarly reported potential benefits of exercise-based interventions for postpartum depressive symptoms (Carter et al., 2019), while physical activity during pregnancy has been associated with a lower subsequent burden of postpartum depressive symptoms (Nakamura et al., 2019). Nevertheless, the effectiveness of postnatal exercise programmes depends partly on intervention design and implementation. Mullins et al. (2021) identified considerable heterogeneity in postnatal exercise interventions, including inconsistent adherence reporting and substantial variation in programme intensity, supervision, and duration. Exercise specifically targeting the pelvic floor and abdominal musculature also appears clinically relevant; recent meta-analytic evidence indicates that postpartum pelvic-floor muscle training can reduce the odds of urinary incontinence and pelvic-organ prolapse, while abdominal exercise may improve inter-rectus distance (Beamish et al., 2025).

Despite these benefits, physical recovery alone does not adequately represent successful postnatal adaptation. Maternal confidence, self-efficacy, knowledge, and practical competence influence women's ability to implement recommended behaviours and manage everyday postnatal responsibilities. Evidence from breastfeeding interventions provides a useful parallel. Galipeau et al. (2018) found that interventions designed to improve breastfeeding self-efficacy produced measurable improvements during the early postpartum period, indicating that structured support can influence women's confidence in performing health-related maternal behaviours. Similarly, an integrated breastfeeding education programme significantly improved breastfeeding self-efficacy and exclusive breastfeeding outcomes (Tseng et al., 2020), while mobile-based postpartum education produced sustained improvements in breastfeeding self-efficacy (Vasegh Rahimpour et al., 2024). Indonesian evidence also demonstrates that maternal breastfeeding self-efficacy is associated with perceived milk sufficiency and favourable breastfeeding practices (Sandhi et al., 2020). Such functional and psychological dimensions are important because adverse postpartum psychological outcomes may affect maternal functioning, mother–infant interaction, breastfeeding, and multiple domains of infant development (Slomian et al., 2019). However, the existing evidence base remains largely outcome-specific: exercise studies predominantly focus on physical fitness, fatigue, anthropometric, pelvic-floor, cardiometabolic, or psychological outcomes, whereas educational interventions commonly focus on breastfeeding knowledge and self-efficacy (Mullins et al., 2021; Beamish et al., 2025; Galipeau et al., 2018; Tseng et al., 2020). Comparatively limited attention has been directed toward integrating structured postnatal exercise guidance with an explicit objective of strengthening maternal independence in postnatal self-care and routine newborn-care activities. This fragmentation represents an important research gap, particularly in Indonesian community settings where continuity of postnatal support after discharge remains suboptimal (Sebayang et al., 2022).

Accordingly, this study aims to develop and evaluate a structured postnatal exercise module designed to support postpartum recovery while strengthening maternal independence during the early postnatal transition in Tanjungpinang, Kepulauan Riau, Indonesia. Rather than conceptualizing postnatal exercise solely as a physical-fitness intervention, the proposed approach integrates structured exercise guidance with practical education intended to increase women's confidence and capacity to conduct appropriate postnatal activities. This approach is consistent with evidence indicating that structured postpartum physical activity can improve multidimensional maternal outcomes (Jones et al., 2025; Deprato et al., 2025; Beamish et al., 2025) and that systematically delivered maternal education can strengthen self-efficacy and health-related behaviours (Tseng et al., 2020; Vasegh Rahimpour et al., 2024). The study therefore contributes by connecting two previously fragmented intervention domains—postnatal exercise and maternal capability development—and by generating context-specific evidence relevant to maternal-health practice and postnatal programme development in Indonesia.

The remainder of this article is organized as follows. The subsequent section reviews the theoretical and empirical literature underpinning postnatal exercise, maternal recovery, and maternal independence. The methodology section describes the research design, participants, intervention procedures, measurement strategy, and analytical approach. The results section presents the empirical findings, followed by a discussion interpreting the findings in relation to previous evidence and their implications for postnatal care. The final section summarizes the principal conclusions, practical implications, study limitations, and directions for future research.

2. Critical Review

2.1 Theoretical and Conceptual Framework

Postpartum recovery is best understood as a multidimensional process rather than as the simple resolution of physiological changes following childbirth. Contemporary postnatal-care frameworks emphasize the continuity of maternal and newborn care and recognize that a positive postnatal experience requires attention to physical recovery, psychological well-being, functional capability, information needs, social support, and women's participation in decisions concerning their own health and newborn care (Wojcieszek et al., 2023; Zhao et al., 2023). This perspective is particularly relevant in Indonesia, where persistent maternal mortality and substantial temporal and geographical disparities indicate continuing weaknesses in the quality and continuity of maternal care (Syairaji et al., 2024). National evidence further demonstrates that postnatal-care utilization is associated with dimensions of women's empowerment, including knowledge and decision-making capacity (Sebayang et al., 2022). Collectively, these findings support a conceptualization of postpartum recovery that extends beyond clinical surveillance toward the development of women's capability to manage routine postnatal demands.

Within this broader framework, maternal self-efficacy provides an important psychological mechanism through which knowledge, support, and experience may be translated into maternal behavior. Leahy-Warren et al. (2012) demonstrated that maternal parental self-efficacy among first-time mothers is closely related to social support and postnatal psychological health. This relationship is clinically important because postpartum psychological difficulties can affect maternal functioning, mother–infant interaction, breastfeeding, and infant-related outcomes (Slomian et al., 2019). Self-efficacy should therefore not be considered merely an attitudinal outcome; it represents a potentially important component of women's perceived capacity to undertake maternal and self-care responsibilities.

For the purposes of the present study, *maternal independence* is conceptualized as a multidimensional capability encompassing women's confidence and functional capacity to undertake appropriate postpartum self-care, mobility, personal hygiene, routine infant care, and everyday recovery-related activities with progressively reduced dependence on external assistance. This conceptualization draws on evidence linking maternal self-confidence with functional status (Bagherinia et al., 2017), maternal self-efficacy with postnatal psychological and parenting outcomes (Leahy-Warren et al., 2012), and women's empowerment with utilization of postnatal healthcare (Sebayang et al., 2022). Importantly, the existing literature does not establish maternal independence as a single standardized theoretical construct. Rather, relevant dimensions are distributed across studies of functional status, self-efficacy, breastfeeding, newborn-care competence, psychological health, and service utilization. The conceptual framework adopted here therefore integrates these related domains without assuming that they are interchangeable.

2.2 Empirical Evidence on Maternal Self-Efficacy and Postnatal Education

Educational intervention constitutes one of the most direct mechanisms for strengthening women's knowledge and perceived competence during the postpartum transition. Evidence from randomized intervention research indicates that education can influence both psychological and functional outcomes. [Bagherinia et al. \(2017\)](#), for example, reported that an educational package for primiparous women improved maternal functional status and self-confidence during the postpartum period. This finding is important because it suggests that structured education can affect not only knowledge acquisition but also women's perceived and practical capacity to manage postpartum responsibilities.

Comparable effects have been observed in specific domains of maternal care. In a randomized controlled study, [Tseng et al. \(2020\)](#) found that an integrated breastfeeding education programme improved breastfeeding self-efficacy and exclusive breastfeeding outcomes. At a broader evidence level, [Guo et al. \(2025\)](#) synthesized studies of newborn-care education and reported improvements across maternal self-confidence, care knowledge, and breastfeeding-related behavior. These findings provide convergent evidence that structured educational interventions can enhance maternal capability when educational content is connected to clearly defined postpartum tasks.

Nevertheless, the empirical literature remains conceptually fragmented. Breastfeeding education primarily evaluates feeding-specific efficacy and behavior ([Tseng et al., 2020](#)), newborn-care programmes concentrate on infant-care knowledge and confidence ([Guo et al., 2025](#)), and broader educational packages have often been evaluated in specific populations such as primiparous women ([Bagherinia et al., 2017](#)). Consequently, improvement in a particular competence should not automatically be interpreted as evidence of comprehensive maternal independence. The available evidence supports the modifiability of maternal confidence and functional capability, but provides considerably less evidence on whether a structured intervention can simultaneously improve self-care, physical functioning, infant-care competence, and confidence in routine postpartum activities. This distinction is central to the development of an integrated postnatal intervention.

2.3 Postnatal Physical Activity and Multidimensional Maternal Recovery

Physical activity and exercise constitute a second major component of postpartum recovery. An umbrella review by [DiPietro et al. \(2019\)](#) identified substantial evidence supporting the health benefits of physical activity during pregnancy and the postpartum period. More specific syntheses indicate that exercise can reduce pregnancy- and postpartum-related fatigue ([Liu et al., 2020](#)), while postpartum physical activity is associated with improvements in maternal anthropometric outcomes ([Gervais et al., 2025](#)). These findings are relevant to maternal independence because fatigue, physical deconditioning, and impaired functional capacity may constrain women's ability to undertake routine self-care and infant-care activities.

The potential benefits of postpartum activity extend beyond physical conditioning. [Jones et al. \(2025\)](#) found evidence concerning cardiometabolic health, breastfeeding, maternal injury, and infant growth and development, supporting the broader safety and health relevance of postpartum physical activity. Psychological outcomes have also received considerable attention. Meta-analytic evidence suggests that exercise-based interventions can contribute to the prevention or reduction of postpartum depressive symptoms ([Carter et al., 2019](#)). Similarly, [Nakamura et al. \(2019\)](#) identified an association between physical activity and postpartum depression, while a more recent systematic review and meta-analysis examined the effects of postpartum physical activity on maternal depression and anxiety ([Deprato et al., 2025](#)). Taken together, these findings suggest that appropriately designed physical activity may support recovery through interconnected physiological and psychological pathways.

The evidence, however, does not justify treating "postnatal exercise" as a homogeneous intervention. [Mullins et al. \(2021\)](#) identified substantial variability across postnatal exercise studies in intervention characteristics, adherence, and measured effects. Differences in frequency, intensity, duration, modality, supervision, participant characteristics, and outcome definitions complicate direct comparison among programmes. Similarly, contemporary evidence on postpartum mental-health outcomes indicates that the magnitude and consistency of effects depend on characteristics of the physical-activity exposure and the underlying evidence base ([Deprato et al., 2025](#)). Thus, the critical question is not simply whether postpartum exercise is beneficial, but which activities, doses, delivery strategies, and support mechanisms are sufficiently acceptable and feasible to produce meaningful improvements in women's everyday functioning.

This distinction has practical implications for intervention design. A postnatal exercise programme intended to increase maternal independence should not be evaluated solely through anthropometric or cardiometabolic outcomes. Although such outcomes are clinically relevant ([Gervais et al., 2025](#); [Jones et al., 2025](#)), the intervention should also consider fatigue, confidence, behavioral adherence, and the functional ability to undertake everyday maternal activities ([Liu et al., 2020](#); [Mullins et al., 2021](#)). An integrated evaluation would therefore provide a more comprehensive account of whether physical recovery translates into meaningful functional capability during the postpartum period.

2.4 Barriers and Facilitators to Postnatal Physical Activity

The translation of physical-activity recommendations into actual postpartum behavior is strongly shaped by women's social, physical, and environmental circumstances. [Makama et al. \(2021\)](#) identified multiple barriers and facilitators to healthy lifestyle behaviors among postpartum women, demonstrating that participation is influenced by interacting individual, interpersonal, and contextual factors. Qualitative systematic evidence similarly identifies time constraints, childcare responsibilities, fatigue, physical limitations, competing maternal priorities, social support, access to information, and environmental conditions as important determinants of healthy eating and physical activity after childbirth ([Ryan et al., 2022](#)).

Evidence from qualitative synthesis further illustrates that perceived barriers and enablers are embedded within women's broader perinatal experience rather than being reducible to a lack of motivation ([McKeough et al., 2022](#)). This has an important implication: merely informing women that exercise is beneficial is unlikely to be sufficient. Recommendations need to be translated into activities that women perceive as safe, manageable, compatible with caregiving responsibilities, and feasible within their daily routines. This interpretation is consistent with the substantial adherence variation documented across postnatal exercise interventions ([Mullins et al., 2021](#)).

Behavior-change evidence provides additional support for this position. [Lim et al. \(2020\)](#) demonstrated that postpartum physical-activity and healthy-eating interventions vary in effectiveness according to the behavioral strategies incorporated into intervention design. Consequently, intervention content, delivery mechanisms, goal setting, practical instruction, monitoring, and strategies for incorporating activities into everyday life may be as important as the exercise prescription itself. A structured postnatal exercise module can therefore be conceptualized as both a physical-activity intervention and an educational-behavioral support mechanism.

Contextual adaptation is particularly important in Indonesia. [Sebayang et al. \(2022\)](#) showed that postnatal-care utilization is related to dimensions of women's empowerment, indicating that knowledge and decision-making capacity interact with healthcare engagement. At the same time, the continuing burden and geographical heterogeneity of maternal mortality demonstrate that Indonesian maternal-health conditions

cannot be assumed to be equivalent across communities (Syairaji et al., 2024). A locally implemented programme should therefore combine standardized core content with sufficient contextual sensitivity to accommodate maternal capability, available support, service accessibility, and everyday caregiving demands.

2.5 Research Gaps and Opportunities

The reviewed evidence reveals several important gaps. First, postpartum outcomes remain highly compartmentalized across the literature. Physical-activity studies commonly emphasize depressive symptoms, fatigue, cardiometabolic outcomes, anthropometric measures, or other health indicators (Carter et al., 2019; Liu et al., 2020; Gervais et al., 2025; Jones et al., 2025), whereas educational studies frequently focus on breastfeeding, newborn-care knowledge, functional status, or maternal confidence (Bagherinia et al., 2017; Tseng et al., 2020; Guo et al., 2025). Although each domain is relevant, this outcome-specific approach provides limited evidence regarding whether improvements across these dimensions collectively translate into greater independence in women's routine postpartum activities.

Second, evidence supporting education and physical activity has largely developed through parallel rather than integrated intervention traditions. Educational interventions demonstrate that maternal confidence and practical competence can be modified (Bagherinia et al., 2017; Tseng et al., 2020; Guo et al., 2025), while systematic reviews demonstrate the physical and psychological potential of exercise (DiPietro et al., 2019; Carter et al., 2019; Deprato et al., 2025; Jones et al., 2025). However, the reviewed literature provides comparatively limited evidence on interventions intentionally integrating structured postnatal exercise, practical education, self-efficacy enhancement, and functional maternal capability within a single programme. Such integration represents an important opportunity because physical capacity without confidence may not generate sustained behavior, while knowledge without feasible behavioral strategies may not translate into practice.

Third, intervention implementation remains constrained by adherence and contextual barriers. The heterogeneity reported across postnatal exercise interventions (Mullins et al., 2021), together with evidence concerning physical, social, environmental, and caregiving barriers (Makama et al., 2021; Ryan et al., 2022; McKeough et al., 2022), indicates that efficacy cannot be separated from feasibility. This supports the use of clearly specified intervention components and behaviorally informed delivery strategies rather than generic recommendations to become more physically active (Lim et al., 2020).

Finally, transferability to Indonesian community settings requires explicit evaluation. International evidence establishes the importance of high-quality postnatal care (Zhao et al., 2023; Wojcieszek et al., 2023), but Indonesian evidence demonstrates distinctive challenges related to maternal mortality, service utilization, empowerment, and geographical variation (Sebayang et al., 2022; Syairaji et al., 2024). The principal research opportunity is therefore to develop and rigorously evaluate a contextually adapted postnatal exercise module in which maternal independence is treated as a primary multidimensional outcome. Such an approach permits physical recovery, maternal self-efficacy, functional capacity, and behavioral adherence to be examined as complementary dimensions rather than isolated endpoints. Conceptually, this moves postpartum intervention research beyond a predominantly outcome-specific biomedical orientation toward an integrated model linking physical activity, health education, maternal capability, and participation in postnatal self-management.

3. Method Innovation

3.1 Study Design

This study employed a quasi-experimental pretest–posttest control-group design to evaluate the effectiveness of a structured postnatal exercise module in improving maternal independence during the postpartum period. A quasi-experimental approach was selected because the intervention was evaluated under real-world service conditions without individual randomization, while the inclusion of a comparison group and repeated measurements strengthened the assessment of intervention-related change. Pretest–posttest designs with non-equivalent comparison groups are established quasi-experimental approaches for evaluating health interventions when randomized allocation is impractical or infeasible (Handley et al., 2018). The design and reporting principles were also aligned with recommendations for transparent reporting of nonrandomized evaluations (Des Jarlais et al., 2004).

The methodological innovation of this study lies in integrating structured health education with guided postnatal exercise within a single intervention. Rather than treating exercise solely as a physical-activity prescription, the module combines illustrated educational materials, progressive exercise stages, daily activity monitoring, and self-evaluation tools to facilitate the translation of knowledge into practical postpartum behavior. This approach is consistent with evidence showing that postnatal exercise interventions vary substantially in their delivery, supervision, and adherence, indicating the importance of structured implementation and monitoring (Mullins et al., 2021). The intervention was therefore designed to address maternal knowledge, practical skills, behavioral engagement, and autonomy simultaneously.

3.2 Setting and Participants

The study was conducted in Tanjungpinang, Kepulauan Riau, Indonesia. Tanjungpinang is located within an archipelagic setting in which geographical dispersion may affect the continuity and accessibility of maternal healthcare. National evidence from Indonesia indicates that although postnatal contact with skilled health professionals is relatively common, postnatal care following discharge remains less consistently utilized and is associated with dimensions of women's knowledge, empowerment, and decision-making capacity (Sebayang et al., 2022). These contextual conditions support the relevance of interventions that enable postpartum women to undertake appropriate self-care and newborn-care activities with greater independence.

The study population comprised postpartum mothers within the first week following childbirth. Participants were eligible when they had experienced a normal vaginal delivery, were clinically stable, were able to participate in postnatal exercise, and voluntarily agreed to participate in the study. Women with clinical conditions that contraindicated participation in postnatal exercise were not included.

A total of 30 postpartum mothers were recruited using purposive sampling. The participants were divided equally between the intervention group ($n = 15$) and the control group ($n = 15$). Both groups underwent baseline assessment before implementation of the intervention and post-intervention assessment using the same maternal-independence outcome framework.

3.3 Sample Size Determination

The required sample size was estimated using the formula for comparing two independent proportions. Sample-size planning for comparative studies should incorporate the expected difference between groups, the selected type I error rate, and the desired statistical power (Whitley and Ball, 2002). The calculation used a two-sided confidence level of 95% ($Z_{\alpha/2} = 1.96$), statistical power of 80% ($Z_{\beta} = 0.84$), an expected proportion of maternal independence of $p_1 = 0.85$ in the intervention group, and $p_2 = 0.40$ in the control group.

The sample size per group was calculated as follows:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 [p_1(1 - p_1) + p_2(1 - p_2)]}{(p_1 - p_2)^2}. \quad (1)$$

Substituting the predetermined parameters:

$$n = \frac{(1.96 + 0.84)^2 [0.85(1 - 0.85) + 0.40(1 - 0.40)]}{(0.85 - 0.40)^2} \approx 14.23. \quad (2)$$

Accordingly, the required sample was rounded up to 15 participants per group, resulting in a total study sample of 30 postpartum mothers. The proportions used in the calculation represented a priori planning assumptions for the anticipated between-group difference rather than observed study outcomes.

3.4 Intervention and Control Conditions

Participants in the intervention group received the structured postnatal exercise module in addition to routine postpartum care. The module consisted of illustrated educational content, step-by-step postnatal exercise instructions, progressive exercise stages, daily activity logs, and self-evaluation tools. The structured format was intended to facilitate safe and progressive implementation while enabling participants to monitor their own participation and gradually develop confidence in performing postpartum activities independently.

The intervention combined instructional and behavioral components rather than relying exclusively on verbal recommendations. This approach is supported by evidence indicating that the organization, supervision, monitoring, and adherence characteristics of postnatal physical-activity interventions are important considerations in intervention implementation (Mullins et al., 2021). Educational interventions during the postpartum period have also demonstrated the potential to improve maternal functional status and self-confidence (Bagherinia et al., 2017). Accordingly, the module was designed to integrate exercise guidance with practical education and self-monitoring to support maternal autonomy.

Participants in the control group received routine postpartum care provided within the existing maternal-health service and did not receive the structured postnatal exercise module during the study period. The use of a concurrent control condition enabled the intervention effect to be evaluated relative to routine postpartum management.

3.5 Outcome Measures

The primary outcome was maternal independence during the postpartum period. Maternal independence was operationalized as the mother's ability to perform essential postpartum self-care and newborn-care activities with minimal assistance. Assessment was conducted using a structured observational checklist covering four principal domains: personal hygiene, early mobilization, breastfeeding-related activities, and newborn-care practices.

The same observational framework was used during the pretest and posttest assessments to maintain consistency in outcome measurement. The functional orientation of the assessment is consistent with postpartum research demonstrating that maternal functional status and self-confidence represent relevant dimensions of recovery and adaptation following childbirth (Bagherinia et al., 2017). However, the present study specifically operationalized maternal independence through observable performance of routine postpartum activities rather than treating self-confidence alone as the primary outcome.

3.6 Data Analysis

Data analysis focused on determining the magnitude of the association between exposure to the structured postnatal exercise module and maternal independence. Participant characteristics and maternal-independence outcomes were initially summarized descriptively using frequencies and percentages for categorical variables.

The Odds Ratio (OR) was calculated to quantify the likelihood of maternal independence among participants in the intervention group relative to those receiving routine postpartum care. Odds ratios are appropriate measures of association for binary outcomes and provide an interpretable estimate of the relative odds of an outcome occurring between comparison groups (Bland and Altman, 2000). The OR was expressed with its 95% confidence interval to indicate the magnitude and precision of the estimated intervention effect.

The general form of the Odds Ratio for a 2×2 contingency table was:

$$OR = \frac{ad}{bc}, \quad (3)$$

where a represents independent mothers in the intervention group, b represents non-independent mothers in the intervention group, c represents independent mothers in the control group, and d represents non-independent mothers in the control group. An $OR > 1$ indicated higher odds of maternal independence in the intervention group, an $OR = 1$ indicated no difference in odds between groups, and an $OR < 1$ indicated lower odds of maternal independence in the intervention group (Bland and Altman, 2000). Reporting the effect estimate together with its confidence interval enabled interpretation of both the direction and practical magnitude of the intervention effect rather than relying exclusively on statistical significance.

3.7 Ethical Considerations

The study was conducted in accordance with internationally recognized ethical principles for research involving human participants (World Medical Association, 2013). Ethical approval was obtained from [insert full name of the Research Ethics Committee] under approval number [insert ethical approval number] before participant recruitment and data collection.

All eligible participants received information concerning the objectives, procedures, potential benefits, and potential risks of the study before enrollment. Written informed consent was obtained from each participant before participation. Participants were informed that participation was voluntary and that they could withdraw from the study at any time without affecting their entitlement to routine healthcare. Participant information was maintained confidentially, and study data were handled in a manner designed to protect personal identity and privacy.

4. Results



4.1 Characteristics of Respondents

A total of 30 postpartum mothers participated in the study. As shown in Table 1, the majority of respondents were aged 20–35 years ($n = 22$, 73.3%), followed by those aged > 35 years ($n = 5$, 16.7%) and those aged < 20 years ($n = 3$, 10.0%). Regarding educational attainment, 18 respondents (60.0%) had completed secondary school, eight (26.7%) had attained higher education, and four (13.3%) had completed primary school.

Most respondents were housewives ($n = 20$, 66.7%), while 10 respondents (33.3%) were employed. In terms of parity, 18 respondents (60.0%) were multiparous and 12 (40.0%) were primiparous. Regarding postpartum timing, 16 respondents (53.3%) were assessed on days 4–7 after delivery, whereas 14 respondents (46.7%) were assessed on days 1–3.

Table 1. Characteristics of Respondents ($N = 30$)

Characteristic	Category	Frequency (n)	Percentage (%)
Age	< 20 years	3	10.0
	20–35 years	22	73.3
	> 35 years	5	16.7
Education level	Primary school	4	13.3
	Secondary school	18	60.0
	Higher education	8	26.7
Occupation	Housewife	20	66.7
	Employed	10	33.3
Parity	Primipara	12	40.0
	Multipara	18	60.0
Postpartum day	Day 1–3	14	46.7
	Day 4–7	16	53.3

Note. Percentages were calculated using the total sample of 30 respondents.

4.2 Comparison of Maternal Independence Between Groups

The distribution of maternal independence differed between the intervention and control groups. As presented in Table 2, 13 of the 15 mothers in the intervention group (86.7%) were categorized as independent, whereas two mothers (13.3%) were categorized as not independent. In the control group, six of the 15 mothers (40.0%) were categorized as independent, while nine mothers (60.0%) were categorized as not independent.

The reported between-group comparison yielded a p -value of 0.001. The unadjusted odds ratio for maternal independence was $OR = 9.75$, with a 95% confidence interval of 1.68–56.4.

Table 2. Association Between the Postnatal Exercise Module and Maternal Independence

Group	Independent n (%)	Not Independent n (%)	Total	p -value	OR (95% CI)
Intervention	13 (86.7)	2 (13.3)	15	0.001	9.75 (1.68–56.4)
Control	6 (40.0)	9 (60.0)	15	–	Reference

Note. OR = odds ratio; CI = confidence interval. The control group was used as the reference category. The statistical values are reported as provided in the study data.

4.3 Odds Ratio Analysis

The unadjusted odds ratio analysis showed that the intervention group had an estimated $OR = 9.75$ for maternal independence compared with the control group, with a 95% confidence interval of 1.68–56.4. The control group served as the reference category. The confidence interval did not include 1.00, based on the reported study estimates.

4.4 Multivariable Logistic Regression Analysis

A multivariable logistic regression analysis was conducted to examine the association between the postnatal exercise module and maternal independence while accounting for age, education, and parity. The results are presented in Table 3.

The module intervention had a regression coefficient of $B = 2.28$ and an adjusted odds ratio of 9.75 (95% CI: 1.95–48.7; $p = 0.003$). Age had a regression coefficient of $B = 0.45$ and an adjusted odds ratio of 1.57 (95% CI: 0.77–3.21; $p = 0.210$). Education had a coefficient of $B = 0.62$ and an adjusted odds ratio of 1.86 (95% CI: 0.80–4.30; $p = 0.145$). Parity had a coefficient of $B = 0.38$ and an adjusted odds ratio of 1.46 (95% CI: 0.72–2.98; $p = 0.298$).

Among the variables included in the regression model, the module intervention had a reported p -value below 0.05, whereas the reported p -values for age, education, and parity were greater than 0.05.

4.5 Summary of Statistical Findings

Overall, maternal independence was observed in 86.7% of participants in the intervention group and 40.0% of participants in the control group. The unadjusted analysis yielded an odds ratio of $OR = 9.75$ (95% CI: 1.68–56.4; $p = 0.001$). In the multivariable logistic regression model, the module intervention was associated with an adjusted odds ratio of 9.75 (95% CI: 1.95–48.7; $p = 0.003$). The corresponding reported p -values for age, education, and parity were 0.210, 0.145, and 0.298, respectively.

4.6 Discussion

The present study demonstrates that a structured postnatal exercise module integrating guided physical activity, visual education, self-monitoring, and self-directed learning was associated with substantially greater maternal independence than routine postpartum care. Maternal



Table 3. Multivariable Logistic Regression Analysis of Maternal Independence

Variable	<i>B</i>	<i>p</i> -value	Adjusted OR	95% CI
Module intervention	2.28	0.003	9.75	1.95–48.7
Age	0.45	0.210	1.57	0.77–3.21
Education	0.62	0.145	1.86	0.80–4.30
Parity	0.38	0.298	1.46	0.72–2.98

Note. *B* = logistic regression coefficient; OR = odds ratio; CI = confidence interval. Adjusted odds ratios were obtained from the multivariable logistic regression model.

independence was observed in 86.7% of women in the intervention group compared with 40.0% in the control group. The unadjusted analysis produced an odds ratio of 9.75 (95% CI: 1.68–56.4; $p = 0.001$), while the multivariable model reported an adjusted $OR = 9.75$ (95% CI: 1.95–48.7; $p = 0.003$). These findings indicate that the intervention was associated with greater independence across practical postpartum activities and directly address the research gap identified in the preceding review: previous studies have generally examined physical recovery, exercise, breastfeeding competence, or maternal self-efficacy separately, whereas the present study positions maternal independence as an integrated functional outcome of postpartum care.

The observed improvement is consistent with evidence that structured educational support can strengthen maternal functional capacity and confidence. Bagherinia et al. (2017) demonstrated that an educational package improved postpartum functional status and maternal self-confidence among primiparous women. Similarly, it Tseng et al. (2020) showed that structured breastfeeding education enhanced maternal self-efficacy and breastfeeding outcomes. Although those interventions focused on more specific domains, their findings support the mechanism underlying the current intervention: appropriately structured information may increase women's confidence and capacity to translate knowledge into behavior. This interpretation is also compatible with the findings of Leahy-Warren et al. (2012), who identified maternal parental self-efficacy as an important component of postpartum adaptation. The present results extend this evidence by suggesting that education combined with guided physical activity may influence a broader functional outcome encompassing personal hygiene, mobilization, breastfeeding-related activities, and newborn care.

The exercise component provides a complementary pathway through which maternal independence may have improved. Postnatal physical-activity interventions have demonstrated benefits for physical fitness and fatigue, although intervention characteristics and adherence vary substantially across studies (Mullins et al., 2021). More recent evidence also indicates that postpartum physical activity can contribute to maternal cardiometabolic health without adverse effects on breastfeeding, maternal injury, or infant growth (Jones et al., 2025). In the present study, exercise was not delivered as an isolated prescription; rather, progressive activities were accompanied by visual instructions, daily monitoring, and self-evaluation. This combination may be particularly relevant because Mullins et al. (2021) identified adherence and heterogeneity of intervention delivery as persistent challenges in the postnatal exercise literature. Structured guidance may therefore facilitate the conversion of recommended activity into routine behavior.

The findings are also relevant to the Indonesian postnatal-care context. Sebayang et al. (2022) reported that postnatal care utilization in Indonesia is associated with women's knowledge, empowerment, and decision-making characteristics, while postnatal care after discharge remains an area for improvement. The current intervention complements conventional service delivery by providing mothers with a practical resource they can use beyond direct contact with healthcare professionals. This is particularly pertinent in geographically dispersed settings such as Tanjungpinang, where continuity of face-to-face care may be constrained. The broader emphasis on active maternal participation is consistent with contemporary recommendations that postnatal care should support a positive experience encompassing information, confidence, well-being, and responsive maternal and newborn care rather than clinical surveillance alone (Wojcieszek et al., 2023).

From a theoretical perspective, the study supports conceptualizing maternal independence as an outcome arising from the interaction among physical capability, knowledge, self-efficacy, and behavioral implementation. Previous literature has frequently separated these dimensions; the present intervention integrates them within a single framework. Maternal independence therefore represents more than physical mobility or the absence of complications. It reflects the practical capacity to undertake postpartum self-care and newborn-care responsibilities with decreasing reliance on assistance. From a practical perspective, a structured module may provide midwives and other maternal-health professionals with a standardized mechanism for reinforcing postnatal education while encouraging progressive self-management. Such an intervention may be particularly useful where professional follow-up is intermittent, although its implementation should complement, rather than replace, appropriate clinical assessment and postnatal services.

Several limitations require cautious interpretation of these findings. First, the sample comprised only 30 participants, resulting in relatively wide confidence intervals around the estimated intervention effect. The magnitude of the odds ratio should therefore not be interpreted as a precise population estimate. Second, purposive sampling and the quasi-experimental design limit causal inference because unmeasured baseline differences between groups may have influenced the outcome. Third, although the multivariable model adjusted for age, education, and parity, the small sample relative to the number of modeled predictors may produce unstable regression estimates. Fourth, the study evaluated early postpartum outcomes, and it remains unknown whether improvements in independence persist over subsequent weeks or months. Finally, implementation in a single local setting limits direct generalization to populations with different healthcare, cultural, or geographical characteristics.

Future studies should evaluate the module using adequately powered multicenter randomized controlled trials, longer follow-up periods, and validated multidimensional measures of maternal independence. Research should also examine adherence, intervention fidelity, maternal self-efficacy, physical recovery, and neonatal outcomes as potential pathways or complementary outcomes. Overall, the findings provide preliminary evidence that integrating structured education with guided postnatal exercise can enhance maternal independence beyond routine postpartum care. By treating maternal independence as a multidimensional functional outcome, this study contributes an intervention model that links physical recovery, education, and maternal capability within a more participatory approach to postpartum care.

5. Conclusion

This study demonstrates that a structured postnatal exercise module integrating guided physical activity, visual education, self-monitoring, and self-directed learning can enhance maternal independence during the early postpartum period. The principal contribution of this study lies in positioning maternal independence as a multidimensional functional outcome encompassing self-care, mobilization, breastfeeding-related activities, and newborn care, rather than focusing solely on clinical recovery. Practically, the module provides healthcare professionals with

a structured and potentially scalable approach for strengthening maternal capability, particularly in settings where continuity of postpartum services may be limited. Its implementation may complement routine postnatal care by promoting greater maternal participation and confidence in everyday recovery activities. Future research should validate these findings through adequately powered multicenter randomized controlled trials with longer follow-up periods to determine the sustainability and broader applicability of the intervention.

Ethical Statement

This study was conducted in accordance with established ethical principles for research involving human participants and the principles of the Declaration of Helsinki. The study involved 30 postpartum mothers in Tanjungpinang, Kepulauan Riau, Indonesia, who participated voluntarily after receiving information regarding the objectives, procedures, potential benefits, and possible risks of the research.

Written informed consent was obtained from all participants prior to enrollment and data collection. Participants were informed that participation was voluntary and that they could withdraw from the study at any time without affecting their access to routine maternal healthcare services. All participant information was treated confidentially, and data were anonymized and used solely for research purposes.

The research was conducted under the institutional research and ethical requirements applicable to the Diploma III Midwifery Study Program, Poltekkes Kemenkes Tanjungpinang, Tanjungpinang, Kepulauan Riau, Indonesia.

Informed Consent Statement

Written informed consent was obtained from all participants prior to their inclusion in the study. Participants received information regarding the objectives, procedures, potential benefits, and possible risks of the research and were informed that participation was voluntary. They were also informed of their right to withdraw from the study at any time without affecting their access to routine maternal healthcare services. No personally identifiable participant information is reported in this article.

Author Contributions

Nurniati Tianastia Rullyni: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft, and Project Administration. Vina Jayanti: Methodology, Investigation, Validation, and Writing—Review & Editing. Sabtini Ika Putri: Investigation, Data Curation, Validation, and Writing – Review & Editing. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for the integrity of the work.

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Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available because they contain information collected from human participants and are subject to ethical and confidentiality considerations.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Declaration of Generative AI and AI-Assisted Technologies

During the preparation of this manuscript, ChatGPT (OpenAI) was used solely for academic language refinement and LaTeX formatting. The tool was not used to collect, analyze, interpret, or generate research data, statistical results, or participant information. All data analysis and research findings were produced and verified by the authors. The authors reviewed and edited the manuscript after using the tool and take full responsibility for the content of the published article.

References

- Baattaiah, B.A., Zedan, H.S., Almasaudi, A.S., Alashmali, S., Aldhahi, M.I., 2022. Physical activity patterns among women during the postpartum period: An insight into the potential impact of perceived fatigue. *BMC Pregnancy and Childbirth* 22, 678. doi:[10.1186/s12884-022-05015-0](https://doi.org/10.1186/s12884-022-05015-0).
- Bagherinia, M., Mirghafourvand, M., Shafaie, F.S., 2017. The effect of educational package on functional status and maternal self-confidence of primiparous women in postpartum period: A randomized controlled clinical trial. *The Journal of Maternal-Fetal & Neonatal Medicine* 30, 2469–2475. doi:[10.1080/14767058.2016.1253061](https://doi.org/10.1080/14767058.2016.1253061).
- Beamish, N.F., Davenport, M.H., Ali, M.U., Gervais, M.J., Sjwed, T.N., Bains, G., Sivak, A., Deering, R.E., Ruchat, S.M., 2025. Impact of postpartum exercise on pelvic floor disorders and diastasis recti abdominis: A systematic review and meta-analysis. *British Journal of Sports Medicine* 59, 562–575. doi:[10.1136/bjsports-2024-108619](https://doi.org/10.1136/bjsports-2024-108619).
- Bland, J.M., Altman, D.G., 2000. The odds ratio. *BMJ* 320, 1468. doi:[10.1136/bmj.320.7247.1468](https://doi.org/10.1136/bmj.320.7247.1468).
- Carter, T., Bastounis, A., Guo, B., Morrell, C.J., 2019. The effectiveness of exercise-based interventions for preventing or treating postpartum depression: A systematic review and meta-analysis. *Archives of Women's Mental Health* 22, 37–53. doi:[10.1007/s00737-018-0869-3](https://doi.org/10.1007/s00737-018-0869-3).
- Deprato, A., Ruchat, S.M., Ali, M.U., Cai, C., Forte, M., Gierc, M., Meyer, S., Sjwed, T.N., Shirazi, S., Matenchuk, B.A., Jones, P.A.T., Sivak, A., Davenport, M.H., 2025. Impact of postpartum physical activity on maternal depression and anxiety: A systematic review and meta-analysis.



- British Journal of Sports Medicine 59, 550–561. doi:[10.1136/bjsports-2024-108478](https://doi.org/10.1136/bjsports-2024-108478).
- Des Jarlais, D.C., Lyles, C., Crepaz, N., TREND Group, 2004. Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: The TREND statement. *American Journal of Public Health* 94, 361–366. doi:[10.2105/AJPH.94.3.361](https://doi.org/10.2105/AJPH.94.3.361).
- DiPietro, L., Evenson, K.R., Bloodgood, B., Sprow, K., Troiano, R.P., Piercy, K.L., Vaux-Bjerke, A., Powell, K.E., 2019. Benefits of physical activity during pregnancy and postpartum: An umbrella review. *Medicine & Science in Sports & Exercise* 51, 1292–1302. doi:[10.1249/MSS.0000000000001941](https://doi.org/10.1249/MSS.0000000000001941).
- Galipeau, R., Baillot, A., Trottier, A., Lemire, L., 2018. Effectiveness of interventions on breastfeeding self-efficacy and perceived insufficient milk supply: A systematic review and meta-analysis. *Maternal & Child Nutrition* 14, e12607. doi:[10.1111/mcn.12607](https://doi.org/10.1111/mcn.12607).
- Gervais, M.J., Ruchat, S.M., Ali, M.U., Sjwed, T., Matenchuk, B.A., Meyer, S., Mottola, M.F., Adamo, K.B., Sivak, A., Davenport, M.H., 2025. Impact of postpartum physical activity on maternal anthropometrics: A systematic review and meta-analysis. *British Journal of Sports Medicine* 59, 605–617. doi:[10.1136/bjsports-2024-108449](https://doi.org/10.1136/bjsports-2024-108449).
- Guo, K., Shang, X., Deng, X., 2025. The effects of a newborn care education program on mothers' self-confidence, care knowledge, and breastfeeding behavior: A systematic review and meta-analysis. *Public Health Nursing* 42, 395–410. doi:[10.1111/phn.13484](https://doi.org/10.1111/phn.13484).
- Handley, M.A., Lyles, C.R., McCulloch, C., Cattamanchi, A., 2018. Selecting and improving quasi-experimental designs in effectiveness and implementation research. *Annual Review of Public Health* 39, 5–25. doi:[10.1146/annurev-publhealth-040617-014128](https://doi.org/10.1146/annurev-publhealth-040617-014128).
- Jones, P.A.T., Mooly, A., Ruchat, S.M., Ali, M.U., Fleming, K., Meyer, S., Sjwed, T.N., Wowdzia, J.B., Maier, L., Mottola, M., Sivak, A., Davenport, M.H., 2025. Impact of postpartum physical activity on cardiometabolic health, breastfeeding, injury and infant growth and development: A systematic review and meta-analysis. *British Journal of Sports Medicine* 59, 539–549. doi:[10.1136/bjsports-2024-108483](https://doi.org/10.1136/bjsports-2024-108483).
- Leahy-Warren, P., McCarthy, G., Corcoran, P., 2012. First-time mothers: Social support, maternal parental self-efficacy and postnatal depression. *Journal of Clinical Nursing* 21, 388–397. doi:[10.1111/j.1365-2702.2011.03701.x](https://doi.org/10.1111/j.1365-2702.2011.03701.x).
- Lim, S., Hill, B., Pirota, S., Moran, L., Skouteris, H., 2020. What are the most effective behavioural strategies in changing postpartum women's physical activity and healthy eating behaviours? a systematic review and meta-analysis. *Journal of Clinical Medicine* 9, 237. doi:[10.3390/jcm9010237](https://doi.org/10.3390/jcm9010237).
- Liu, N., Wang, J., Chen, D.D., Sun, W.J., Li, P., Zhang, W., 2020. Effects of exercise on pregnancy and postpartum fatigue: A systematic review and meta-analysis. *European Journal of Obstetrics & Gynecology and Reproductive Biology* 253, 285–295. doi:[10.1016/j.ejogrb.2020.08.013](https://doi.org/10.1016/j.ejogrb.2020.08.013).
- Makama, M., Awoke, M.A., Skouteris, H., Moran, L.J., Lim, S., 2021. Barriers and facilitators to a healthy lifestyle in postpartum women: A systematic review of qualitative and quantitative studies in postpartum women and healthcare providers. *Obesity Reviews* 22, e13167. doi:[10.1111/obr.13167](https://doi.org/10.1111/obr.13167).
- McKeough, R., Blanchard, C., Piccinini-Vallis, H., 2022. Pregnant and postpartum women's perceptions of barriers to and enablers of physical activity during pregnancy: A qualitative systematic review. *Journal of Midwifery & Women's Health* 67, 448–462. doi:[10.1111/jmwh.13375](https://doi.org/10.1111/jmwh.13375).
- Mullins, E., Sharma, S., McGregor, A.H., 2021. Postnatal exercise interventions: A systematic review of adherence and effect. *BMJ Open* 11, e044567. doi:[10.1136/bmjopen-2020-044567](https://doi.org/10.1136/bmjopen-2020-044567).
- Nakamura, A., van der Waerden, J., Melchior, M., Bolze, C., El-Khoury, F., Pryor, L., 2019. Physical activity during pregnancy and postpartum depression: Systematic review and meta-analysis. *Journal of Affective Disorders* 246, 29–41. doi:[10.1016/j.jad.2018.12.009](https://doi.org/10.1016/j.jad.2018.12.009).
- Ryan, R.A., Lappen, H., Bihuniak, J.D., 2022. Barriers and facilitators to healthy eating and physical activity postpartum: A qualitative systematic review. *Journal of the Academy of Nutrition and Dietetics* 122, 602–613.e2. doi:[10.1016/j.jand.2021.11.015](https://doi.org/10.1016/j.jand.2021.11.015).
- Sandhi, A., Lee, G.T., Chipojola, R., Huda, M.H., Kuo, S.Y., 2020. The relationship between perceived milk supply and exclusive breastfeeding during the first six months postpartum: A cross-sectional study. *International Breastfeeding Journal* 15, 65. doi:[10.1186/s13006-020-00310-y](https://doi.org/10.1186/s13006-020-00310-y).
- Sebayang, S.K., Has, E.M.M., Hadisuyatmana, S., Efendi, F., Astutik, E., Kuswanto, H., 2022. Utilization of postnatal care service in indonesia and its association with women's empowerment: An analysis of 2017 indonesian demographic health survey data. *Maternal and Child Health Journal* 26, 545–555. doi:[10.1007/s10995-021-03324-y](https://doi.org/10.1007/s10995-021-03324-y).
- Slomian, J., Honvo, G., Emons, P., Reginster, J.Y., Bruyère, O., 2019. Consequences of maternal postpartum depression: A systematic review of maternal and infant outcomes. *Women's Health* 15, 1745506519844044. doi:[10.1177/1745506519844044](https://doi.org/10.1177/1745506519844044).
- Souza, J.P., Day, L.T., Rezende-Gomes, A.C., Zhang, J., Mori, R., Baguiya, A., Jayaratne, K., Osoti, A., Vogel, J.P., Campbell, O., Mugerwa, K.Y., Lumbiganon, P., Tunçalp, Ö., Cresswell, J., Say, L., Moran, A.C., Oladapo, O.T., 2024. A global analysis of the determinants of maternal health and transitions in maternal mortality. *The Lancet Global Health* 12, e306–e316. doi:[10.1016/S2214-109X\(23\)00468-0](https://doi.org/10.1016/S2214-109X(23)00468-0).
- Syairaji, M., Nurdianti, D.S., Wiratama, B.S., Prüst, Z.D., Bloemenkamp, K.W.M., Verschueren, K.J.C., 2024. Trends and causes of maternal mortality in indonesia: A systematic review. *BMC Pregnancy and Childbirth* 24, 515. doi:[10.1186/s12884-024-06687-6](https://doi.org/10.1186/s12884-024-06687-6).
- Tsang, J.F., Chen, S.R., Au, H.K., Chipojola, R., Lee, G.T., Lee, P.H., Shyu, M.L., Kuo, S.Y., 2020. Effectiveness of an integrated breastfeeding education program to improve self-efficacy and exclusive breastfeeding rate: A single-blind, randomised controlled study. *International Journal of Nursing Studies* 111, 103770. doi:[10.1016/j.ijnurstu.2020.103770](https://doi.org/10.1016/j.ijnurstu.2020.103770).
- Vasegh Rahimparvar, F., Nayeibian, S., Ebrahimi Kalan, M., Haghani, S., Shahbazi Sigaladeh, S., 2024. Mother's milk-mother's gift: Mobile-based training to increase self-efficacy of nursing women during postpartum and puerperium: A quasi-experimental study. *Journal of Pediatric Nursing* 75, e10–e15. doi:[10.1016/j.pedn.2023.12.008](https://doi.org/10.1016/j.pedn.2023.12.008).
- Whitley, E., Ball, J., 2002. Statistics review 4: Sample size calculations. *Critical Care* 6, 335–341. doi:[10.1186/cc1521](https://doi.org/10.1186/cc1521).
- Wojcieszek, A.M., Bonet, M., Portela, A., Althabe, F., Bahl, R., Chowdhary, N., Dua, T., Edmond, K., Gupta, S., Rogers, L.M., Souza, J.P., Oladapo, O.T., 2023. WHO recommendations on maternal and newborn care for a positive postnatal experience: Strengthening the maternal and newborn care continuum. *BMJ Global Health* 8, e010992. doi:[10.1136/bmjgh-2022-010992](https://doi.org/10.1136/bmjgh-2022-010992).
- World Medical Association, 2013. World medical association declaration of helsinki: Ethical principles for medical research involving human subjects. *JAMA* 310, 2191–2194. doi:[10.1001/jama.2013.281053](https://doi.org/10.1001/jama.2013.281053).
- Zhao, S., Zhang, Y., Xiao, A.Y., He, Q., Tang, K., 2023. Key factors associated with quality of postnatal care: A pooled analysis of 23 countries. *eClinicalMedicine* 62, 102090. doi:[10.1016/j.eclinm.2023.102090](https://doi.org/10.1016/j.eclinm.2023.102090).

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