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A Model for Fostering Self-Efficacy in Breastfeeding Mothers through Self-Directed Learning in Nursing Care

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ABSTRACT

Background: The prevailing low coverage of exclusive breastfeeding in Indonesia has a profound impact on the health outcomes of both mothers and infants in the short and long term. Notably, the primary issue in this context pertains to maternal self-efficacy. No concurrent research has addressed a self-efficacy model grounded in self-directed learning among breastfeeding mothers. This study aims to develop a model to enhance breastfeeding confidence in mothers through self-directed learning, with significant implications for maternal and infant health. **Methods:** The research utilized cross-sectional methods to examine 200 mothers who were breastfeeding infants between the ages of 0 and 6 months. Data analysis was carried out using structural equation modelling (SEM). **Results:** The research findings indicate a significant relationship between breastfeeding self-efficacy and the autonomic process, as evidenced by a *t*-value of 9.414 and a beta coefficient of 0.492 (moderate correlation). An increase in breastfeeding self-efficacy positively correlates with the success of exclusive breastfeeding. This autonomous process is influenced by breastfeeding education design and personal attributes, all of which contribute to the enhancement of breastfeeding self-efficacy and, ultimately, the success of exclusive breastfeeding. The autonomous process is identified as a significant influencer of breastfeeding self-efficacy. Breastfeeding support significantly influences Personal Attributes (PA) but does not have a notable impact on the Autonomous Process. **Conclusion:** In conclusion, breastfeeding self-efficacy emerges as the principal determinant in bolstering the successful practice of exclusive breastfeeding, facilitated by self-directed learning capabilities. The capacity for self-regulation significantly impacts breastfeeding self-efficacy.

Keywords: Autonomous Process; Breastfeeding; Self-Directed Learning; Self-Efficacy

INTRODUCTION

The practice of exclusive breastfeeding, as recommended by the World Health Organisation (WHO) and the United Nations Children's Fund (UNICEF), is very important for optimal baby growth and development. It provides balanced nutrition and protects against various diseases. WHO has set a global target of 70% exclusive breastfeeding by 2030; however, in 2020, the achievement of exclusive breastfeeding worldwide will still be 40% for babies aged 6 months (North *et al*., 2022).

Studies focusing on the prevalence of exclusive breastfeeding in Indonesia have revealed varying rates. While some studies reported an exclusive breastfeeding rate of 35.73% of babies in Indonesia received exclusive breastfeeding for up to 6 months in 2017 (Kapti, Arief & Azizah, 2023; Nisman *et al*., 2021). These

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highlight the importance of continuously monitoring and evaluating exclusive breastfeeding practices in the country.

A study found that many women exhibited low breastfeeding self-efficacy, which was correlated with various breastfeeding challenges. Mothers encountering both non-illness and illness-related obstacles were identified as having a higher likelihood of experiencing low self-efficacy (Titaley *et al.*, 2021). Additionally, lower educational attainment was associated with increased difficulties in breastfeeding confidence. Insufficient breast milk is the reason why mothers are not confident about breastfeeding, and research results indicate that between 30% and 80% of mothers experience the perception that breast milk is insufficient. This perception of inadequate breast milk is often influenced by anxiety related to the baby's crying, difficulty in latching correctly, and the decision to introduce formula milk without first consulting a lactation counsellor (Gatti, 2008; Huang *et al*., 2022).

Notably, only 5% of breastfeeding mothers encounter difficulties with insufficient breast milk attributable to pathological disorders (Huang *et al*., 2022; Neifert, 2001). To address the perception of inadequate breast milk supply, breastfeeding mothers must possess high self-efficacy (Huang *et al*., 2022; McGuire, 2018). The mother's inability to maintain exclusive breastfeeding shows the low ability of self-directed learning to breastfeed.

Self-directed learning (SDL) in the context of breastfeeding education necessitates further investigation. While numerous studies emphasise the enhancement of breastfeeding self-efficacy, the role of SDL remains inadequately defined. Existing Indonesian resources provide insufficient guidance, underscoring the need for mothers to utilise breastfeeding diaries to monitor and manage their practices effectively.

SDL encompasses five essential stages: designing educational experiences, delivering supportive resources, recognising individual attributes, comprehending prior knowledge, and engaging in an autonomous learning process. Mothers traverse these stages to augment their self-efficacy. Effective educational strategies must incorporate various resources and postpartum support, while personal characteristics such as motivation and prior knowledge significantly influence the learning experience. The autonomous process encourages planning and self-monitoring through the use of journaling techniques. Research has established a strong correlation between self-efficacy and the successful practice of exclusive breastfeeding. This study aims to develop a model that enhances maternal self-efficacy through SDL by examining these five key factors. The anticipated findings are expected to contribute meaningfully to this domain's existing body of knowledge.

The following research hypotheses are put forward: 1) H1. Breastfeeding education design is associated with personal attributes; 2) H2. Breastfeeding education design is associated with an autonomous process; 3) H3. Breastfeeding support is associated with personal attributes; 4) H4. Breastfeeding support is associated with an autonomous process; 5) H5. Personal attributes are associated with prior knowledge; 6) H6. Personal attributes are associated with the autonomous process, and 7) H7. The autonomous process is associated with breastfeeding self-efficacy.

METHODOLOGY

The research was conducted using a cross-sectional method, a design that provides a snapshot of the health outcomes of breastfeeding mothers at a specific time, over a period of three months, from January to March 2023, at three Public Health Centres located in Balung, Klatakan, and Sabrang, within the Jember area of East Java, Indonesia. The primary focus of the study was to examine and compare the health outcomes of mothers who were currently breastfeeding with those who were not, based on specific inclusion criteria. The criteria for inclusion involved having an infant aged between 0-6 months, a history of carrying the baby to full term, a birth weight of the baby being equal to or greater than 2500 grams, and residency within the research area for a minimum of one year. These criteria were carefully selected to ensure a homogeneous sample and control for potential confounding factors that could skew the results. It is important to note that mothers facing severe health issues during the research period were excluded from the study to maintain the integrity and accuracy of the findings.

The participants were selected through purposive sampling, with 200 participants included in the study. The sample size was calculated using the Slovin formula, incorporating a 5% margin of error. Considering a

population of 354 people six months before the study, an initial requirement of 188 participants was determined, with an additional 10% included to account for potential dropouts. Despite this planning, four participants were excluded based on specific criteria, and three withdrew during the study. Furthermore, it's crucial to highlight that all the participants were treated with the utmost respect and their rights were protected, as they willingly provided their informed consent before taking part in the study.

The study used a structured data collection methodology, employing comprehensive questionnaires that examined breastfeeding practices, self-regulated learning, self-efficacy, and self-regulation. The objective was to evaluate breastfeeding education, support structures, and individual characteristics. The survey was administered on two separate occasions to enhance reliability, with each session lasting approximately 10 to 15 minutes. Data collection was efficiently conducted using Google Forms, catering specifically to the needs of breastfeeding mothers. The validity and reliability of the instruments were established through Pearson correlation analysis, while data analysis was performed using Structural Equation Modelling (SEM).

Research indicators for reflective measurement model constructs encompass the following categories: X1. Breastfeeding Education Design (D), which includes X.1.1 Materials, X.1.2. Types of Learning Resources, X.1.3 Postpartum Discharge Education. X2. Breastfeeding Support (S), which consists of: X.2.1 Health Professional Feedback, X.2.2 Spousal Support, X.2.3 Support from Mothers-in-Law or Grandmothers. X3. Personal Attributes (PA) are categorized as: X3.1 Initiative, X3.2 Creativity, X3.3 Motivation. X4. Prior Knowledge (PK) involves: X4.1 Previous Breastfeeding Experiences, X4.2 Cultural Beliefs or Myths Surrounding Breastfeeding, X4.3 Perception of Insufficient Milk. X5. Autonomous Process (AP) includes: X5.1 Breastfeeding Planning, which comprises: X.5.1.1 Breastfeeding Intention, X.5.1.2 Breastfeeding Logbook. X5.2 Self-Monitoring Skills, which involve: X.5.2.1 Latch, X.5.2.2 Breastfeeding Frequency, X.5.2.3 Duration of Breastfeeding, X.5.2.4 Infant Breastfeeding Challenges, X.5.2.5 Type of Supplementation, X.5.2.6 Method of Supplementation, X.5.2.7 Urine Output, X.5.2.8 Faeces Output, X.5.2.9 Maternal Breastfeeding Issues, X.5.2.10 Infant Condition. Y1. Breastfeeding Self-Efficacy (BSE) encompasses: Y.1 Interpersonal Beliefs, Y.2 Maternal Confidence. According to the conceptual model depicted in Figure 1, this research analyses the relationship between breastfeeding education design, breastfeeding support, personal attributes, prior knowledge, and autonomous process (AP), and breastfeeding self-efficacy.

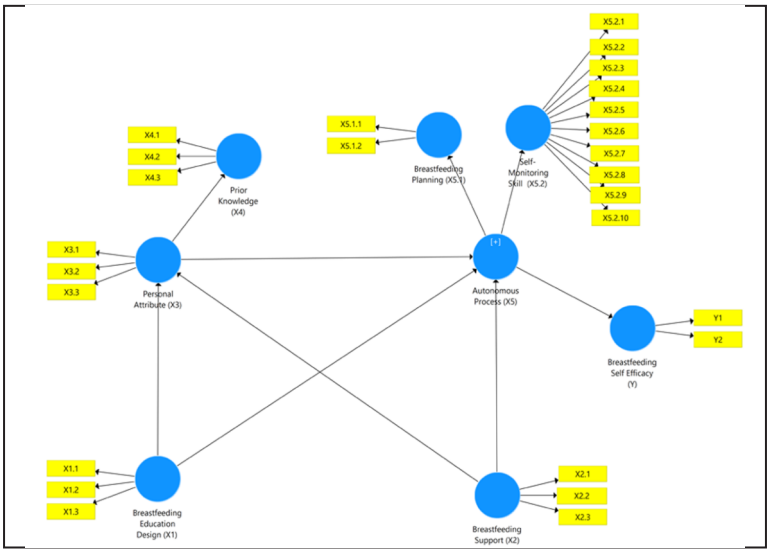

Figure 1: Conceptual framework Breastfeeding Education Design, Breasfeeding Support, Personal Attribute, Prior knowledge, Autonomous Process (Breastfeeding Planning, Self-Monitoring Skill), Breastfeeding Self Efficacy)

Ethical Consideration

The researchers obtained ethical clearance from the Health Research Ethics Commission, Faculty of Medicine, Universitas Brawijaya, Indonesia with reference number 637/UN 10.F08.11.31/PP/2023 on 30th January, 2023.

RESULTS

This study aims to establish a model for enhancing mothers' self-efficacy in breastfeeding through self-directed learning. The development of this model involved evaluating various factors influencing breastfeeding self-efficacy and the successful implementation of exclusive breastfeeding through self-directed learning. These factors included breastfeeding education design (D), breastfeeding support (S), personal attributes (PA), prior knowledge (PK), autonomous processes (AP), and breastfeeding self-efficacy (BSE). A maternal self-efficacy model was formulated and examined using structural equation modelling (SEM) and partial least squares (PLS) analysis.

Tests of the Measurement Models

Structural Equation Modelling (SEM) assesses the interconnections among observed variables, outer loadings within the measurement model, the structural model, path coefficients, and R2 values. In Figure 2, the outcomes of the measurement model tests following the application of the consistent Partial Least Squares (PLS) algorithm are presented. A repeated indicators approach has been utilised to estimate the scores of the latent variables for the higher-order constructs (HOCs).

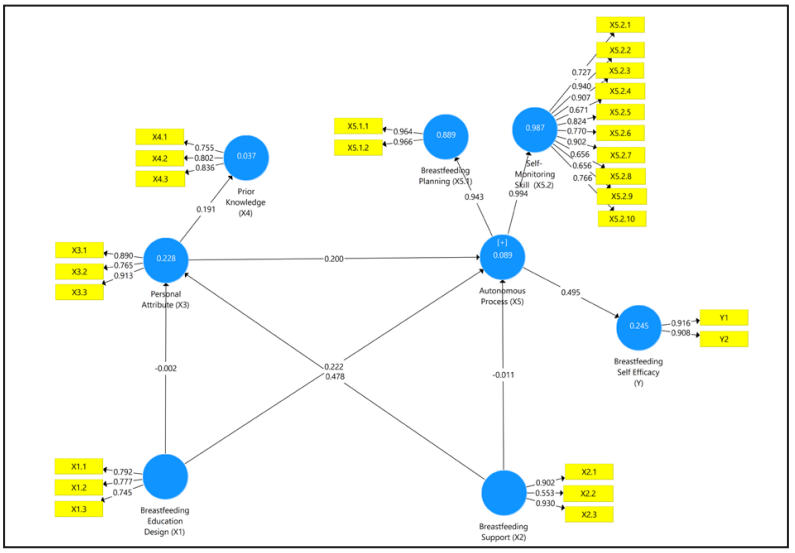

Figure 2: Initial Outer Model

Table 1 provides a detailed definition of all indicators for each variable in this study. This meticulous approach was undertaken by seasoned researchers in the field, ensuring high-quality data collection. Their expertise and meticulousness in developing these measurement tools further fortified the integrity of the data collection process. The research analysis utilised Structural Equation Modelling (SEM).

Table 1: Indicators for Reflective Measurement Model Constructs

Indicator	Definition
X1 Breastfeeding Education Design (D)	Breastfeeding education design includes structure, types of learning resources, and postpartum discharge education that supports breastfeeding mothers' self-directed learning.
X.1.1 Materials	The arrangement of breastfeeding educational materials is founded on maternal and child health literature.
X.1.2 Type of learning resources	Resources for information offered by health services should be sought for independent learning regarding breastfeeding education, including access to books about breastfeeding and breastfeeding education Technology through smartphone apps, online platforms, and social media.
X.1.3 Postpartum Discharge Education	Providing health services for breastfeeding before the patient's return home following childbirth.
X2 Breastfeeding Support (S)	Breastfeeding mothers receive psychological and material support from husbands, mother in-laws or grandmothers, friends and neighbours, and health professionals.

X.2.1 Health professional feedback	Feedback received from professionals during the 1-week postpartum period.
X.2.2 Husband support	Breastfeeding mothers receive support from their husbands.
X.2.3 Mother-in-law support or grandmother	Breastfeeding mothers receive support from their in-laws or grandmothers.
X3 Personal Attributes (PA)	Mothers' traits were observed in their approaches to breastfeeding, which included components such as initiative, creativity to learning, and motivation.
X3.1 Initiative	The characteristics of breastfeeding mothers who actively seek information regarding breastfeeding from various sources are noteworthy. These sources include maternal and child health literature, social media applications, websites, online videos, podcasts, and email communications
X3.2 Creativity	The capacity of breastfeeding mothers to identify and evaluate lactation service providers can be influenced by their specific needs. This process may involve various methods to facilitate independent learning about breastfeeding practices, including face-to-face discussions, online forums, or email communications.
X3.3 Motivation	The internal energy that drives mothers to engage in breastfeeding.
X4 Prior Knowledge (PK)	Mothers' previous experiences with breastfeeding encompass elements such as breastfeeding culture or myths, the perception of insufficient milk, and previous breastfeeding experiences.
X4.1 Previous breastfeeding experiences	The prepartum experiences of expectant mothers who intend to breastfeed.
X4.2 Breastfeeding culture or myths	Cultures and myths discourage exclusive breastfeeding.
X4.3 Perception of insufficient milk	Perceived insufficiency of breast milk by mothers before seeking consultation with a lactation counsellor.
X5 Autonomous Process (AP)	The Autonomous Process (AP) entails meticulous and dedicated implementation of exclusive breastfeeding. This approach emphasizes the following components: Planning (maintaining a breastfeeding logbook), Monitoring (comprising latch assessment, breastfeeding frequency, breastfeeding duration, type of supplementation, maternal breastfeeding issues, urine and faeces output, method of supplementation, infant's condition, and infant breastfeeding issues), and Design (encompassing structure, types of learning resources, and discharge planning).
X5.1 Breastfeeding Planning	Breastfeeding planning is the intention of breastfeeding and an effort to fill out the logbook to breastfeed successfully.
X.5.1.1 Breastfeeding Intention	Breastfeeding mothers' willingness to publicly demonstrate breastfeeding for up to six years of the infant's life.
X.5.1.2 Breastfeeding logbook	Mothers' willingness to keep track of their breastfeeding progress using a manual log or an app/website.
X5.2 Self-Monitoring Skill	Self-monitoring skills in breastfeeding include a latch, breastfeeding frequency, breastfeeding duration, type of supplementation, maternal breastfeeding issues, urine and faeces output, method of supplementation, infant's condition, and infant breastfeeding issues) which are needed as self-control in identifying breastfeeding problems and looking for them. Help with breastfeeding problems.
X.5.2.1 Latch	Mothers carefully monitor the baby's latch during breastfeeding.
X.5.2.2 Breastfeeding frequency	Mothers monitor how often their babies are breastfed within 24 hours.
X.5.2.3 Breastfeeding duration	Mothers monitor the duration of breastfeeding on each breast for their infants (up to 20 minutes).
X.5.2.4 Infant Breastfeeding Problems	Breastfeeding challenges that stem from infants' oral anatomy and behaviour during breastfeeding, which can impact breastfeeding routines and patterns.
X.5.2.5 Type of supplementation	Alternative feeding types for infants when direct breastfeeding is not possible.
X.5.2.6 Method of supplementation	The method of nourishing the infant when not directly engaged in breastfeeding.
X.5.2.7 Urine Output	Mothers monitor the infant's urinary output, noting the frequency within 24 hours.
X.5.2.8 Faeces output	Mothers observe the infant's excrement, recording the frequency and colour over a 24-hour.
X.5.2.9 Maternal breastfeeding problems	Mothers experiencing breastfeeding challenges originating from physical conditions such as blocked milk ducts, mastitis, or nipple blisters.
X.5.2.10 Infant state	Mothers monitor the infant's actions during the act of breastfeeding.
Y1 Breastfeeding Self-Efficacy (BSE)	Maternal self-efficacy in breastfeeding is founded on interpersonal beliefs regarding the adequacy of breast milk and the mother's confidence in her ability to engage in breastfeeding successfully.
Y.1 Interpersonal Beliefs	Interpersonal beliefs held by mothers while engaged in the practice of exclusive breastfeeding.
Y.2 Mothers 'confidence	Mothers' confidence in breastfeeding techniques.

Table 2 presents the values of Average Variance Extracted (AVE), Composite Reliability (CR), Cronbach's Alpha (CA), standardised indicator loadings (SIL), and the level of explanatory power (LEP). The composite reliability values of all scales exceeded the recommended threshold of 0.7. However, the average variance extracted falls below the recommended value of 0.5 (Siah *et al*., 2023). Notably, the respective target constructs' R-squared values, 0.273, 0.526, 0.537, and 0.443, are considered weak to medium (Li *et al*., 2020). To assess the impact of an independent variable on a dependent variable, an effect size, denoted as f^2, was employed, following the guidelines established by (Henseler, Ringle & Sarstedt, 2015).

Table 2: Reliability, Convergent Validity and R^2

Variables	SIL	CA	CR	AVE	R^2	
					Value	LEP
Breastfeeding Education Design (X1)		**0.669**	**0.815**	**0.643**	**-**	**-**
X.1.1 Materials	0.792					
X.1.2 Type of learning resources	0.777					
X.1.3 Postpartum Discharge Education	0.745					
Breastfeeding Support (X2)		**0.871**	**0.938**	**0.883**	**-**	**-**
X.2.1 Health Professional Feedback	0.902					
X.2.2 Husband support	0.553					
X.2.3 Grandmother or Mothers-in-law support	0.930					
Personal Attributes (X3)		**0.830**	**0.893**	**0.737**	**0.223**	**Weak**
X3.1 Initiative	0.890					
X3.2 Creativity	0.765					
X3.3 Motivation	0.913					
Prior Knowledge (X4)		**0.740**	**0.840**	**0.637**	**0.037**	**Weak**
X4.1 Previous breastfeeding experiences	0.755					
X4.2 Breastfeeding culture or myths	0.802					
X4.3 Perception of insufficient milk	0.836					
Autonomous Process (X5)		**0.951**	**0.958**	**0.643**	**0.089**	**Weak**
Breastfeeding Planning (X5.1)		**0.926**	**0.964**	**0.931**	**0.893**	**Substantial**
X.5.1.2 Breastfeeding Intention	0.964					
X.5.1.1 Breastfeeding Logbook	0.966					
Self-Monitoring Skill (X5.2)		**0.934**	**0.947**	**0.722**	**0.976**	**Substantial**
X.5.2.1 Latch	0.727					
X.5.2.2 Breastfeeding frequency	0.940					
X.5.2.3 Breastfeeding Duration	0.907					
X.5.2.4 Infant Breastfeeding Problems	0.671					
X.5.2.5 Type supplementation	0.824					
X.5.2.6 Method of Supplementation	0.770					
X.5.2.7 Output urine	0.902					
X.5.2.8 Output feces	0.656					
X.5.2.9 Mothers Breastfeeding Problems	0.656					
X.5.2.10 Infant state	0.766					
Breastfeeding Self-Efficacy (Y)		**0.798**	**0.908**	**0.832**	**0.242**	**Weak**
Y.1 Interpersonal Belief's	0.916					
Y.2 Mothers 'confidence	0.908					

SIL: Standardized Indicator Loadings, CA: Cronbach's Alpha, CR: Composite Reliability, AVE: Average Variance Extracted, LEP: Level of Explanatory Power

Structural Model Evaluation

The coefficients of the structural model are obtained through the estimation of regression equations. It is important to note that solid correlations among predictor constructs can introduce bias into estimates and standard errors. Based on the data presented in Figure 3, all count values surpass the critical count of 1.96. Therefore, Figure 3 represents the final path model.

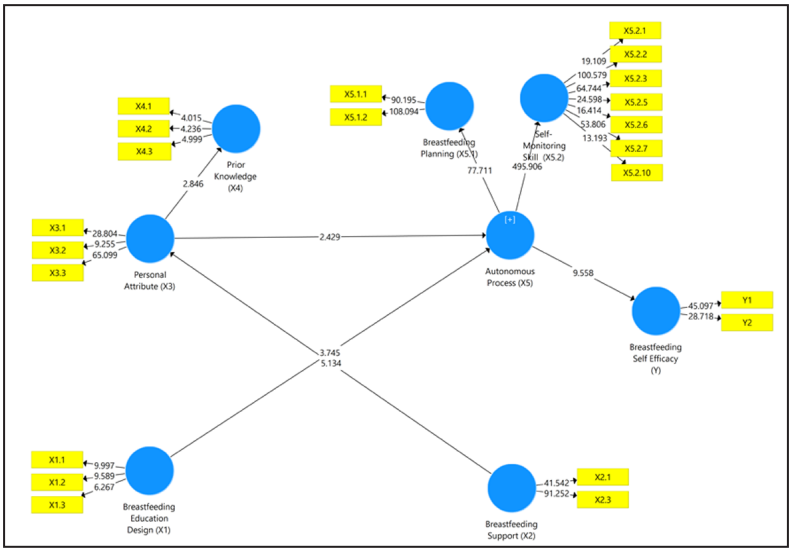

Figure 3: Final Model Self-Efficacy Based on Self-Directed Learning for Breastfeeding Mothers

Table 3 presents the structural path model coefficients and their associated significance. Several paths exhibit significant values, namely: Breastfeeding Education Design affecting Autonomous Process (p=0.000), Breastfeeding Support affecting Personal Attributes (p=0.000), Personal Attributes affecting Prior Knowledge (p=0.000), Personal Attributes affecting Autonomous Process (p=0.000), and Autonomous Process affecting Breastfeeding Self-Efficacy (p=0.000). Conversely, the path values that are not deemed significant are Breastfeeding Education Design affecting Personal Attributes, Breastfeeding Support affecting Autonomous Process.

Table 3: Path Coefficients

Paths	Path Coefficient (β)	*t*	Sig.	Interpretation
Breastfeeding Education Design (D) → Personal Attributes (PA)	0.007	0.242	0.404	Not Significant
Breastfeeding Education Design (D) → Autonomous Process (AP)	0.219	3.503	0.000	Significant
Breastfeeding Support (S) → Personal Attributes (PA)	0.472	5.167	0.000	Significant
Breastfeeding Support (S) → Autonomous Process (AP)	0.023	0.242	0.404	Not Significant
Personal Attributes (PA) → Prior Knowledge (PK)	0.192	2.806	0.003	Significant
Personal Attributes (PA) → Autonomous Process (AP)	0.184	1.849	0.032	Significant
Autonomous Process (AP) → Breastfeeding Self-Efficacy (BSE)	0.492	9.414	0.000	Significant

Note: path significance: $p < 0.05$

DISCUSSION

This study underscores the critical role of self-directed learning in enhancing breastfeeding self-efficacy among postpartum mothers, which is a pivotal factor in achieving exclusive breastfeeding. The findings affirm that the autonomous process, which is fostered through structured breastfeeding education and influenced by personal attributes, significantly improves mothers' confidence and ability to breastfeed effectively. This aligns with Bandura's theory of self-efficacy, which posits that individuals' belief in their capabilities to execute specific actions is crucial in determining behavioural outcomes (Bandura, 1997). So, the SEM technique was utilised to evaluate the latent variables, and the model explored the interrelationships between exogenous latent constructs (independent variables) and endogenous constructs (dependent variables) (Hair *et al*., 2019).

In this context, the nursing role encompasses the duty of developing and executing educational interventions that are tailored, easily accessible, and self-guided. Nurses are strategically positioned to guide mothers through the learning process, empowering them to take control of their health-related decisions. This involves integrating evidence-based teaching strategies, motivational interviewing, and digital tools such as mobile health applications and virtual consultations to facilitate autonomous learning (Basheer, Al-Mutairi & Al-Dosari, 2024). Furthermore, this study emphasizes that although breastfeeding support affects personal factors such as motivation and emotional readiness, it has minimal influence on the autonomous process. This suggests a need for nurses to go beyond traditional support roles and foster self-regulatory skills in mothers, such as goal setting, self-monitoring, and reflective practice; these are key components of self-directed learning (WHO, 2023).

The self-efficacy model presented in this study is constructed on the foundation of self-directed learning, a theoretical framework developed among breastfeeding mothers. This study evaluated the latent variables' validity and excluded any invalid indicators. Additionally, the relationships between the latent variables using path coefficients were established. Path coefficients typically fall within the range of -1 to +1, with values closer to -1 indicating more pronounced negative relationships (Hair *et al*., 2019). According to Hair *et al*., (2021) an f^2 value of 0.02 indicates a small effect size, 0.15 denotes a moderate effect size, and 0.35 represents a substantial effect size. The subsequent discussion will focus on the seven specific research hypotheses delineated below:

H1. Breastfeeding education design is associated with personal attribute in breastfeeding mothers

Hypothesis 1 (H1) indicates no significant relationship between breastfeeding education design and mothers' attributes, with a correlation coefficient of 0.007 and a *p*-value of 0.404. Effective breastfeeding education should focus on developing instructional materials to enhance mothers' initiative and motivation. Postpartum stress can impede mothers' ability to face lactation challenges (Nagel *et al*., 2022). The World Health Organisation and UNICEF emphasise the need for comprehensive breastfeeding education on techniques and overcoming challenges to improve self-efficacy (Ghafourian Abadi *et al.*, 2024). Support is crucial before discharge and at home to prevent breastfeeding difficulties (Lojander, Axelin & Niela-Vilén, 2024). Further research is needed on personalised breastfeeding education, and nurses and midwives play a vital role in providing the necessary emotional support, particularly for mothers with limited family assistance.

H2. The Breastfeeding Education Design is associated with the autonomous process in breastfeeding mothers

Hypothesis 2 (H2) demonstrates a correlation coefficient of 0.219 with a statistically significant *p*-value of 0.000, suggesting a substantial relationship between the design of breastfeeding education programmes and the autonomy experienced by mothers. Research conducted in Iran indicates that mobile applications designed for breastfeeding education can significantly enhance self-efficacy among first-time mothers (Ghafourian Abadi *et al*., 2024).

Technology-driven interventions, including websites and mobile applications, have been shown to increase breastfeeding frequency substantially (Almohanna, Win & Meedya, 2020). Discharge planning and education must take into account variables such as the mother's age, number of children, history of caesarean deliveries, and previous breastfeeding experiences, as these factors significantly influence breastfeeding autonomy and overall success (Lojander, Axelin & Niela-Vilén, 2024).

Comprehensive educational initiatives effectively equip mothers with the knowledge to breastfeed and navigate related challenges exclusively. Healthcare providers should strategically utilise Internet resources and enhance support mechanisms during prenatal care and postpartum discharge to foster improved breastfeeding autonomy and self-efficacy.

H3. Breastfeeding support is associated with personal attributes

Hypothesis 3 (H3) indicates a correlation coefficient of 0.472, accompanied by a significant *p*-value of 0.000, suggesting a robust relationship between breastfeeding support and the personal attributes of mothers. The presence of social support, whether from professionals or family members such as grandmothers, significantly enhances breastfeeding practices. The research underscores that psychological stress can impede

lactation, highlighting the necessity for improved interventions to strengthen personal attributes linked to breastfeeding (Nagel *et al*., 2022). Furthermore, while grandmothers are integral in providing support to mothers, their involvement in offering supplemental baby food often contradicts the goals of exclusive breastfeeding. Thus, there is an imperative need for effective educational interventions targeted at grandmothers (Maviso, Kaforau & Hastie, 2023). Comprehensive support from healthcare professionals and family members is vital for increasing exclusive breastfeeding rates, as emotional support and encouragement profoundly impact mothers' motivation (Emmott & Mace, 2015).

H4. Breastfeeding support is associated with the autonomous process in breastfeeding mothers

Hypothesis 4 (H4) reveals a correlation coefficient of 0.023 and a *p*-value of 0.404, indicating a lack of a significant relationship between breastfeeding support and the development of self-autonomy. Breastfeeding support encompasses emotional, informational, and instrumental dimensions. Emotional support, which is essential for fostering self-autonomy, includes nurturing behaviours and empathy (Boateng *et al*., 2018). Although the research addressing the impact of support on the success of exclusive breastfeeding remains limited, both professional and familial support can significantly enhance a mother's confidence and diminish feelings of isolation (Chang *et al*., 2022). It is imperative that nurses and midwives leverage Internet technology to provide accurate information and actively involve family members in the promotion of optimal breastfeeding practices.

H5. The personal attributes are associated with Prior knowledge among breastfeeding mothers

Hypothesis 5 (H5) indicates a correlation coefficient of 0.192 and a statistically significant p-value of 0.003, suggesting a notable relationship between personal attributes and prior knowledge. Individual attributes are defined as stable patterns in cognitive, emotional, and behavioural dimensions that influence the retention of knowledge in memory, as articulated by Ackerman (1996) and Huang, Gursoy and Xu, (2014).

There is a paucity of research examining the impact of personal traits of breastfeeding mothers on their breastfeeding knowledge. Mothers exhibiting traits that facilitate self-directed learning may require mentorship, whereas those who utilise online resources may benefit from clarification of health-related information (Galvão *et al*., 2022). Support from healthcare professionals and peer networks is essential for successfully initiating and continuing breastfeeding. Tele lactation presents a cost-effective solution for mothers in need of support (Chua *et al*., 2023). Educational interventions must be tailored to address the specific needs of mothers and should include continuous support mechanisms (Amoo, Popoola & Lucas, 2022; Bai, Lee & Overgaard, 2019). Mothers with suitable attributes are more likely to comprehend breastfeeding information effectively; therefore, professional guidance is critical in developing impactful educational resources and promoting self-directed learning.

H6. The personal attribute is associated with the autonomous process among breastfeeding mothers

Hypothesis 6 (H6) elucidates the relationship between personal characteristics and the independent learning process among breastfeeding mothers, indicating a correlation coefficient of 0.184 and a *p*-value of 0.032. Personal attributes significantly influence mothers' acquisition of breastfeeding skills, thereby underscoring the necessity for effective initial education. To enhance their experience, mothers must cultivate skills such as initiative and motivation.

Utilising online breastfeeding resources allows mothers to select learning methods most suitable for their needs (Wong, Mou & Chien, 2021). Motivation is critical in accomplishing breastfeeding objectives and empowering mothers to strategies their learning approaches (Ceylan & Şahin, 2020; Mizrak Sahin *et al*., 2019; Moon & Woo, 2021; Omolola Adams *et al.*, 2020; Yıldırım Gökşen & Özkan, 2024). The Autonomous Process (AP) entails the planning and monitoring of breastfeeding intentions (Li *et al*., 2022 a; Taha *et al.*, 2022). Positive strategies for this process include maintaining composure, acknowledging the gradual development, and fostering skin-to-skin contact. Mothers need to seek support from healthcare providers and family members. Furthermore, equipping healthcare professionals with the skills to employ technology and diverse learning strategies can significantly enhance mothers' autonomy in the breastfeeding experience.

H7. Autonomous process is associated with breastfeeding self-efficacy

Hypothesis 7 (H7) posits a significant relationship between the autonomous process and Breastfeeding Self-Efficacy among mothers, as indicated by a correlation coefficient of 0.492 and a *p*-value of 0.000. The autonomous process is characterised by mothers actively engaging in the planning and executing of learning initiatives to enhance their self-efficacy related to breastfeeding. Breastfeeding Self-Efficacy embodies a mother's confidence in her ability to breastfeed, which includes beliefs regarding milk sufficiency and familiarity with breastfeeding techniques (Al-Thubaity *et al*., 2023). A higher level of self-efficacy is associated with increased maternal satisfaction and prolonged breastfeeding duration (Al-Thubaity *et al*., 2023; De Roza *et al*., 2019; Li *et al*., 2022 *b*; Titaley *et al*., 2021).

Healthcare providers must cultivate breastfeeding competencies to devise effective educational programmes that assist mothers in evaluating milk adequacy and comprehending the factors that influence milk production. Fostering autonomy in breastfeeding practices can significantly enhance self-efficacy and encourage exclusive breastfeeding (Huang *et al*., 2022; Maleki, Faghihzadeh & Youseflu, 2021; Wong, Mou & Chien, 2021).

This study underscores the importance of Self-Directed Learning (SDL) and highlights the necessity of comprehensive education and family support as vital components in promoting breastfeeding autonomy. Healthcare providers should actively endorse self-autonomy to facilitate successful breastfeeding outcomes.

Limitation

As the study was restricted to specific areas, to ensure the robustness of the results, future research should encompass diverse populations of breastfeeding mothers across various regions in Indonesia. It is important to recognize that a cross-sectional design is valuable for identifying associations, though it may not provide definitive evidence of causality.

CONCLUSION

Breastfeeding self-efficacy is essential for the attainment of exclusive breastfeeding through self-directed learning. Mothers must possess personal attributes and the capability for independent learning, which are influenced by their prior experiences, cultural beliefs, and the support they receive from healthcare professionals and family members. While independence is not directly correlated with social support, it is associated with individual characteristics. Educational initiatives should provide adequate resources and planning. This study advocates for midwives and nurses to promote exclusive breastfeeding and actively facilitate mothers' self-directed learning. Future research should concentrate on intervention studies to elucidate causal relationships. The nursing profession must embrace a proactive role in equipping mothers with the knowledge, skills, and autonomy necessary to enhance breastfeeding self-efficacy. This can be achieved through innovative, individualised education programmes grounded in self-directed learning models. Future nursing practices should focus on enhancing maternal capacity for self-regulation, as this directly impacts the success of exclusive breastfeeding and, by extension, the health outcomes of both mother and child.

Conflict of Interest

The authors affirm that they do not have any conflicts of interest to declare.

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