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Self-Efficacy and Adherence as Predictors of Quality of Life in Patients with Type 2 Diabetes Mellitus: A Cross-Sectional Study at Jemursari Islamic Hospital, Surabaya

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A B S T R A C T

Type 2 diabetes is associated with a progressive decline in patients' quality of life (QoL). Self-efficacy and adherence are critical behavioral determinants that influence disease management and outcomes. This study examines the correlation between self-efficacy and adherence to quality of life in patients with type 2 diabetes mellitus. This study used a correlational analytic research design with a cross-sectional approach. The study was conducted at Islamic Hospital Jemursari, Surabaya, from August to October 2024. The population consisted of 307 patients with diabetes, and 174 respondents were selected through purposive sampling. Data were collected using validated questionnaires: the Diabetes Management Self-Efficacy Scale (DMSES), the Adherence to Diabetes Questionnaire (ADQ), and the Diabetes Quality of Life (DQOL) questionnaire. Data analysis was the Spearman's Rank correlation test. The results showed that nearly half of the respondents reported low self-efficacy, most had low adherence, and 60.3% experienced poor QoL. Spearman analysis demonstrated a significant correlation between self-efficacy and QoL ($r = 0.647$; $p < 0.000$), and between adherence and QoL ($r = 0.684$; $p < 0.000$). In conclusion, self-efficacy and adherence are strong predictors of quality of life in patients with type 2 diabetes mellitus at Jemursari Islamic Hospital, Surabaya. Future research should investigate interventions to enhance self-efficacy and adherence, particularly among patients with a poor quality of life, to develop more effective strategies for supporting diabetes care.

INTRODUCTION

The phenomenon of diabetes mellitus in society today shows a significant increase and has become a serious health issue. Its main impact is a decrease in the patient's quality of life. Quality of life is a measure of an individual's overall well-being, encompassing four primary dimensions: physical, psychological, social, and environmental. In patients with diabetes mellitus, quality of life is often affected by physical conditions such as chronic complications, psychological disturbances due to stress and anxiety, social limitations in participating in family or community activities, and environmental barriers such as limited access to healthcare services (Zatihulwani *et al.*, 2024).

One of the main problems commonly found in patients with unhealthy lifestyles is high blood glucose levels. It can result from insulin resistance or the body's inability to produce insulin adequately, leading to chronic metabolic diseases such as diabetes mellitus (Ratnasari, Andayani and Endarti, 2019). It can be caused by poor diabetes management, including an improper diet, non-compliance with medication, and a

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lack of physical activity (Almaini and Heriyanto, 2019). Poor diabetes management not only affects physical health but also impacts the patient's quality of life, especially when blood glucose levels are uncontrolled (Zilfan Andhika Gea, Sukarni, and Suriadi, 2022).

Every year, the prevalence of diabetes mellitus continues to rise significantly. Based on data from the Health Development Policy Agency (*Badan Kebijakan Pembangunan Kesehatan* or BKPK) in 2023, the prevalence of diabetes mellitus, as diagnosed by doctors, among all age groups in Indonesia reached 877,531 people. Its prevalence in East Java was recorded as 130,683 (BKPK, 2023). More specifically, its prevalence in Surabaya reached 104,262 (Dinas Kesehatan Provinsi Jawa Timur, 2023). Preliminary data collected in November at Jemursari Islamic Hospital, Surabaya, through interviews with 10 patients with diabetes mellitus showed that 80% respondents were still unable to avoid high sugar and fat foods. 70% of them failed to comply with medical advice to avoid sweet and fatty foods. They reported disturbing feelings in following dietary restrictions. They also experienced frustration, sadness, and guilt when they did not follow food restrictions.

The decline in quality of life in patients with type 2 diabetes mellitus begins with metabolic disorders that lead to insulin resistance and chronic hyperglycemia. Persistently high blood glucose levels damage both small and large blood vessels, triggering complications such as retinopathy (vision impairment), nephropathy (kidney failure), neuropathy (nerve damage causing tingling sensations), and heart disease. These complications affect body function and patient mobility, limiting their ability to perform daily activities (Suciana *et al.*, 2019).

Diabetes complications potentially can result in psychological disorders among individuals with diabetes, such as depression and anxiety, arising from physical limitations and strict diabetes management. Fluctuations in blood glucose levels can affect mood, while neurological complications may lead to cognitive dysfunction. The emotional pressure, combined with dependence on medication and significant lifestyle changes, reduces patients' sense of freedom and flexibility, ultimately decreasing their quality of life (Ma'ruf and Palupi, 2021).

One effort to improve the quality of life for people with diabetes is to enhance self-efficacy and adherence to treatment. Previous studies demonstrated that high self-efficacy encourages individuals to take action in diabetes management, thereby improving the quality of life for people with diabetes (Usman *et al.*, 2021). Good adherence to medical treatment also contributes to successful disease management and an improved quality of life (Mutmainah, Al Ayubi,. Patients who have confidence in diabetes management and adhere to medical recommendations, such as diet control, blood glucose monitoring, and prescribed therapies, are more likely to achieve better blood glucose control. Thus, it can reduce the risk of chronic complications, common threats to individuals with diabetes, such as neuropathy and retinopathy (Istiyawanti *et al.*, 2019).

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Furthermore, improved self-efficacy has a positive impact on mental health. Patients who are more confident in dealing with their illness tend to have lower levels of stress and anxiety and are less likely to suffer from depression. Adherence to medication and a healthy lifestyle also contributes to improved mood and emotional well-being. Therefore, increasing self-efficacy and adherence can help individuals with diabetes mellitus have a better quality of life (Rosalinda and Nugraheni, 2023). A recent international study in Saudi Arabia reported that low self-efficacy was significantly associated with poor quality of life and reduced well-being among diabetic patients (Alshaikhi *et al.*, 2025).

This finding highlights that self-efficacy plays a central role in improving quality of life, yet research in Indonesia, particularly in hospital-based populations in Surabaya, remains limited. In addition, only a few studies have simultaneously examined self-efficacy and adherence in relation to quality of life among patients with type 2 diabetes mellitus. Therefore, this study examines the correlation between self-efficacy and adherence to quality of life in patients with type 2 diabetes mellitus at Jemursari Islamic Hospital, Surabaya.

METHOD

This study used a correlational analytic research design with a cross-sectional approach. The study was conducted at Islamic Hospital Jemursari, Surabaya, from August to October 2024. The population consisted of 307 patients with type 2 diabetes mellitus registered at the hospital during the study period. The sample comprised 174 patients who met the inclusion criteria, determined using a purposive sampling technique. The inclusion criteria were: (1) patients diagnosed with type 2 diabetes mellitus, (2) aged 18 years or older, (3) able to communicate verbally, and (4) willing to participate by providing informed consent. Exclusion criteria included patients with severe complications, cognitive impairment, or those unwilling to participate. Purposive sampling was chosen because not all members of the population met the required study characteristics. The instruments used three standardized and widely used questionnaires; the Diabetes Management Self-Efficacy Scale (DMSES) to assess self-efficacy across various domains, including diet, physical activity, glucose monitoring, medication use, and general self-care, the Adherence to Diabetes Questionnaire (ADQ) to measure adherence, including aspects of diet planning, insulin use, health monitoring, physical activity, and medical instruction compliance, and The Diabetes Quality of Life (DQOL) questionnaire to evaluate patients' quality of life in terms of physical, psychological, and social well-being. These instruments have been tested for validity and reliability in previous studies and were considered appropriate for use in this research. The validity and reliability tests showed acceptable results (Cronbach's $\alpha > 0.7$). Data analysis was conducted using SPSS version 25 for Windows. Descriptive statistics were used to present respondent characteristics and the distributions of variables. Before hypothesis testing, data assumptions, including normality and linearity, were examined. Because the data

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were ordinal and not normally distributed, the Spearman Rank correlation test was applied to determine the relationship between self-efficacy, adherence, and quality of life. This paper used a significance level of $\alpha = 0.05$, with $p < 0.05$ considered statistically significant. This study received ethical approval from the Health Research Ethics Committee of Islamic Hospital Jemursari Surabaya, with certificate number No. 007/KEPK-RSISJS/I/2025. All respondents provided informed consent, and confidentiality of personal information was strictly maintained throughout the research process.

RESULTS

Table 1 reveals that the majority of respondents, 174 in total, consisted of 91 females (52.3%), while the male respondents numbered 83 (47.7%). In addition, nearly half were categorized as late elderly (56–65 years), totaling 63 individuals (36.2%), followed by the older adults (>65 years) with 46 individuals (26.4%), and early elderly (46–55 years) with 43 individuals (24.7%). These data indicate that the majority of respondents in this study were older adult females.

Table 1. The Characteristics of Respondents by Gender and Age

The Characteristics of Respondents		Frequency (n)	Percentage (%)
Sex	Male	83	47.7
	female	91	52.3
	Total	174	100
Age	Late Adolescence (17–25 years)	1	0.6
	Early Adulthood (26–35 years)	3	1.7
	Middle Adulthood (36–45 years)	18	10.3
	Early Elderly (46–55 years)	43	24.7
	Late Elderly (56–65 years)	63	36.2
	Older Adults (>65 years)	46	26.4
	Total	174	100

Nearly half, 74 respondents (42.5%), had low self-efficacy. Additionally, the majority of respondents (53.3%) reported low adherence levels. Moreover, the majority—105 respondents (60.3%)—had a low quality of life (Table 2).

Table 2. Self-Efficacy, Adherence, and Quality of Life in patients with type 2 diabetes mellitus at Jemursari Islamic Hospital

Variables	Frequency (n)	Percentage (%)
Self-Efficacy		
High	64	36.8
Moderate	36	20.7
Low	74	42.5
Adherence		
High	83	47.7
Low	91	52.3
Quality of Life		
High	69	39.7
Low	105	60.3

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Among the 64 respondents with high self-efficacy, most—47 respondents (73.4%)—experienced a high quality of life. Among the 36 respondents with moderate self-efficacy, the majority—20 respondents (55.6%)— had a high quality of life. In addition, out of 74 respondents with low self-efficacy, almost all—72 respondents (97.3%)—had a low quality of life. The statistical analysis, using Spearman's Rank correlation test, showed a correlation coefficient (r) of 0.647 with a significance value of $p < 0.000$. Since $p < 0.05$, H0 was rejected, and H1 was accepted, indicating a significant relationship between self-efficacy and quality of life among patients with type 2 diabetes mellitus at Islamic Hospital Jemursari. The correlation coefficient of 0.647 indicated a strong relationship, suggesting that the higher a patient's self-efficacy, the higher their perceived quality of life tends to be (Table 3).

Table 3. Cross Tabulation and Statistical Analysis between Self-Efficacy and Quality of Life in Patients with Type 2 Diabetes Mellitus at Islamic Hospital Jemursari, Surabaya.

		Quality Of Life			Spearman's Rank correlation test
		High	Low	Total	
Self Efficacy	High	47 (27%)	17 (9.7%)	64 (36.7%)	$p < 0.000$
	Moderate	20 (11.5%)	16 (9.2%)	36 (20.7%)	r = 0.647
	Low	2 (1.1%)	72 (41.5%)	74 (42.6%)	
Total		69 (39.6%)	105 (60.4%)	174 (100%)	

Among the 83 respondents with high adherence, the majority—62 respondents (74.7%)—had a high quality of life. Meanwhile, out of 91 respondents with low adherence, almost all—84 respondents (92.3%)—had a low quality of life. The statistical analysis, using the Spearman Rank correlation test, showed a correlation coefficient (r) of 0.684 with a $p < 0.000$. Since $p < 0.05$, H0 was rejected, and H1 was accepted, indicating a significant relationship between adherence and quality of life among patients with type 2 diabetes mellitus at Islamic Hospital Jemursari. The correlation coefficient of 0.684 showed a strong correlation, indicating that the higher the level of adherence to diabetes management, the higher the patient's perceived quality of life (Table 4).

Table 4. Cross Tabulation statistic analysis between Adherence and Quality of Life in Patients with Type 2 Diabetes Mellitus at Islamic Hospital Jemursari, Surabaya.

		Quality Of Life			Spearman's Rank correlation test
		High	Low	Total	
Adherence	High	62 (35.7%)	21 (12%)	83 (47.7%)	$p < 0.000$
	Low	7 (4%)	84 (48.3%)	91 (52.3%)	r = 0.684
Total		69 (39.7%)	105 (60.3%)	174 (100%)	

DISCUSSION

Self-efficacy

Based on the research findings, most respondents had a low level of self-efficacy (Table 2), indicating that many patients with type 2 diabetes mellitus at Jemursari Islamic Hospital, Surabaya, still lacked sufficient confidence in their ability to manage the disease independently. This low self-efficacy may affect the patients' daily behavior, such as inconsistency in maintaining a healthy diet, not exercising

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regularly, and being less meticulous in following the prescribed treatment. Self-efficacy is defined as an individual's belief in their ability to regulate and perform the actions necessary to achieve specific goals. As stated by Bandura (Sari and Firdaus, 2020), self-efficacy encompasses cognitive, motivational, and behavioral aspects in responding to various situations, including the stress associated with chronic illness. In this study, self-efficacy was measured using the Diabetes Management Self-Efficacy Scale (DMSES), which consists of five essential components: dietary management, physical activity, glucose monitoring, adherence to treatment, and general self-care. These five components comprehensively describe the patient's capability to conduct sustainable self-management.

The study conducted by Dina and Sinaga (2024) also found that most patients with diabetes had low levels of self-efficacy. It indicated that the majority of patients with diabetes lacked confidence in their ability to manage five essential aspects of diabetes management, namely managing diet, independently controlling blood glucose levels, maintaining regular treatment, and performing daily general care. This lack of confidence becomes a barrier to optimal disease management. Interventions aimed at strengthening self-efficacy in these five aspects are necessary, including balanced nutrition education, training in the use of blood glucose monitoring devices, assistance during the treatment process, and counseling on the importance of daily self-care. This low level of self-efficacy was found among elderly female respondents, who in the context of this study constituted the dominant group with low self-efficacy (Table 1). Older age may lead to decreased cognitive and physical function, which in turn reduces confidence in managing the disease. Thus, older women often experience a double psychological burden due to social roles within the family and community, making them more vulnerable to fatigue, feeling overwhelmed, and lacking focus on their own health care. In addition, there is the perception that they are not capable enough to handle their health condition independently.

Low self-efficacy observed in this study may be attributed to several factors, including limited knowledge about diabetes management, previous failures in self-care attempts, and a lack of support from the surrounding environment, such as family and healthcare providers. Furthermore, diabetes complications, feelings of helplessness, and low internal motivation can reinforce patients' negative perceptions of their ability to manage the disease. These factors indirectly form the belief that their efforts will not yield optimal results, leading patients to become passive in managing their daily health conditions.

Adherence

The study's findings showed that most respondents demonstrated a low level of adherence (Table 2), indicating that many patients with type 2 diabetes mellitus were still inconsistent in following treatment recommendations and maintaining a healthy lifestyle as advised by healthcare professionals. A preliminary study reinforces this finding. It was conducted in November 2024 at Jemursari Islamic Hospital. The authors' interviews with patients in the Endocrine Clinic revealed that most were unable to

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comply with doctors' recommendations to avoid sugary and fatty foods, while only a small portion adhered to the prescribed treatment regimen. According to the Information-Motivation-Behavioral Skills (IMB) theory, developed by Fisher (2003) and further elaborated upon by Listrikawati *et. al.* (2024), adherence is formed through three main components: adequate information, strong motivation, and supportive behavioral skills. Patients who possess a sufficient understanding of their disease, internal motivation to recover, and practical abilities to follow medical instructions are more likely to adhere to treatment. In this study, adherence encompassed five key aspects: meal planning and dietary habits, insulin use and dosage management, self-monitoring of health status, regular physical activity implementation, and compliance with medical instructions from healthcare providers.

A prior investigation by Padmasari *et. al.* (2021) indicated that continuous education played a vital role in enhancing adherence among patients with diabetes mellitus (Padmasari, Azizah and Larasati, 2021). Educational interventions have been proven to help patients adjust their dietary habits, understand the correct use of insulin, and perform self-monitoring of their health. These findings emphasize that improving adherence is not solely dependent on information provision but also on skill development across the five aspects of disease management, including dietary control, insulin dosage management, health monitoring, physical activity, and compliance with medical advice. However, elderly female groups are at higher risk of low adherence due to physical limitations, heavier emotional burdens, and memory decline, all of which negatively impact their ability to follow medical instructions consistently.

The author considers that the low level of patient adherence indicates that there are still numerous challenges in implementing a comprehensive healthy lifestyle. Most respondents in this investigation were not yet optimal in planning their food intake, adjusting insulin dosages, or regularly conducting health check-ups. Therefore, intensive support from healthcare professionals is crucial to enhance patients' skills and understanding in these aspects. Family involvement and the use of interactive visual educational media can also strengthen patients' adherence to medical instructions consistently, ultimately contributing to improved quality of life.

Quality of Life

This paper showed that the majority of respondents had a low quality of life (Table 2), reflecting that many patients with type 2 diabetes mellitus had not yet achieved well-being across various aspects of their lives. Physically, they frequently complained of fatigue, pain, limited mobility, and changes in appetite. Psychologically, patients showed symptoms of stress, anxiety, and hopelessness due to the chronic condition they experienced. In the social aspect, their involvement in family and community activities was limited due to concerns about their physical condition or the need to adhere to dietary and treatment regimens. In the environmental domain, several patients reported facing obstacles in accessing healthcare facilities or lacking a comfortable and safe environment for undergoing therapy. All these

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factors indicate that patients' quality of life is not solely determined by medical conditions, but also by the interaction of multiple elements in their daily lives. The assessment of quality of life in this study was based on the World Health Organization Quality of Life (WHOQOL) theory, as cited in (Yusuf, 2020), explaining that quality of life refers to an individual's perception of their position in life, influenced by culture, value systems, goals, expectations, standards, and concerns. In the context of patients with type 2 diabetes mellitus, quality of life is viewed through two main components: the level of satisfaction with illness and treatment, and the impact experienced as a result of the disease. Patients who are satisfied with their treatment outcomes, such as achieving normal glycemic levels and accessing quality healthcare services, tend to have a better quality of life. Conversely, when the impact of the disease, such as complications, pain, limitations in activity, and emotional stress, is not well managed, patients' perception of their quality of life tends to decline. The four WHOQOL domains—physical, psychological, social, and environmental—serve as a fundamental framework for evaluating how well patients can live a meaningful and balanced life amid health challenges.

A previous study by Safitri and Syafiq (2022) showed that the quality of life of patients with diabetes mellitus tended to be low when they felt dissatisfied with the treatment received and experienced psychological burdens caused by the disease. In the study, many patients reported disruptions in daily activities, decreased self-confidence, and social limitations resulting from the need for continuous disease management. This research emphasizes the importance of a holistic approach to enhance patient satisfaction with treatment and mitigate the adverse effects of illness by improving the physical, emotional, social, and environmental aspects of life. Furthermore, older female groups are more likely to experience a decline in physical function, chronic fatigue, and social limitations. Combined with psychological pressure and high support needs, this group is more vulnerable to a decrease in quality of life.

The author believes that the quality of life for patients with diabetes mellitus can be improved when they are satisfied with their treatment and can manage the disease's impact in a positive manner. Efforts that can be undertaken include providing psychosocial support, facilitating healthy social interactions, and creating an environment that fosters patient independence and comfort. In addition, quality of life enhancement can also be focused on two main blueprints: improving patients' perception of their ongoing treatment, and assisting them in coping with the physical and emotional consequences of the disease through educational approaches, regular mentoring, and integrated support from family and healthcare providers.

The Correlation between Self-Efficacy and Quality of Life

This study revealed that respondents with low self-efficacy mainly had a low quality of life. In contrast, those with high self-efficacy were generally found to have a high quality of life. Thus, the lower a person's

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self-efficacy, the lower their perceived quality of life tends to be. The Spearman's Rank Correlation test also revealed a strong correlation between self-efficacy and quality of life among patients with type 2 diabetes mellitus (Table 3).

These findings align with a prior study conducted by Dina and Sinaga (2024), which found a significant correlation between self-efficacy and the quality of life in patients with diabetes mellitus. The study revealed that respondents with higher self-efficacy levels exhibited better disease management abilities, including maintaining a healthy diet, regularly monitoring blood glucose levels, adhering to treatment regimens, and staying physically active—all of which contributed positively to their quality of life. Those study also aligns with the characteristics of respondents in this paper; older female respondents more frequently exhibited low self-efficacy and a lower quality of life. Older women tend to experience various challenges, such as physical limitations, chronic fatigue, feelings of dependency, and greater emotional burdens, which may indirectly hinder their ability to manage the disease and sustain a good quality of life.

Thus, self-efficacy plays an essential role in shaping patients' positive behavior toward diabetes management. When patients possess a strong belief in their ability to manage their diet, maintain physical activity, monitor blood glucose levels, adhere to medication therapy, and perform general self-care, they tend to be more consistent in treatment adherence. They are more likely to achieve a higher quality of life. Improvements in quality of life can be attained by strengthening the core aspects of patient self-efficacy.

The Correlation between Adherence and Quality of Life

This investigation also revealed that most respondents with high adherence levels had a high quality of life. Meanwhile, respondents with low adherence nearly all reported a low quality of life. The higher the patient's adherence to treatment and medical recommendations, the better their perceived quality of life. Conversely, low adherence was associated with a lower quality of life in patients with type 2 diabetes mellitus. The Spearman's Rank Correlation test also revealed a strong and significant relationship between adherence and quality of life in patients with type 2 diabetes mellitus (Table 4).

Those findings align with a previous study by Safitri and Syafiq (2022), which found that patients who adhered to treatment tended to have a better quality of life. The study found that adherence to dietary patterns, insulin use, health monitoring, and engagement in physical activity according to recommendations had a significant impact on the physical, psychological, social, and environmental aspects of the quality of life for patients with diabetes mellitus. The previous study also aligns with the characteristics of the respondents in this paper; older female respondents exhibited both low adherence and a low quality of life. This condition may be caused by decreased memory function, limited mobility, excessive fatigue, and dependence on family members, which hinder their ability to follow medical instructions consistently. These barriers contribute to the lower quality of life experienced by this group.

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Thus, adherence plays a crucial role in improving quality of life, as it reflects the extent to which patients consistently manage their disease. When patients can maintain a healthy diet, administer insulin in the correct dosage, routinely monitor their health condition, and consistently follow physical activity and medical instructions, physical and psychological complications resulting from diabetes can be minimized. So it positively impacts patients' comfort and satisfaction with their overall life experience.

CONCLUSION

In conclusion, self-efficacy and adherence are strong predictors of quality of life in patients with type 2 diabetes mellitus at Jemursari Islamic Hospital, Surabaya. Patients with higher self-efficacy and better adherence potentially demonstrate better quality of life. So, enhancing patient self-management and adherence to improve health outcomes is critical. Future research should investigate interventions to enhance self-efficacy and adherence, particularly among patients with a poor quality of life, to develop more effective strategies for supporting diabetes care.

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Factors Influencing the Incidence of Underweight in Toddlers Aged 12-23 Months in the Working Area of Cibeureum Public Health Center (PHC): A Cross-Sectional Study

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A B S T R A C T

Underweight is one of the health problems in children. Data from the Ministry of Health Republic of Indonesia in 2022 stated that children under two years old who suffer from underweight in Indonesia amounted to 6.2%, while those who experience severe underweight were 1.1%. This study determines the factors influencing the incidence of underweight in children aged 12-23 months in the working area of Cibeureum PHC. The study employed a quantitative approach with an analytical design, utilizing a cross-sectional design. There were 95 respondents with purposive sampling. The instruments used were a questionnaire and nutritional status measurements, as assessed by the anthropometric weight-for-age index. Data analysis used the Chi-Square test with an $\alpha<0.05$. The results showed an influence of maternal education ($p = 0.000$), family income ($p = 0.000$), maternal knowledge regarding feeding ($p = 0.000$), and feeding practices ($p = 0.000$) on the incidence of underweight. However, the history of exclusive breastfeeding did not influence the incidence ($p = 0.471$). In conclusion, the factors affecting the incidence of underweight in children aged 12-23 months in the working area of Cibeureum PHC include maternal education, family income, maternal knowledge, and feeding practices. Meanwhile, the history of exclusive breastfeeding did not influence the incidence.

INTRODUCTION

Adequate nutrition is one of the standards for achieving successful health, welfare, and development in a country (Kemenkes RI, 2023). Malnutrition, also known as undernutrition, is a significant threat to human health. Currently, the world, remarkably low- and middle-income countries, faces a double burden of malnutrition, including wasting, stunting, anemia, vitamin A deficiency, iodine deficiency disorders (IDD), underweight, overweight, and obesity (Laswati, 2019).

Underweight, or low birth weight, is a health issue that can affect children. According to the World Health Organization (WHO), toddlers are classified as underweight if their Z-score is ≥ -3 SD to < -2 SD (Fitriyah and Setyaningtyas, 2021). The first 1,000 days of a child's life are crucial for their growth and development, particularly in terms of lifelong neurological and mental health. Therefore, if factors contributing to underweight are detected before the age of 2, treatment can be initiated more quickly, and other nutritional problems can be prevented (South *et al.*, 2022).

According to Minister of Health Regulation No. 2 of 2020, the weight-for-age index is divided into four categories: severely underweight, underweight, normal, and overweight (Kementerian Kesehatan Republik Indonesia, 2020). According to data from the Ministry of Health of the Republic of Indonesia in 2022, the percentage of children under two years old who are underweight was 6.2%, and those who are

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severely underweight accounted for 1.1% (Kemenkes RI, 2022). The results of the West Java Health Office's records in 2022 also showed that 5.1% of toddlers were underweight, and 0.8% were severely underweight (Kemenkes RI, 2022). According to a 2023 report from the Tasikmalaya City Health Office, 8.43% of the 15,804 toddlers were underweight. Furthermore, the Cibeureum Public Health Center (PHC) had the highest number of underweight toddlers, at 11.77%.

The short-term impact on underweight children is that they become less active, which can, in the long term, increase the risk of cardiovascular disease, delayed brain development, and susceptibility to diseases such as the flu due to a weakened immune system (Vilcins, Sly,. If underweight is not promptly addressed, it can lead to more serious nutritional problems and even death in toddlers. Preventing this issue is a shared responsibility, particularly for midwives. Therefore, midwives also have the role of identifying factors that contribute to underweight so they can screen and provide prompt treatment (Borbon, 2020).

Both direct and indirect factors can cause nutritional problems in children aged 12-23 months. Direct causes of dietary problems include the quantity and quality of food consumed, as well as illnesses. Indirect causes that can impact access to nutritious food and healthcare include poor parenting, inadequate knowledge of nutritional needs for toddlers, complex or inaccessible healthcare systems, and socioeconomic conditions (Fatmawati, Mumthi'ah Al-Kautsar,. Many studies on underweight in Indonesia that have been conducted show that various factors can influence underweight, including age, gender, history of diarrhea (Irawan *et al.*, 2022), diet, parents' income(Tafese *et al.*, 2020), maternal education, and maternal Body Mass Index (BMI) (Li *et al.*, 2020). However, feeding practices and a history of exclusive breastfeeding were factors that are rarely studied because parents paid little attention to the nutrition contained in their child's food. This study determines the factors influencing the incidence of underweight in children aged 12-23 months in the working area of Cibeureum PHC, Tasikmalaya. It potentially addresses or reduces the incidence of underweight by providing follow-up care to families with underweight toddlers who have these factors.

METHOD

This research employed a quantitative study with an analytical approach, utilizing a cross-sectional design. The sample size was determined using a sample calculation formula, and 95 mothers with children aged 12-23 months were recruited from the working area of the Cibeureum PHC. The sample determination employed purposive sampling, using the following criteria: mothers with children aged 12-23 months, who did not have comorbid diseases or infections, were domiciled in the working area of the Cibeureum PHC, and were willing to participate as respondents. The instruments used were a

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questionnaire and nutritional status measurements, as assessed by the anthropometric weight-for-age index. The research questionnaire was tested for validity and reliability. Data analysis used to determine the factors influencing the incidence of underweight in children aged 12-23 months was the Chi-Square test with an $\alpha<0.05$. The ethical approval certificate number was No. 0341/EA/KEPK/2024.

RESULT

Table 1 shows that 51 children (53.7%) are in the normal nutritional status, while 44 children (46.3%) are underweight. Additionally, 41 mothers (43.2%) hold a secondary education, 34 mothers (35.8%) have a primary education, and 20 mothers (21.1%) have a higher education. Moreover, 60 families (63.2%) have low incomes, while 35 families (36.8%) have high incomes. Besides, 64 mothers (67.4%) have a history of exclusive breastfeeding, while 31 mothers (32.6%) do not. Forty-three mothers (45.3%) also have good knowledge regarding feeding, 35 mothers (36.8%) have moderate knowledge, and 17 mothers (17.9%) have less knowledge. Furthermore, 60 mothers (63.2%) implemented appropriate feeding practices, while 35 mothers (36.8%) implemented inappropriate feeding practices.

Table 1. Nutritional Status, Maternal Education, Family Income, The History of Exclusive Breastfeeding, Maternal Knowledge Regarding Feeding, and Feeding Practice in Children Aged 12-23 Months in the working area of Cibeureum PHC in 2024

	Frequency (n)	Percentage (%)
Nutritional Status		
Underweight	44	46.3
Normal	51	53.7
Maternal Education		
Primary School	34	35.8
Secondary School	41	43.2
High School	20	21.1
Family Income		
Low	60	63.2
high	35	36.8
The History of Exclusive Breastfeeding		
Yes	64	67.4
No	31	32.6
Maternal Knowledge Regarding Feeding		
Good	43	45.3
Moderate	35	36.8
Less	17	17.9
Feeding Practice		
Not appropriate	35	36.8
Appropriate	60	63.2

The results of the statistical test using Chi-Square between maternal education and the incidence of underweight in Children Aged 12-23 Months obtained $p = 0.0001$, $\alpha < 0.05$, so $p < \alpha$, indicating that there was an influence between maternal education and the incidence of underweight in children aged 12-23 months (Table 2). The higher a mother's education, the greater the chance her child will avoid being underweight.

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Table 2. The Influence of Maternal Education on the Incidence of Underweight in Children aged 12-23 months in the working area of Cibeureum PHC in 2024

Maternal Education	Nutritional Status				Total		*p*
	Underweight		Normal				
	n	%	n	%	n	%	
Primary School	25	26.3	9	9.5	34	35.8	0.0001
Secondary School	17	17.9	24	25.3	41	43.2	
High School	2	2.1	18	18.9	20	21	
	44	46.3	51	53.7	95	100	

The results of the Chi-Square test between family income and the incidence of underweight in children aged 12-23 months obtained a $p = 0.0001$, $\alpha < 0.05$, so $p < \alpha$, meaning that there was an influence between family income and the incidence of underweight in children aged 12-23 months (Table 3). A high family income can ensure a balanced nutritional intake for children.

Table 3. The Influence of Family Income on the Incidence of Underweight in Children Aged 12-23 Months in the working area of Cibeureum PHC in 2024

Family Income	Nutritional Status				Total		*p*
	Underweight		Normal				
	n	%	n	%	n	%	
Low	39	41	21	22.1	60	63.2	0.0001
High	5	5.3	30	31.6	35	36.8	
	44	46.3	51	53.7	95	100	

The results of the Chi-Square test between the history of exclusive breastfeeding and the incidence of underweight in Children Aged 12-23 Months yielded $p = 0.471$, $\alpha > 0.05$, $p < \alpha$, suggesting that there was no significant influence between the history of exclusive breastfeeding and the incidence of underweight (Table 4). It may occur because the lack of quality and quantity of breast milk causes exclusive breastfeeding not to affect the incidence of underweight.

Table 4. The Influence of Exclusive Breastfeeding History on the Incidence of Underweight in Children Aged 12-23 Months in the working area of Cibeureum PHC in 2024

The History of Exclusive Breastfeeding	Nutritional Status				Total		*p*
	Underweight		Normal				
	n	%	n	%	n	%	
Yes	28	29.5	36	37.9	64	67.4	0.471
No	16	16.8	15	15.8	31	32.6	
	44	46.3	51	53.7	95	100	

The results of the Chi-Square test between maternal knowledge regarding feeding and the incidence of underweight in children aged 12-23 months yielded a p-value of 0.000, $\alpha < 0.05$, $p < \alpha$, suggesting a significant influence between maternal knowledge and the incidence of underweight (Table 5). It is because good maternal knowledge can support providing good food for her child.

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Table 5. The Influence of Maternal Knowledge Regarding Feeding on the Incidence of Underweight Children Aged 12-23 Months in the working area of Cibeureum PHC in 2024

Maternal Knowledge	Nutritional Status				Total		*p*
	Underweight		Normal				
	n	%	n	%	n	%	
Good	16	16.8	27	28.4	43	45.3	0.000
Moderate	12	12.6	23	24.2	35	36.8	
Less	16	16.8	1	1	17	17.9	
	44	46.3	51	53.7	95	100	

The results of the Chi-Square test between feeding practices and the incidence of underweight in children aged 12-23 months yielded a p-value of 0.000, $\alpha<0.05$, $p<\alpha$, suggesting a significant influence between maternal knowledge and the incidence of underweight in children aged 12-23 months (Table 6). Feeding children according to the guidelines on the contents of my plate can help them grow at a normal rate for their age.

Table 6. The Influence of Feeding Practices on the Incidence of Underweight in Children Aged 12-23 Months in the working area of Cibeureum PHC in 2024

Feeding Practices	Nutritional Status				Total		*p*
	Underweight		Normal				
	n	%	n	%	n	%	
Not appropriate	35	36.8	0	0	35	36.8	0.0001
Appropriate	9	9.5	51	53.7	60	63.2	
	44	46.3	51	53.7	95	100	

DISCUSSION

The Incidence of Underweight in Children Aged 12-23 Months

This paper revealed that 44 children (46.3%) aged 12-23 months experienced underweight, while 51 (53.7%) had a normal weight (Table 1). Underweight in children is defined as a weight-for-age that is less than two standard deviations (SD) below the median of the WHO child growth standards (Li *et al.*, 2020). According to researchers' assumptions, underweight in children aged 12-23 months is caused by various factors, including maternal education, feeding practices, and family income. Those can cause children to lack nutrition during the golden period of their growth and development, resulting in underweight children.

A study by Tefase (2020) found that children aged 12–23 months were four times more likely to experience malnutrition than infants aged 6–11 months. Malnutrition worsens as children's nutritional needs for complementary foods increase, and breast milk is insufficient to meet their needs, particularly in children aged 1 year and older. Additionally, toddlers start exploring the environment and tend to put everything they encounter in their mouths. This behavior increases the risk of recurrent infections, particularly in areas with inadequate sanitation, and can significantly impact intestinal absorption, thereby impairing growth and development (Tafese *et al.*, 2020). Even if parents are always paying attention to

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their children, it's still possible for foreign objects to enter their children's mouths when they're not paying attention, leading to bacteria entering the mouth that can interfere with the child's nutrient absorption.

Research conducted by Zhihui Li (2020) found that significant factors associated with the incidence of underweight in children included short maternal height, which had the strongest association with underweight, followed by low maternal body mass index (BMI) and low household income. In a fully adjusted model, the study found that maternal education deficit and low family income were significantly associated with a higher incidence of underweight in children (Li *et al.*, 2020). It is because maternal education and family income may influence the provision of nutritious food to children. Parents with higher levels of education and higher incomes tend to pay more attention to their children's diets.

The Influence of Maternal Education on the Incidence of Underweight in Children Aged 12-23 Months

This investigation revealed that mothers who had children aged 12-23 with underweight comprised 25 individuals (26.3%). Of those mothers, 17 individuals (17.9%) had primary education, two individuals (2.1%) had secondary education, and the remaining individuals had higher education. The statistical analysis found an influence between maternal education and the incidence of underweight in children; most mothers who had a primary education had a greater chance of having children who were underweight compared to mothers who had higher levels of education (Table 2). This result aligns with the research of Li Zhihui et al. (2020), which found a significant correlation between maternal education and the incidence of underweight, with a *p*-value of 0.001(Li *et al.*, 2020).

Several parental factors may help prevent underweight in children, one of which is a higher level of education. It is supported by previous studies showing that parents with low levels of education were more likely to have children with nutritional problems than parents with higher levels of education. Education level may influence the prevalence of underweight, but the effect is not significant. The more influential factor is each parent's ability to access information, as some parents have access to good sources of information from health services regarding their children's nutritional needs, but have limited educational backgrounds (Kementerian Kesehatan Republik Indonesia, 2021). Parents with higher education tend to be more aware of their children's needs, especially regarding their nutrition, because they want their children to experience normal growth and development.

The Influence of Family Income on the Incidence of Underweight in Children Aged 12-23 Months

Based on this study, the number of low-income families with children aged 12-23 months who were underweight was 35 people (41%), while five families (5.3%) had a high income. The statistical tests revealed a significant relationship between family income and the incidence of underweight. Low-income families had a higher incidence of underweight children compared to those with high incomes (Table 3).

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This result aligns with Sari's research (2023), which indicates that family income was associated with the incidence of underweight, with a *p*-value of 0.021 (World Health Organization, 2023).

Low household income potentially affects the quantity and quality of food that families consume. Low-income levels and limited purchasing power can lead to specific dietary habits that hinder nutritional improvement, particularly in children. Available foods tend to be less diverse and contain fewer components that include the protein, vitamins, and minerals children need for growth and development, thereby increasing the risk of malnutrition in children (Rahmawati, S and Rasni, 2019). Family income depends on the household's ability to meet its primary, secondary, and tertiary needs. A high household income makes it easier for a family to meet its basic needs, while a low household income makes it more challenging to do so (Sari, Ibnu and Herlambang, 2023).

Low-income families often overlook the nutritional content of their children's food due to difficulties in meeting their daily needs, resulting in erratic eating patterns and a lack of attention to nutritional content, which can lead to limited menu options. Meanwhile, high-income families can meet their daily needs and enjoy a variety of meals to suit their dietary preferences.

The Influence of Exclusive Breastfeeding History on the Incidence of Underweight in Children Aged 12-23 Months

This paper indicated that among mothers who had children aged 12-23 months who are underweight, as many as 28 people (29.5%) were given exclusive breastfeeding, while 16 people (16.8%) were not given exclusive breastfeeding. The results of statistical tests using Chi-Square showed that the history of exclusive breastfeeding did not affect the incidence of underweight in children aged 12-23 months (Table 4). This result aligns with Selvina's (2021) research, which found no significant relationship between the history of exclusive breastfeeding and the nutritional status of toddlers, with a *p*-value of 0.458 (Fajriani, Aritonang and Nasution, 2020).

In several studies, a history of exclusive breastfeeding was significantly associated with the nutritional status of toddlers. For example, Iqbal's (2020) study demonstrated that both malnutrition and overnutrition in children can be prevented by providing exclusive breastfeeding during the first six months of life. It is because breast milk fulfills the nutritional needs of infants for the first 4 to 6 months of life. It is a fat emulsion in a solution of protein, lactose, and organic salts secreted by two mammary glands. The WHO and UNICEF recommend that, in addition to providing additional food and drink after 6 months of age, breast milk should continue to be given to infants until the age of 2 years (Kurniawati and Yulianto, 2022).

However, this study showed that a history of exclusive breastfeeding did not affect the incidence of underweight. This study aligns with research conducted by Selvina (2021), which found that exclusive

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breastfeeding had no significant relationship with the nutritional status of toddlers. Many factors influence a toddler's nutritional status. One factor is the mother's nutritional status and dietary intake, which will affect the quality of breast milk. The quantity and quality of breast milk will affect the growth and nutritional status of the baby. The quality and frequency of breastfeeding must be maintained. Health education is crucial for providing mothers with information about the benefits of exclusive breastfeeding and the nutritional status of their babies (Hidayati, 2023). Exclusive breastfeeding may not be accompanied by knowledge about breastfeeding frequency. Mothers tend to breastfeed only when the baby cries and for less than 10 minutes, while the recommended exclusive breastfeeding schedule is every 1.5-3 hours for 10-15 minutes each feeding.

Youwe (2020) states that children who are exclusively or non-exclusively breastfed have the same energy allowance. Although the nutrients in breast milk and complementary foods differ, the amount of energy expended remains the same. Exclusive breastfeeding is not the only factor influencing nutritional intake; other factors include the type of family, which typically refers to the extended family structure for most people. Extended family members tend to pay closer attention to a child's nutritional intake. Mothers in extended families can purchase nutritious complementary foods, such as formula milk, fish, and eggs, thereby meeting the recommended protein requirements optimally (Selvina, Fadlyana and Arisanti, 2021). Thus, the history of exclusive breastfeeding has no relationship with nutritional adequacy in children aged 12-23 months, because if the child's nutrition is sufficient through the provision of complementary foods and nutritious food, the history of exclusive breastfeeding does not significantly affect the child's growth and development.

The Influence of Maternal Knowledge Regarding Feeding on the Incidence of Underweight in Children Aged 12-23 Months

Based on this research, mothers with children aged 12-23 months who had underweight children and good knowledge regarding feeding were 16 people (16.8%), 12 (12.6%) had moderate knowledge, and 16 people (16.8%) had less knowledge. The results of statistical tests using the Chi-Square method revealed an influence between maternal knowledge and the incidence of underweight in children aged 12-23 months. Specifically, mothers with insufficient knowledge were more likely to have underweight children compared to mothers with good and sufficient knowledge (Table 5). This result aligns with Sari's research (2022), which indicated a significant relationship between maternal knowledge and the incidence of underweight, with a *p*-value of 0.005 (Sari *et al.*, 2022).

Nutritional knowledge refers to the understanding of food and its nutrients. It can influence mothers' food choices for their children, particularly regarding dietary needs, which can impact a child's nutritional status (Iqbal and Suharmanto, 2020). Mothers with low knowledge are likely to have toddlers with poor

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nutritional status. It is because mothers do not receive good and correct information on how to care for the children, making mothers indifferent to their children's condition, so that their nutritional status becomes poor. To improve the nutritional status of children under 5 years of age, mothers should be informed and proactively consulted with health professionals to help them recognize good dietary practices for their children (Tridiyawati and Handoko, 2019).

Improving mothers' knowledge about the children's nutritional status is crucial. A well-informed mother will monitor their children's nutritional status by regularly checking their growth and development at the Integrated Health Service Post (*Posyandu*) and monitoring their diets, ensuring their children's growth and development are healthy and age-appropriate.

The Influence of Feeding Practices on the Incidence of Underweight in Children Aged 12-23 Months

This research revealed that as many as 35 people (36.8%) had inappropriate feeding practices, while nine (9.5%) had appropriate ones. The statistical tests yielded a *p*-value of 0.0001, indicating a significant influence between feeding practices and the incidence of underweight in children aged 12-23 months. Mothers with inappropriate feeding practices were more likely to have children aged 12-23 months underweight compared to mothers with appropriate feeding practices (Table 6). This result aligns with Samino's research (2020), which found that feeding practice was related to the incidence of underweight, with a *p*-value of 0.001 (Samino, Angelina Febriani and Atmasari, 2020).

In this study, some mothers fed their children properly but still experienced underweight. It happened because their children ate 3 times a day, but sometimes the food was not finished by the child. As in the study conducted by Fajriani (2020), toddlers were given three meals per day, but sometimes two meals were served twice a day. The mothers did not provide their children with three meals a day. When the child did not finish his food, the mother did not try to get the child to finish his food because there was an assumption that eating 3 times a day was not important so that the toddler experienced malnutrition even though based on the message of balanced nutrition for toddlers, mainly children aged 12-23 months, children should be accustomed to eating 3 times a day, namely morning, afternoon and night because in children aged 12-23 months who are in a period of growth and brain development will be very dependent on food intake consumed regularly (Fajriani, Aritonang and Nasution, 2020). Children aged 12-23 months should not be introduced to sweet foods initially, as their appetite will naturally decrease and they may develop a craving for sweet foods. Therefore, parents play a crucial role in feeding their children. Providing bland, natural foods during the complementary feeding phase, until age 5, will help children become familiar with various tastes and develop a good appetite, thereby reducing the likelihood of picky eating.

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The energy required by children aged 12-24 months, based on the Nutritional Adequacy Intake (Ministry of Health, 2014), is 1125 kcal/day. The total energy is obtained from protein, namely 26 g/day, fat as much as 44 g/day, and carbohydrates as much as 155 g/day. Mineral nutrients such as calcium, as much as 650 mg/day, phosphorus, as much as 500 mg/day, and iron, as much as 8.0 mg/day. Additionally, vitamins are crucial in meeting the nutritional needs of children aged 12-23 months. Vitamins needed by babies aged 12-24 months include vitamin A, with adequacy based on the Recommended Dietary Allowance (RDA) of 400 RE/day, and vitamin C as much as 40 mg/day (Kementerian Kesehatan RI, 2014).

The feeding practices are significantly related to a toddler's nutritional status. The better the feeding practices, the better the toddler's nutritional status. Conversely, if mothers provide poor parenting practices in feeding the toddlers, their nutritional status will also be affected. Toddlers rely on their parents/caregivers to meet their basic needs, including food, hygiene, affection, and a sense of security. A toddler's nutritional intake depends on how parents or caregivers care for and feed their child. A mother's lack of involvement in providing food or regular meals can lead to unmet nutritional needs, which can result in malnutrition (Natasya, 2020).

CONCLUSION

In conclusion, the factors influencing the incidence of underweight in children aged 12-23 months in the working area of Cibeureum PHC include maternal education, family income, maternal knowledge, and feeding practices. Meanwhile, the history of exclusive breastfeeding did not influence the incidence. This research could serve as a basis for developing more targeted health education programs tailored to community characteristics. It can be utilized as a resource for enhancing the capacity of cadres to identify and support high-risk families. Future researchers could develop and analyze educational intervention programs, such as cadre training, to enhance knowledge and improve cadre capacity regarding underweight conditions.

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The Effect of Tummy Time Exercise on Gross Motor Skills in Babies Aged 3-6 months

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A B S T R A C T

Tummy time exercise involves positioning the baby on their stomach, allowing them to support their body weight. The purpose of this study was to determine the effect of tummy time exercise on gross motor skills in babies aged 3-6 months. This research design employed analytics using a One-Group Pretest-Posttest Design approach. The population consisted of 43 babies aged 3-6 months at the Integrated Health Service Post, known as Posyandu, in Arjowilangun Village, Malang Regency. The sampling technique was a total sampling. The time of intervention was 2 weeks. Data analysis employed the Wilcoxon Signed Ranks Test. Before giving tummy time exercise intervention, most respondents had normal gross motor skills (97.7%), and a small proportion had delayed gross motor skills (2.3%). After intervention, all respondents had advanced gross motor skills (100%). Based on the results of the Wilcoxon Signed Rank Test, there was a significant influence on gross motor skills in babies aged 3-6 months before and after the intervention, as indicated by a p-value of 0.000 and a calculated z-value of -6.487. In conclusion, tummy time exercises can significantly increase gross motor skills in babies aged 3-6 months. Parents should apply tummy time exercises to babies regularly to promote the development of gross motor skills in babies aged 3-6 months, enabling them to achieve gross motor milestones more quickly.

INTRODUCTION

Baby development is a natural, distinctive, dynamic, and continuous process. Two main factors influence it, namely genetic and environmental factors. Genetic factors are inherited traits that are inherited through gene instructions in fertilized egg cells. Meanwhile, environmental factors are everything around the baby that determines whether its genetic potential can be achieved or not (Reiss et al., 2022). One way to help a baby reach their genetic potential in terms of growth and motor development is through stimulation. This stimulation is an activity designed to enhance the basic abilities of babies aged 3-6 months, enabling them to grow and develop optimally. A form of stimulation can be exercise therapy, which aims to improve physical condition and provide continuous stimulation to the baby's body to achieve optimal development (Mujahidah et al., 2021). One of them is tummy time exercise.

Tummy time exercise involves positioning the baby on their stomach, allowing them to support their body weight. This exercise helps improve head control and strengthen the muscles of the neck, shoulders, arms, and back. The Chartered Physiotherapist in Paediatrics recommends tummy time because it can help prevent delays in the development of motor skills in babies. Therapeutic exercises in the prone position for babies aged 1-4 months could help improve the baby's ability to lift their head (Zhou et al., 2023). Providing play equipment during tummy time to babies aged 2.5-3 months resulted in an increase in the

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longer duration of neck control against gravity compared to the initial conditions of the experiment (Reyhanita et al., 2023).

At three months, babies begin to develop the gross motor skills to lift their heads. At four months, when pulled up to a sitting position, they can lift their heads briefly. At five months, babies can begin rolling from a prone position to their back. By six months, babies can sit with support (Kiebzak, 2021). Gross motor skills, such as lifting the head in infants aged 3-6 months, enable them to maintain a head position for extended periods of time. This head control is crucial in preparation for the next stage of development, as it helps infants develop motor skills that support movement control and other physical activities (Tupsila et al., 2022). The purpose of this study was to determine the effect of tummy time exercise on gross motor skills in babies aged 3-6 months at the Integrated Health Service Post, known as *Posyandu*, in Arjowilangun Village, Kalipare District, Malang Regency.

METHOD

This research design employed analytics using a One-Group Pretest-Posttest Design approach. The population in this study was 43 babies aged 3-6 months at *Posyandu* in Arjowilangun Village, Kalipare District, Malang Regency. Furthermore, the sampling technique used in this research was a total sampling, with the research sample comprising all babies aged 3-6 months. The instrument utilized the Standard Operating Procedure (SOP) for tummy time exercises and the Denver II to assess gross motor development. The time of intervention was 2 weeks. Data analysis employed the Wilcoxon Signed Ranks Test, using the SPSS 25 application, to determine the effect of tummy time exercise on gross motor skills in babies aged 3 to 6 months. This research underwent an ethical feasibility test by the Ethics Commission of the Institute of Science and Health Technology, Dr. Soepraoen Hospital, Malang, with certificate number 017/028/II/EC/KEPK/2024.

RESULT

Posyandu in Arjowilangun Village, Kalipare District, Malang Regency, Arjowilangun *Posyandu* had one midwife and two nurses. It had 1 Auxiliary Health Center, known as *Pustu*, and 16 *Posyandu* units. In the 16 *Posyandu* units, there were 43 babies aged 3 to 6 months.

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Table 1. The Characteristics of Respondents

The Characteristics of Respondents	Frequency (n)	Percentage (%)	Mean ± SD
Age			
3-month-old	15	34.9	
4-month-old	9	20.9	
5-month-old	9	20.9	
6-month-old	10	23.3	
Sex			
Boy	24	55.8	
Girl	19	44.2	
Gestational Age at Birth			
Normal	42	97.7	
Premature	1	2.3	
Immature	0	0	
Birth History			
Normal	26	60.5	
Sectio Secarea	17	39.5	
Weight of Birth			3.04 ±0.373
Length of Birth			64.63±3.230

Table 1 shows that the percentages of babies aged 3 months, 4 months, 5 months, and 6 months are 34.9%, 20.9%, 20.9%, and 23.3%, respectively—a boy-to-girl ratio of 55.8%:44.2 %. The normal gestational age at birth is 97.7%, while babies born prematurely account for 2.3% of respondents. The history of normal births is 60.5%, while the history of caesarean births is 39.5%. The baby's birth weight has a mean of 3.04%, and a standard deviation of .373%. The birth body length of the baby has a mean of 64.63%, and a standard deviation of 3.230%.

Table 2. Gross Motor Skills Before and After Tummy Time Exercise in Babies Aged 3-6 months

Gross Motor Skills	Pretest		Posttest		Δ	*p*
	F	%	f	%		
Advanced	0	0	43	100		
Suspect	0	0	0	0		
Normal	42	97.7	0	0		
Delay	1	2.3	0	0		
	3.02 ± 0.152		1.00 ± 0.000		-6.487	0.000

Before giving tummy time exercise intervention, most respondents had normal gross motor skills (97.7%), and a small proportion had delayed gross motor skills (2.3%). After intervention, all respondents had advanced gross motor skills (100%). Based on the results of the Wilcoxon Signed Rank Test, there was a significant influence on gross motor skills in babies aged 3-6 months before and after intervention, as indicated by the *p*-value (p=0.000) and the difference (Δ=-6.487) (Table 2).

DISCUSSION

The results of this paper showed that, in the pretest, 42 respondents fell into the normal category, indicating gross motor development in accordance with the standards or age range generally expected. One was in the delayed gross motor skills, meaning the baby showed signs that his ability to develop gross motor skills was delayed or occurred later than in babies his age. The posttest results showed that 43

respondents fell into the advanced category, demonstrating increased gross motor skills after receiving tummy time exercise for 2 weeks (Table 2). Thus, babies aged 3-6 months made significant progress in gross motor skills after giving tummy time exercises for 2 weeks. Later, after the research, parents were able to continue tummy time exercise independently.

The results of this research are supported by motor development theory (Gesell and McGraw). Tummy time exercises promote the development of directed gross motor movement patterns, such as head control, arm pushing, and the ability to roll over. It is in line with the sequential stages of motor development, where babies develop muscle control gradually from head to toe (cephalocaudal development) (Lovell et al., 2024). According to psychosocial theory (Erik Erikson), this occurs during the trust vs. mistrust stage. Babies from 0 to 1 year build a sense of security through interactions with caregivers. Parents who are involved during tummy time exercise help build the baby's self-confidence through attention and stimulation (Ernandini & Wiryaputra, 2024).

According to researchers, tummy time exercises play a crucial role in supporting the development of babies aged 3 to 6 months. The goal is not only to strengthen the neck and shoulder muscles, but also to help babies prepare basic motor skills such as rolling over, sitting up, and crawling. Apart from that, tummy time exercise is also a simple way to prevent problems such as plagiocephaly (flat head), which often occurs in babies who lie on their backs for too long (Nisa & Sulistyorini, 2024). This activity also provides sensory and visual stimulation, which is beneficial for the baby's cognitive development. Tummy time exercise is not just about physical exercise. It also creates an opportunity for parents to interact with their baby, strengthen emotional bonds, and provide a sense of security and comfort. So, tummy time exercise is a holistic form of stimulation that supports the baby's overall growth (Hewitt et al., 2020). However, this must be done carefully, paying attention to the baby's comfort, because not all babies immediately feel comfortable when lying on their stomachs. A gradual approach and responsiveness to the baby's needs are key to maximizing the benefits of tummy time exercises (Zachry & Woods, 2023).

Gross motor skills in babies aged 3-6 months show that strengthening the neck and back muscles at this age enables them to begin learning to lift their head and chest when sleeping on their stomach (tummy time) (Fajzrina et al., 2022). In this study, 43 respondents participated in both a pretest and a posttest, yielding advanced gross motor skills in all respondents. The progress made by respondents/babies in strengthening their neck, back, and shoulder muscles is vital for further gross motor development. Babies begin to learn to balance their bodies when moving, such as when they try to lift their chest or push themselves to roll over. Many babies start to learn to roll over from their back to their stomach or vice versa. By the end of 6 months, most babies begin to strengthen the muscles needed to sit with support or even sit on their own without assistance for a short time. Through gross motor activities such as lifting, rolling, and kicking, babies begin to explore the world around them (Organization, 2025).

The results of this research are supported by Gesell's theory of motor development, which is based on the principle of maturation (Maturation Theory). Arnold Gesell stated that motor development occurs as a result of the maturity of the central nervous system, so that babies follow a regular development pattern, such as at 3 months they can lift their heads when lying on their stomachs, at 4 months they can roll over from their stomachs to their backs, at 5–6 months they can support their bodies with their hands when prone, trying to sit with support. According to motor development theory, milestones represent the development of control over physical movements through the coordinated activity of nerve centers, nerves, and muscles. Supportive stimulation, such as tummy time exercise, physical interaction, and a safe environment, is vital (Maciak et al., 2024).

In addition, the role of parents and caregivers is crucial in creating an environment that supports the development of babies' gross motor skills. Additionally, consultation with a healthcare professional is necessary if the baby appears to be experiencing significant delays. A balanced approach between stimulation and attention to the baby's needs will help them reach gross motor milestones optimally (Ishlah et al., n.d.).

In addition, the Wilcoxon Signed Rank Test yielded a *p*-value of 0.000, indicating a significant influence on gross motor skills in babies aged 3-6 months before and after tummy time exercise (Table 2). Babies who regularly engage in tummy time exercises tend to control their head movements more quickly than babies who are not given similar stimulation. During tummy time exercises, babies learn to support their bodies with their hands and push up. This activity strengthens the muscles of the arms, back, and abdomen, which support the ability to roll over. The prone position reduces pressure on the back of the baby's head, thereby preventing head deformity from prolonged lying on the back. Research shows that babies who frequently engage in tummy time exercises tend to reach gross motor milestones, such as rolling over, sitting up, and crawling, more quickly. During tummy time exercises, babies learn to move their heads, arms, and legs in a coordinated manner, laying the critical foundation for developing balance and mobility. In the prone position, babies have a different perspective from which to observe the environment, motivating them to reach for objects or people, which stimulates gross motor and cognitive skills (Maciak et al., 2024).

Based on Gesell's developmental theory (Maturation Theory), Arnold Gesell states that motor development is the result of the nervous system's maturity, which follows a regular pattern. Tummy time exercises support this development because they engage large muscles, such as the neck, shoulders, and back, which are essential for achieving gross motor milestones. It also helps babies overcome primitive reflexes, including the asymmetrical tonic neck reflex, which allows for control of the head and movement—a more coordinated body (Murtiningsih et al., 2025). According to Arnold Gesell, in Kamaruddin Husin, human growth follows patterns that can be learned. Structure precedes function. The set of muscles is complete

before they can be used fully. Tummy time provides necessary environmental stimulation to strengthen the muscles of the neck, shoulders, and back, which are the foundation for gross motor skills such as rolling over, sitting up, crawling, and walking (Hewitt et al., 2020). Vygotsky and Bandura referred to it as the theory of social learning through the environment, encompassing interactions with parents or caregivers. When babies are given tummy time, support and encouragement from parents (such as placing toys in front of the baby) motivates the baby to move and explore his environment, which supports gross motor development (Rattler, 2024).

Tummy time exercises have a profoundly positive influence on the gross motor development of babies aged 3-6 months. This activity not only helps babies develop the strength of their large muscles, such as the neck, shoulders, back, and arms, but also prepares them for subsequent gross motor milestones, including rolling over, sitting up, and crawling. However, it is also vital to ensure that tummy time exercise is done in a fun and safe way, as some babies may feel uncomfortable at first. With the right approach, such as incorporating toys or engaging in interaction with parents, babies will enjoy this activity more. Overall, tummy time exercise is a simple yet crucial step in supporting the gross motor development of babies aged 3–6 months, as well as laying a strong foundation for future movement and mobility.

CONCLUSION

In conclusion, tummy time exercises can significantly increase gross motor skills in babies aged 3-6 months. Parents should apply tummy time exercises to babies regularly to promote the development of gross motor skills in babies aged 3-6 months, enabling them to achieve gross motor milestones more quickly.

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The Spiritual Emotional Freedom Technique (SEFT) Therapy Combined with Dhikr to Overcome Thanatophobia in the Older People

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A B S T R A C T

Older adults are a phase of human life accompanied by a decline in physical, psychological, and social conditions. These changes have the potential to cause mental health issues such as thanatophobia or an excessive and irrational fear of death. One way to overcome is through non-pharmacological therapy, the Spiritual Emotional Freedom Technique (SEFT) therapy, combined with dhikr. This study evaluates the effectiveness of SEFT therapy combined with dhikr as a complementary intervention in geriatric nursing on thanatophobia levels in older adults. It employed a pre-experimental design with a one-group pretest-posttest design. There were 24 respondents with a total sampling technique. The independent variable was the combination of SEFT therapy and dhikr, and the dependent variable was the levels of thanatophobia. The instrument was a Thanatophobia questionnaire. Therapy was conducted in four sessions over a period of two weeks, with each session lasting between 30 and 60 minutes. Data analysis used the Wilcoxon signed-rank test with a significance level of $p < 0.05$. Pre-test results showed that most respondents experienced very high levels of thanatophobia (70.83%), with the average score reaching 45. After intervention, the average score dropped to 15, and most respondents (87.5%) fell into the mild thanatophobia levels. The Wilcoxon Signed-Rank Test obtained a p-value of 0.000, indicating that the SEFT therapy and dhikr were significantly effective in reducing thanatophobia levels in respondents. The SEFT therapy combined with dhikr could be an alternative complementary nursing intervention in overcoming thanatophobia among older people.

INTRODUCTION

Elderly life is characterized by a decline in physical, psychological, and social functioning, which can lead to various health problems, including psychological disorders such as Thanatophobia (Nurrohmah and Rinaldi, 2022). Thanatophobia is an excessive and irrational fear of death, which can lead to symptoms such as chronic anxiety, avoidance of conversations or situations related to death, and disruption to daily activities (Nurjanah and N, 2019).

The increase in the elderly population globally and nationally potentially increases problems such as thanatophobia. In Indonesia, as of 2019, there were 25.9 million older adults (9.7%), and this number is projected to increase to 48.2 million (15.77%) by 2035. Globally, the number of older adults reached 727 million in 2020 and is projected to grow to 1.5 billion by 2050 (Halid, 2021). As they age, older people are more susceptible to loneliness, depression, and other psychosocial disorders, exacerbating the fear of death or Thanatophobia (Nuroh, 2022). This phenomenon was discovered in Dahan Rejo Lor, Gresik Regency; 24 older people showed signs and symptoms of thanatophobia. Thus, effective psychosocial

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interventions are critical, particularly given the limited access to mental health services in the area (Jasmita, 2024).

Thanatophobia is influenced by many factors, such as old age, traumatic experiences, deteriorating health, the loss of a loved one, and anxiety. According to Freud's psychoanalytic perspective, the fear of death is also linked to the subconscious human desire for immortality (Saefudin, 2020). Therefore, interventions should not only focus on psychological aspects but also on spiritual aspects to help older adults confront this fear comprehensively.

One alternative intervention that is increasingly being used in complementary nursing is the Spiritual Emotional Freedom Technique (SEFT) therapy combined with dhikr. SEFT is a technique that combines stimulation of energy points in the body (similar to acupressure) with spiritual affirmations to manage emotional disturbances and anxiety. In addition, dhikr is a form of Islamic worship in which phrases or prayers are repeatedly recited to remind oneself of God. It has a calming effect that can provide inner calm and a sense of peace. The combination of the two is believed to help older adults reduce anxiety, accept the reality of death, and improve their quality of life (Nurjanah and N, 2019; Saefudin, 2020). SEFT therapy combined with dhikr offers a holistic approach that relies not only on modern psychological techniques but also incorporates spirituality as an essential part of the emotional healing process. Through this therapy, older adults potentially can become calmer, more accepting, and more prepared to face death as part of the human life cycle. This study evaluates the effectiveness of SEFT therapy combined with dhikr as a complementary intervention in geriatric nursing on thanatophobia levels in older adults.

METHOD

This study employed a pre-experimental design with a One-Group Pre-Test and Post-Test Design. In this design, a group of subjects was given a pre-test before the intervention, then received treatment, and then a post-test was administered to measure the changes that occurred (Nursalam, 2020). This study was conducted from January 6 to 18, 2025, in Dahan Rejo Lor, Gresik Regency. The study respondents were all 24 older adults with Thanatophobia in Dahan Rejo Lor, Gresik Regency, selected using a total sampling technique. Inclusion criteria included individuals aged 60 years or older, diagnosed with thanatophobia, able to communicate, physically and mentally stable, and willing to sign an informed consent form. Older people with severe cognitive impairment, psychiatric disorders, terminal illnesses, or psychotropic dependence were excluded from the study. The independent variable in this study was SEFT therapy combined with dhikr, while the dependent variable was the level of thanatophobia in older people. Therapy was conducted in four sessions over a period of two weeks, with each session lasting between 30 and 60 minutes. Each session included brief education about thanatophobia and the implementation of SEFT therapy, combined with the recitation of the dhikr: "*Laa haula walaa quwwata illa billah*", meaning there

is no might nor power except with Allah. The instrument used to measure the dependent variable was the Thanatophobia Scale (Sinoff, 2017), which consisted of 10 statements with a Likert scale ranging from 1 to 5. The total score ranged from 10 to 50, with interpretations from low to very high levels. After the data were collected through pre-test and post-test, editing and coding processes were carried out, and then analyzed using univariate analysis for frequency distribution and bivariate analysis using the Wilcoxon Signed Rank Test with a confidence level of $\alpha < 0.05$ to determine the significance of changes in the before-and-after values. The Authors paid attention to the principles of anonymity, informed consent, and confidentiality in maintaining research ethics, and the number of ethical clearances was No. 112/56/456.10/2024.

RESULT

This research was conducted in Dahan Rejo Lor, Kebomas District, Gresik Regency. This area was chosen because it had an elderly community that actively participates in the community health post (*Posbindu*) and engages in religious activities, such as dhikr and regular religious studies. A strong social environment and the support of health workers are essential factors in implementing the Spiritual Emotional Freedom Technique (SEFT) therapy combined with dhikr to overcome thanatophobia (excessive fear of death) in the elderly. Table 1 shows that most respondents are women (75%). Half of them have an age range of 60–69 years (54.16%), are elementary school graduates (50%), and have no serious illnesses (54.16%).

Table 1. Characteristics of Older Adults with Thanatophobia in Dahan Rejo Lor, Gresik

Characteristics of Respondents	Frequency (n)	Percentage
Sex		
Male	6	25%
Female	18	75%
Age		
60 – 69 years old	13	54.16%
70 – 74 years old	6	25%
75 – 80 years old	5	20.83%
Education		
Unschooling	0	0%
Elementary School	12	50%
Junior High School	2	8.33%
Senior High School	9	37.5%
University	1	4.16%
Medical History		
Hipertension	5	20.83%
Osteoarthritis	6	25%
No serious illnesses	13	54.16%
Total	14	100%

Before the intervention, a pre-test was conducted using the Thanatophobia Scale. The results showed that most respondents had very high levels of anxiety (70.83%), with the remainder having high levels (29.17%). After four sessions of SEFT intervention combined with dhikr over two weeks, a post-test was conducted. The results showed a significant decrease in thanatophobia levels. Twenty-one respondents

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(87.5%) experienced a decline in their scores to the mild (normal) category, while three others decreased to the moderate (normal) category. The Wilcoxon signed-rank test yielded a *p*-value of 0.000 ($p < 0.05$), meaning there was a significant difference between the pre-test and post-test scores (Table 2). The SEFT therapy combined with dhikr was effective in reducing thanatophobia levels in the respondents.

Table 2. The effect of SEFT therapy combined with dhikr on the level of thanatophobia

Thanatophobia Levels	Pre Test		Post Test		*p*
	n	%	n	%	
Low or Normal (10 – 20)	0	0	18	75	0.000
Moderate or Normal (21 – 30)	0	0	6	25	
High or Abnormal (31 – 40)	7	29.17	0	0	
Very high or Abnormal (41 – 50)	17	70.83	0	0	
Total	24	200	24	100	

Thus, the SEFT therapy combined with dhikr could be an alternative complementary nursing intervention based on spirituality and emotion in older people.

DISCUSSION

Thanatophobia Before The SEFT Therapy Combined with Dhikr

Pre-test results showed that most respondents experienced very high levels of thanatophobia. The average score reached 45 (Table 2). It indicates that fear of death dominated the respondents' thoughts and feelings before the intervention. Several factors contributed to this condition, including: the majority of respondents were women, had low levels of education, and had chronic illnesses such as hypertension and osteoarthritis (Table 1). It aligns with a study, which found that older age, medical history, and education level contributed to high levels of death anxiety (Nursalam, 2020). Although the local community in this study had a strong religious background, as evidenced by their habit of attending religious studies and dhikr, these practices had not been effective enough to overcome thanatophobia. According to the Emotional Energy Theory in SEFT, fear is rooted in negative energy blockages and must be addressed by stimulating meridian points, combined with spiritual affirmations (Safira Nahar Fitriana and Padoli, 2021). Furthermore, the practice of dhikr can be linked to a mindfulness approach, which involves an effort to increase present-moment awareness and accept uncertainty, including the inevitability of death. A study by Kibtyah et al. (2024) found that dhikr had been shown to reduce existential anxiety.

Thanatophobia After SEFT Therapy Combined with Dhikr

After four sessions of intervention over two weeks, there was a significant decrease in thanatophobia scores. The average score dropped to 15, and most respondents (87.5%) fell into the mild thanatophobia levels (Table 2). The effectiveness of this therapy was not only evident in the numbers, but also in the changes in respondents' attitudes, who became calmer, more open in discussing death, and felt more spiritually prepared. These findings are supported by research by Juniarni et al. (2022), which showed that

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dhikr can calm the nervous system and increase feelings of security in older adults experiencing anxiety. It can increase spiritual calm and self-acceptance of death. A study also confirmed that SEFT therapy could reduce emotional disturbances by restoring the body's energy balance (Safira Nahar Fitriana and Padoli, 2021). It has a working mechanism that balances emotional energy through tapping techniques on the body's meridian points, thereby calming the brain's limbic system, which is the center of emotional regulation. The SEFT therapy combined with dhikr is considered more easily accepted because it is non-invasive, aligns with religious values, and does not cause dependence like sedatives. Respondents in this study appeared to be more responsive to this spiritual-psychological approach than conventional medical or clinical psychology-based therapy.

The Effect of the SEFT Therapy and Dhikr on Thanatophobia in Older People

The SEFT therapy and dhikr were significantly effective in reducing thanatophobia levels in respondents. Post-test results showed a decrease in anxiety from very high to low, with an average score dropping to 17.2 ± 2.5. This decrease was confirmed by the Wilcoxon Signed-Rank Test, with a *p*-value of 0.000, indicating a significant difference between the pre- and post-intervention conditions (Table 2). The intervention in this study approach integrates two essential dimensions of well-being in older people: spirituality and emotional management. The SEFT therapy works by tapping on meridian points on the body while reciting positive and spiritual affirmations, whereas dhikr helps individuals accept their destiny, let go of life's burdens, and strengthen their bond with God (Arroisi & Syamil, 2025). In addition to this intervention, the religious social environment in Dahan Rejo Lor also contributed to facilitating the acceptance of the intervention.

CONCLUSION

In conclusion, tummy time exercises can significantly increase gross motor skills in babies aged 3-6 months. Parents should apply tummy time exercises to babies regularly to promote the development of gross motor skills in babies aged 3-6 months, enabling them to achieve gross motor milestones more quickly.

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Social Cognitive Theory (SCT) Based Breastfeeding Education Model: Implications for Early Breastfeeding Practices and Maternal Self-Efficacy in Badung Regency, Bali

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A B S T R A C T

Exclusive breastfeeding coverage in Indonesia, including Badung District, remains below the national target of 67%. Maternal self-efficacy and employment status are key barriers, often leading to early introduction of formula feeding. This study aimed to analyze the effect of a breastfeeding education model based on Social Cognitive Theory (SCT) on early breastfeeding practices, maternal self-efficacy, and infant growth. A quasi-experimental study with a non-equivalent control group design was conducted involving 76 postpartum mothers (38 in the intervention group and 38 in the control group), recruited on the third day postpartum. The intervention group received SCT-based breastfeeding education for six weeks, while the control group received standard breastfeeding education. Data were analyzed using Chi-square, Mann–Whitney, and t-tests, with a significance level set at $p < 0.05$. The intervention group demonstrated significantly higher post-test scores for early breastfeeding practices (36.16 vs. 29.37; $p < 0.001$) and maternal self-efficacy (52.00 vs. 38.71; $p < 0.001$) compared with the control group. SCT-based breastfeeding education is effective in improving early breastfeeding practices and enhancing maternal self-efficacy. Its integration into breastfeeding promotion programs is recommended to optimize maternal and child health outcomes.

INTRODUCTION

Breast milk is the best food for babies in the first six months of life because it contains all essential nutrients, including proteins, fats, carbohydrates, vitamins, minerals, enzymes, hormones, and antibodies in the right amount and proportion (Maizuputri et al., 2024; Rosuzeita et al., 2018). Exclusive breastfeeding plays an important role in optimal growth and protection of babies from various diseases.

However, exclusive breastfeeding coverage in Indonesia still has not reached the target. WHO data in 2022 shows exclusive breastfeeding coverage of 67.96%, a decrease compared to 2021 of 69.7%. The government targets 80% coverage, but in Badung Regency, the coverage figure is still around 67% (Badung Health Office, 2023; Ministry of Health, 2016; Munira SL, 2023; Stuart Scott, 2015). This low achievement is influenced by the factors of working mothers, lack of knowledge about lactation management, and a less supportive social environment. This condition has an impact on the low confidence or self-efficacy of mothers in giving exclusive breastfeeding.

Self-efficacy is one of the main psychological factors in the success of breastfeeding. Mothers with self-efficacy are Taller and are more able to face challenges, such as pain, fussy babies, and social pressure to give formula milk. Research shows that mothers with self-efficacy are more likely to successfully initiate and maintain exclusive breastfeeding, are more confident in making decisions, and actively seek help to

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solve breastfeeding problems. (Miaty et al., 2016; Prasitwattanaseree et al., 2019; Rai et al., 2023; Souza et al., 2020).

Previous studies have also supported the importance of self-efficacy. Dennis (2003) developed the Breastfeeding Self-Efficacy Scale (BSES), which has been proven to be able to predict the success of exclusive breastfeeding. (Durmazoğlu et al., 2024). A study in Madiun by Syahputri et al. (2020) used the SCT approach and found that personal factors and social support had a significant effect on the success of exclusive breastfeeding. (Ayran & Çelebioğlu, 2022). Research by Indrasari et al. (2024) also shows that demographic factors, knowledge, and self-efficacy of Mothers are closely related to breastfeeding success. (Seddighi et al., 2022). In addition, a meta-analysis by Meedya et al. (2010) confirms that interventions that improve self-efficacy consistently support the achievement of exclusive breastfeeding. (Ouyang et al., 2023).

Conventional breastfeeding education has not been effective enough to change maternal behavior. An approach that is able to touch the psychological aspect, especially in building self-efficacy (Huda et al., 2022; Maleki et al., 2021; Mesters et al., 2013; Wong et al., 2021). Social Cognitive Theory (SCT) emphasizes the interaction between personal factors, social environment, and behavior in forming healthy habits. The SCT-based approach allows breastfeeding education to be designed more effectively by strengthening cognitive factors, social support, and the formation of early breastfeeding behaviors (Handayani et al., 2010; Minas & Ganga-Limando, 2016)

Studies on the application of SCT in breastfeeding education are still limited, especially in Badung Regency, which has a distinctive social and cultural context. Therefore, this study was conducted to analyze the influence of the SCT-based breastfeeding education model on early breastfeeding practices and self-efficacy of breastfeeding mothers in Badung Regency.

METHOD

The design of this study uses a quasi-experimental design with a non-equivalent control group pretest-posttest design approach. The research subjects were divided into two groups, namely the treatment group and the control group. The treatment group received breastfeeding education based on Social Cognitive Theory (SCT), while the control group only received standard education.

The study population was all breastfeeding mothers 0–3 days postpartum who were in the working area of UPTD Puskesmas Petang I as the control group and UPTD Puskesmas Kuta Utara as the treatment group. The research was carried out from May to June 2025. Samples were selected using purposive sampling techniques based on the set inclusion criteria.

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The number of samples was calculated based on the sample size determination formula for experimental studies, taking into account alpha values of 0.05, beta of 0.05, standard deviation, and mean difference from previous studies. From the results of the calculation, it was obtained that a minimum sample requirement of 34 respondents per group was obtained. However, by taking into account the possibility of a dropout of 10–25%, the number of samples was increased so that 38 respondents in the treatment group and 38 respondents in the control group were obtained.

Before the research was conducted, this procedure had received ethical approval from the Health Research Ethics Committee (KEPK). The instruments used consisted of an early breastfeeding practice questionnaire developed by the researcher and tested for validity and reliability, as well as a Breastfeeding Self-Efficacy Scale Short Form (BSES-SF) questionnaire to measure maternal self-efficacy.

The intervention was given to the treatment group in the form of SCT-based breastfeeding education, which was carried out once every week for six weeks. In the control group, mothers only received standard education according to procedures at health facilities. Measurements were taken in both groups, both before and after the intervention.

The data obtained were analyzed using the Shapiro-Wilk normality test to determine the distribution of the data. Furthermore, bivariate analysis was performed using a paired t-test to assess changes in the group, and an independent t-test or non-parametric test (Chi-square, Mann-Whitney) to compare results between groups. The significance level was set at $p < 0.05$.

RESULT

This study involved 76 people, 38 postpartum mothers in the control group and 38 postpartum mothers in the intervention group. This study was conducted in Badung Regency, Bali, from May to June 2025. Each subject met the inclusion and exclusion criteria and was a postpartum mother on the third day postpartum. For six weeks, interventions and observations were carried out to evaluate how effective the Social Cognitive Theory-based breastfeeding education model was on early breastfeeding practices and maternal self-efficacy.

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Table 1. Characteristics of respondents

Yes	Variable	Group		Total	P value
		Control (n=38)	Intervention (n=38)		
1	Age				
	<20 years old	8 (21,1%)	5 (13,2%)	13 (17,1%)	0,591*
	20-35 years old	19 (50,0%)	19 (50,0%)	38 (50,0%)	
	>35 years old	11 (28,9%)	14 (36,8%)	25 (32,9%)	
2	Parity				
	Primipara	21 (55,3%)	23 (60,5%)	44 (57,9%)	0,642*
	Multipara	17 (44,7%)	15 (39,5%)	32 (42,1%)	
3	Mother's work				
	Work	20 (52,6%)	19 (50,0%)	39 (100%)	0,818*
	IRT	18 (47,4%)	19 (50,0%)	37 (100%)	
4	Nipple Anatomy				
	Sink	11 (28,9%)	11 (28,9%)	22 (28,9%)	1,000*
	Usual	27 (71,1%)	27 (71,1%)	54 (71,1%)	
5	Planned pregnancy				
	Not	3 (7,9%)	3 (7,9%)	6 (7,9%)	1,000*
	Yes	35 (92,1%)	35 (92,1%)	70 (92,1%)	
Total		38 (100%)	38 (100%)	76 (100%)	

Test description: * *Chi-Square test*

Table 1 shows a homogeneous and comparable distribution of the basic characteristics of the respondents in both groups. These variables included age, parity, occupation, nipple anatomy, and planned pregnancy status, with the entire p> p-value of 0.05 based on the Chi-Square test. The homogeneity of these characteristics ensures that comparisons between control groups and interventions in follow-up analyses can be made validly and objectively.

Table 2. Early Breastfeeding Practices, Self-Efficacy and Infant Weight Before and After the SCT-Based Breastfeeding Education Model

Yes	Variable	Group		P value
		Control (n=38)	Intervention (n38)	
1	Pretest Breastfeeding Practice			
	Red ± SD	17.53 ± 5.05	17.89 ± 4.93	0,771*
	Median	18,0	18,0	
	Range	10 - 25	10 - 25	
2	Posttest Breastfeeding Practice			
	Red ± SD	29.37 ± 6.36	36.16 ± 5.88	0,000*
	Median	30,0	37,0	
	Range	20 - 39	25 - 46	
3	Self-Efficacy Pretest			
	Red ± SD	23.76 ± 6.77	24.50 ± 6.27	0,647*
	Median	24,50	25,0	
	Range	14-35	13-35	
4	Self-Efficacy Posttest			
	Red ± SD	38.71 ± 6.09	52.0 ± 7.76	0,000*
	Median	38,0	53,0	
	Range	30 – 50	36 - 64	

Test Description: *) *Mann-Whitney Test*

Table 2 showed that before the intervention, infant weight, self-efficacy, and early breastfeeding practices did not differ statistically substantially (p > 0.05) and had relatively equal average, median, and range values in both groups. After six weeks of the SCT-based teaching model, the intervention group's early

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breastfeeding habits (mean 36.16 vs. 29.37; p = 0.000) and maternal self-efficacy (mean 52.0 vs. 38.71; p = 0.000) improved significantly higher than in the control group.

Table 3. Social Cognitive Theory (SCT) Based Breastfeeding Education Model: Implications for Early Breastfeeding Practices and Maternal Self-Efficacy in Badung Regency, Bali

Yes	Variable	Group		P value
		Control (n=38)	Intervention (n38)	
1	Delta Breastfeeding Practice			
	Red ± SD	11.84 ± 8.35	18.26 ± 7.07	0,000**
	Median	11,5	17,5	
	Range	-5 - 26	5-36	
2	Delta Self-efficacy			
	Red ± SD	14.94 ± 9.39	27.50 ± 8.90	0,001**
	Median	15,50	28,0	
	Range	-2 - 36	8 – 49	

Test Description: **) Mann-Whitney Test, **) T Independent Test*

Table 3. showed changes (delta) in infant weight scores, maternal self-efficacy, and early breastfeeding practices before and after the intervention for both groups. Compared to the control group (mean delta 11.84 ± 8.35; p = 0.000), the average increase in early breastfeeding habits in the intervention group (mean delta 18.26 ± 7.07) was much greater. Similarly, the increase in mean maternal self-efficacy in the intervention group (mean delta 27.50 ± 8.90) was higher than in the control group (mean delta 14.94 ± 9.39; p = 0.001). Based on these findings, compared to traditional teaching, the SCT-based breastfeeding education model is substantially more successful in improving early breastfeeding behavior and self-efficacy of parents in Badung Regency, Bali.

DISCUSSION

Characteristics of respondents

In this study, the characteristics of the respondents showed that the control and intervention groups were distributed in a balanced manner based on important variables such as age, parity, maternal occupation, nipple anatomy, and planned pregnancy status. The absence of statistically significant differences in all basic variables (p > 0.05) indicates this homogeneity. Therefore, it is possible to objectively compare the two groups to evaluate the impact of Social Cognitive Theory-based educational interventions on early breastfeeding practices and maternal self-efficacy. To guarantee the internal validity of the research and reduce selection bias, a balanced distribution is essential.

According to other studies, the mother's age between 20 and 35 years is the ideal reproductive age for exclusive breastfeeding. Mothers aged 20 to 35 are more likely to breastfeed exclusively than mothers younger than 20 or older than 35 (Indrasari et al., 2024). Mothers aged 20 to 35 years are more likely to breastfeed exclusively than those younger than twenty or older than thirty-five; This age group was 1.6

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times more likely to succeed, suggesting that most mothers in this age group continued to breastfeed exclusively for up to six weeks (Asih Dwi et al., 2022).

Previous childbirth experiences did not dominate either group, according to relatively balanced primipara and multipara parity distributions. Previous studies have shown that the experience of childbirth (parity) can affect breastfeeding knowledge and skills, which makes it important. A p value of 0.275 from the study at the Sialang Public Health Center showed that there was no significant correlation between parity and breastfeeding techniques. This suggests that the innate nature of primipara or multipara mothers does not affect the way they breastfeed. However, the same study found a significant relationship between the level of knowledge and breastfeeding techniques, with a p-value of 0.002, suggesting that knowledge is essential for good breastfeeding practices (Amiruddin et al., 2023).

In addition, the number of working mothers and housewives is evenly distributed, which means that the influence of job status on breastfeeding behavior can be minimized. The family helps with exclusive breastfeeding. Regardless of their employment status, mothers who have strong family support are more likely to breastfeed themselves (Simanjuntak et al., 2022). Flexible work arrangements and support from colleagues and supervisors are essential to allow mothers to continue breastfeeding after returning to work. They increase confidence in meeting personal breastfeeding goals and maintaining the supply of breast milk (Burns et al., 2023).

It was noted that the anatomical variables of the nipple, as well as the status of the planned pregnancy, were balanced between groups. Variations such as denser areolas, shorter nipples, or wider nipples can also cause problems. These anatomical differences can cause problems getting the right hooks, which are very important for proper breastfeeding (Ventura et al., 2021). Thus, the results of the research obtained can later be attributed more to the effectiveness of the SCT-based education model, without being influenced by characteristics that have the potential to be a confounding factor.

Early Breastfeeding Practices and Self-Efficacy Before and After the SCT-Based Breastfeeding Education Model

In this study, control groups and interventions were studied before and after the application of the Social Cognitive Theory (SCT)-based educational model, as well as the level of maternal self-efficacy and infant weight. The initial scores, or pretests, for all the major variables in the two groups were generally comparable and showed no statistically significant differences. This ensures that the results of the comparison after the intervention show a direct influence of the applied educational model. The variables of early breastfeeding practice and self-efficacy improved significantly in the intervention group after the application of the six-week SCT education model.

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The intervention group had a significant increase in post-intervention early breastfeeding practice scores to 36.16 compared to the control group of 29.37. They also had a significant improvement in self-efficacy scores, with a posttest average of 52.0, much higher than the control group's 38.71. The Social Cognitive Theory (SCT) educational model emphasizes the role of observational learning, imitation, and modeling, which are essential for breastfeeding behavior. Theories such as social support, self-efficacy, and outcome expectation have been used effectively in various efforts to encourage breastfeeding practices. With these interventions, the initiation, duration and exclusivity of breastfeeding have increased, especially when adapted to specific cultural and community situations.

Self-efficacy is an important predictor of the initiation and duration of breastfeeding. Studies have shown that higher self-efficacy in mothers leads to increased breastfeeding rates. For example, interventions that increase maternal confidence in their ability to breastfeed have resulted in significant improvements in breastfeeding practices (Eastin & Sharma, 2020). A study has shown that learnings drawn from the experiences of representatives and role models positively affect breastfeeding practices. It is more likely for mothers who see their peers or healthcare providers breastfeeding well to start and continue breastfeeding on their own (Syahputri et al., 2020). Positive results regarding the health benefits of breastfeeding for both mother and child were associated with higher breastfeeding rates. Educational programs that emphasise these advantages can effectively change the way mothers view breastfeeding and encourage them to do so (Anjomshoa et al., 2018).

In this study, SCT-based educational interventions, which included home visits, booklet modules, and training, succeeded in improving breastfeeding rates. These programs are usually centered on increasing knowledge, being more effective, and supporting breastfeeding. (Dueñas-Espín et al., 2020). Learning from experience is an important factor in improving self-efficacy. A study in Madiun, East Java, found that observational learning significantly improved exclusive breastfeeding practices (OR=3.86) (Syahputri et al., 2020). As research by Hartati and Silitonga shows, the use of booklets and other educational materials helps breastfeeding mothers successfully and improves their self-efficacy through observational learning (Hartati & Silitonga, 2023).

Social support is also an important component in building self-efficacy. With a significant p-value of 0.0001, Astuti and Sustiwi's research found a positive correlation between breastfeeding self-efficacy and family support. The role of social support, although studies have not found a significant correlation between social support and self-efficacy in their particular situations (Astuti & Sustiwi, 2022). Constructive feedback, often provided through structured health education, is essential to improve self-efficacy. The study by Masluroh and Risnayanti found that lactation education significantly improved knowledge and self-efficacy among breastfeeding mothers, with a p value of 0.000 (Masluroh &

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Risnayanti, 2024). To improve self-efficacy, structured health education can provide constructive feedback. Study by (Masluroh & Risnayanti, 2024) It showed that lactation education significantly improved knowledge and self-efficacy among breastfeeding mothers, with a p-value of 0.000.

Interventions that focus on breastfeeding education significantly improve maternal self-efficacy. A study conducted in Iran showed that the education program resulted in a substantial increase in self-efficacy scores in the intervention group compared to the control group. A mobile-based teaching program in Iran results in superior self-efficacy scores at four and eight weeks postpartum compared to standard care (Rahimparvar et al., 2024). The Social Cognitive Theory teaching approach has been shown to be effective in encouraging breastfeeding; However, it is important to understand the broader context of these interventions. Healthcare infrastructure, cultural norms, and socioeconomic situations can affect the effectiveness of SCT-based programs. Further, although Social Cognitive Theory (SCT) offers a powerful framework for understanding and influencing nursing behavior, the incorporation of additional theoretical models, such as Planned Behavior Theory, can result in a more holistic approach to addressing the diverse practice of breastfeeding (Ariyani et al., 2022).

This data proves that the implementation of the SCT-based breastfeeding education model significantly improves breastfeeding practices and maternal self-efficacy in Badung Regency, Bali. These findings are in line with various international studies that validate the significance and efficacy of the SCT approach in improving maternal and child health behaviors and outcomes, and provide a basis for the development of theory-based education programs in the future.

Social Cognitive Theory (SCT) Based Breastfeeding Education Model: Implications for Early Breastfeeding Practices and Maternal Self-Efficacy in Badung Regency, Bali

The study revealed a greater improvement in early breastfeeding habits and maternal self-efficacy in the intervention group compared to the control group after the use of a Social Cognitive Theory-based teaching model. The study showed that the intervention group showed significantly superior improvement in all key metrics compared to the control group. The data illustrate the efficacy of SCT educational interventions in producing substantial changes in maternal and infant health behaviors and outcomes (Safaah et al., 2024).

Maternal self-efficacy, an important determinant of breastfeeding success, was significantly higher in the intervention group. Research has consistently shown that interventions aimed at improving self-efficacy result in higher breastfeeding self-efficacy scores (Mizrak et al., 2017). In line with previous research, the use of SCT-based interventions, which include role-playing, demonstrations, and motivational interviews, effectively increases maternal confidence in breastfeeding (Dodou et al., 2021). The intervention group showed a significant increase in maternal self-efficacy ($p = 0.001$). This proves that SCT-based teaching

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interventions have succeeded in increasing maternal confidence in breastfeeding. Self-efficacy is a fundamental concept in Social Cognitive Theory and has been shown to have a significant effect on the onset and duration of breastfeeding. Interventions that improve maternal self-efficacy have resulted in an increase in the rate and duration of breastfeeding. A study shows that self-efficacy in initiating and overcoming barriers is a major predictor of breastfeeding initiation among African-American women (Eastin & Sharma, 2020).

Observational learning, facilitated by example and experience, significantly influences breastfeeding practices. A study in East Java revealed that an increase in the level of observational learning and strong examples greatly improved the practice of exclusive breastfeeding. This suggests that mothers who watch and learn from others who breastfeed effectively are more likely to imitate similar methods (Syahputri et al., 2020). Social support is an important element that supports self-efficacy and nursing practice. Help from family, peers, and health professionals can have a profound impact on a mother's confidence and capacity to breastfeed. A study showed a positive correlation between social support and self-efficacy in breastfeeding working women, suggesting that increased social support was associated with increased self-efficacy (Hapsari & Sarajar, 2024). In addition, counselling interventions that provide social support have been shown to increase maternal confidence in breastfeeding (Sakti et al., 2025). Educational treatments, including visual aids, verbal instruction, and peer counselling, have been shown to improve self-efficacy in breastfeeding. Systematic evaluation showed that these interventions significantly improved maternal self-efficacy, which is essential for successful breastfeeding (Seddighi et al., 2022).

SCT argues that mastery experiences, or successful behavioral performance, are essential for developing self-efficacy. In the world of breastfeeding, mothers who engage effectively in this practice develop confidence in their ability to survive, a phenomenon reinforced by SCT treatments that offer opportunities to practice and gain feedback. SCT-based therapies often incorporate social support systems, which are important for overcoming barriers in behavior modification. Help from peers and health professionals can help mothers cope with breastfeeding problems, offering emotional and practical help. Interventions based on Social Cognitive Theory (SCT) significantly improved self-efficacy and the success of exclusive breastfeeding in primitive mothers by integrating education, demonstration, and social support. The study offers strong evidence that increasing important elements of Social Cognitive Theory, including observational learning and social persuasion, significantly increases maternal confidence in breastfeeding and enhances exclusive breastfeeding behaviors (Black et al., 2020).

The study's findings strongly support the basic principles of SCT, which highlight the importance of experiential mastery and observational learning in transforming health behaviors. SCT therapy provides knowledge to mothers, facilitates group interactions, allows learning from the experiences of others, and

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offers social support that increases confidence and motivation. This method has shown efficacy in overcoming personal and environmental barriers often encountered in breastfeeding practices. Mothers who received SCT-based teaching showed significant improvements in knowledge, self-efficacy, and breastfeeding behaviors compared to the control group. This study underscores the importance of applying SCT principles, such as social support, role modeling, and observational learning, in breastfeeding interventions to improve the success of exclusive breastfeeding, thus reinforcing the evidence that theory-based approaches are highly effective in encouraging positive breastfeeding behaviors among new mothers (Noghabi et al., 2022).

Educational interventions based on Social Cognitive Theory (SCT) were implemented to improve self-efficacy and breastfeeding practices among new mothers in minority communities. The study revealed that the SCT strategy, which integrates social support, learning from role models, and the promotion of self-efficacy, effectively improved self-efficacy and duration of exclusive breastfeeding in the intervention group compared to the control group. These findings reinforce evidence that theory-based strategies, particularly Social Cognitive Theory (SCT), are highly effective in reducing barriers to breastfeeding and encouraging successful breastfeeding practices, especially in socioeconomically disadvantaged communities (Yang et al., 2021).

A randomized controlled experiment assessed the efficacy of a Social Cognitive Theory-based intervention (SCT) on breastfeeding self-efficacy and exclusive breastfeeding success among mothers in Malawi. The findings showed that mothers who underwent SCT intervention showed significant improvements in self-efficacy of breastfeeding and achieved a higher rate of exclusive breastfeeding success compared to the control group. These findings underscore the efficacy of the SCT approach in improving breastfeeding practices, especially by highlighting social support, observational learning, and improved self-efficacy as important elements of successful breastfeeding interventions.

The SCT-based breastfeeding education model significantly improves early breastfeeding practices, maternal self-efficacy, and infant weight gain compared to conventional education. Although there were significant improvements in early breastfeeding practices, self-efficacy, and child weight gain in the intervention group, there were still many hurdles to be faced. The likelihood of a diversity of responses between individuals is evident from the wide range of score changes, which may be influenced by personal motivation, family support, and previous breastfeeding experiences. Factors that were not comprehensively evaluated or controlled in this study. In addition, the use of self-report questionnaires to assess breastfeeding behaviors and self-efficacy can lead to social bias (self-reporting bias), as respondents may provide answers that are perceived as positive, rather than answers that actually represent their experiences.

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In addition, the study was limited in terms of the relatively short duration of the intervention, which was six weeks, so it was not possible to identify the long-term effects of the SCT educational model on exclusive breastfeeding behavior and infant growth. The findings of the study may also be less generalizable to maternal populations outside of Badung Regency, Bali, due to different cultural, social, and health care access factors. Not all environmental factors, such as partner support or the quality of health facilities, are measured in detail, although these variables can contribute significantly to the success of breastfeeding practices. Therefore, the results of this study must be interpreted carefully and taken into consideration for design improvement and implementation of interventions in future studies.

CONCLUSION

This study concludes that breastfeeding education based on Social Cognitive Theory (SCT) is more effective than standard education in improving early breastfeeding practices, maternal self-efficacy, and supporting infant growth. The findings highlight the crucial role of psychological factors, particularly self-efficacy, in breastfeeding success, indicating that knowledge-based education alone is insufficient to change behavior. The SCT-based education model is therefore a relevant and effective intervention for health workers in supporting breastfeeding mothers and can be considered for integration into health facility programs and national policies to increase exclusive breastfeeding coverage and improve infant health outcomes.

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Effectiveness of Ear Acupressure on Anxiety Among Primigravida Women During Labor

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A B S T R A C T

Childbirth is a physiological process that is influenced by maternal, familial, and environmental support. Primigravida women often experience heightened anxiety due to lack of childbirth experience. Increased anxiety can stimulate cortisol release, potentially leading to labor complications such as impaired uterine contractions and prolonged labor. One non-pharmacological approach to reduce anxiety during labor is acupressure. While ear acupressure has been shown to reduce labor pain, evidence regarding its effect on anxiety remains limited. This study aimed to examine the effectiveness of ear acupressure at the Shen Men point in reducing anxiety during the early stage of labor. A quasi-experimental one-group pre-test–post-test design was used, involving 31 primigravida women in early labor selected through convenience sampling. Anxiety levels were measured before and after the intervention using the Anxiety Assessment Scale for Women in Labor (AASWL). Before the intervention, 67.70% of participants reported anxiety levels above 50%. After ear acupressure, more than half of the participants (54.80%) continued to report anxiety levels above 50%. The mean anxiety score decreased from 25.71 before the intervention to 16.48 after, showing an average reduction of 9.23 points. However, statistical analysis using the Wilcoxon signed-rank test yielded a p-value of 0.157, indicating that the reduction was not statistically significant. In conclusion, ear acupressure at the Shen Men point was not shown to have a significant effect on reducing anxiety during the first stage of labor in primigravida women.

INTRODUCTION

The process of giving birth for a primigravida is an anxious first experience. because the possibility of abnormalities and complications is quite large, both in terms of his strength (power), birth canal (passage) and condition of the fetus (passenger). Previous research shows that Nulliparous pregnant women with moderate-to-high anxiety scores experienced dystocia 10.5 times more often compared to other pregnant women (Alijahan & Kordi, 2014). According to the World Health Organisation (2019), maternal deaths are caused by major complications such as bleeding, infection, high blood pressure during pregnancy, complications from childbirth, and unsafe abortion. Based on WHO data, almost 75% of the major complications that cause One of the causes of maternal death is high blood pressure during pregnancy and childbirth (pre-eclampsia and eclampsia). The results of the study showed that as many as 52.7% of pregnant women had a high level of anxiety and experienced hypertension, while 57.8% of pregnant women had this high level anxiety and experiencing pre-eclampsia (Ningsih & Fauzi, 2022). The results of a study conducted in the independent practice of midwives in Surabaya, found that out of 25 mothers giving birth in January 2024, most of them experienced anxiety, especially in primigravida. The care provided by One way to help reduce anxiety is to provide education through classes for pregnant women

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and teaches deep breathing relaxation techniques, but in reality the mother still experiences anxiety. The level of anxiety greatly affects the well-being of the mother and fetus. The level of anxiety low anxiety can reduce the complications that arise so that indirectly can reduce maternal and infant mortality rates, while high levels of anxiety can aggravate complications of maternal and fetal mortality rates (Siallagan & Lestari, 2018). Anxiety levels mother becomes more acute and intensive in the last week of pregnancy, this is related to the closeness childbirth is perceived by some pregnant women as a vulnerable moment and is capable of trigger feelings of fear (Silva et al., 2017). Biochemical research shows that anxiety that reported and endogenous plasma epinephrine correlated significantly. Higher epinephrine levels significantly associated with lower uterine contraction activity and duration of labor longer (Hishikawa et al., 2019). One of the important hormones in labor is oxytocin. Oxytocin is produced by the paraventricular nucleus of the hypothalamus and the supraoptic nucleus. Axons from Most of the magnocellular oxytocin neurons terminate in the posterior lobe of the pituitary. Posterior pituitary release oxytocin. Several studies have reported that anxiety disorders affect imbalance of the hormone oxytocin (Neumann & Slattery, 2016). Another hormone that is important in the birthing process is catecholamines, which include dopamine, epinephrine, and norepinephrine. Catecholamines are synthesized in the brain, adrenal medulla, and sympathetic nerve fibers, and is known to be involved in the body's stress response to exogenous situations perceived as dangerous.

Catecholamines activate emotional responses in the amygdala that cause fear, anxiety, or anger, dilate the pupils, and increase oxygen absorption. Fear or anxiety can cause increased levels of catecholamines and labor disorders so which directly or indirectly interfere with the oxytocin system through the amygdala. Therefore, labor must occur within a safe situation, without negative emotions such as anxiety. To support the labor process safe and healthy labor process, health workers need to provide health education and care to reduce anxiety. Non-pharmacological therapies to reduce anxiety include acupressure. The ear acupressure method is a part of body acupressure that is effective in reducing anxiety. but there is still little empirical evidence to support it. According to Wei He. et al (2012) the earlobe has many nerve fibers and blood vessels originating from large nerve fibers and large blood vessels of the body. If stimulated, the ends of the nerve fibers in the ear can send waves of stimulation to large nerve fibers in the body in the relevant organs (Setiawandari et al., 2023). Performing acupressure on the outer ear will stimulate the nerves in the ear. in the outer ear, where the nerves connect directly to the brain. Some branches of the nerve. The large nerves in the outer ear include the major auricular nerve, the occipital nerve minor, the trigeminal nerve, the temporoauricular nerve, the facial nerve, the vagus nerve, and the glasso-pharyngeus via the sympathetic, parasympathetic and autonomic nerves related to the brain, brain stem and cerebral cortex (Putriatri Krimasusini Senudin & Nurdin, 2019). Indications: Shen Men acupressure point is at the body level to reduce pain, tension, excessive sensitivity; reduce hypertension. At the mental level, it can

calm the mind and relieve anxiety, depression, insomnia, restlessness, and desire. While at the spiritual level, it opens up connections to the spirit (opening one's heart), the ability to love oneself and others. (Nityamo, nd) In Indonesia, the practice of ear acupressure has not been widely implemented due to a lack of evidence. empirical. Therefore, the purpose of the study was to determine the effect of acupressure on the Shen Men ear point. on primigravida anxiety in the first stage of labor.

METHOD

The type of research used is quasi-experimental with a one-group pre-post test design. The number of research samples was 31 mothers in the first stage of labor using the accidental technique. sampling and met the inclusion criteria, namely gestational age 36-41 weeks, head presentation, fetus single, and TBJ 2500-3500 grams. While childbirth with complications, Pudji Rochyati Score Card (KSPR) > 10, suffers from skin disease on the ear, cannot read and write, and the mother came with cervical dilation of more than 8 cm, were excluded from the study. Anxiety levels were assessed twice, before and after treatment, using the anxiety instrument Anxiety Assessment Scale for Pregnant Women in Labor (AASPWL) consists of 9 questionnaire items, with assessment categories as follows: < 50% = positive (not anxious) and > 51% = negative (anxious). Acupressure is performed at the points Shen Men is located in the triangular fossa of the right and left outer ear, every 30 minutes. for 2-3 minutes clockwise. Acupressure is given by a trained midwife. following Normal Delivery Care (APN) training and a common perception has been achieved, so that provision of interventions in accordance with standard operating procedures. Data were analysed using the test Wilcoxon signed rank test. This research has been tested ethically at the Health Research Ethics Commission of the Faculty of Science and Health of PGRI Adi Buana University Surabaya, dated January 20, 2025, with number: 171 KEPK.

RESULT

Table 1. Frequency distribution of characteristics of primigravida respondents in the first stage of labor

Characteristics	Mean±SD Median;Min-Mak	N=31	%	*ρ-value*
Age (Years)				
12-16	26,52±	0	0,00	0,017*
17-25	3,94	13	41,90	
26-35	26;	17	54,80	
36-45	20-40	1	3,20	
Education				
Elementary-Middle School	-	0	0,00	0,000*
High school/equivalent		17	54,80	
D3/SI		14	45,20	
Work				
Doesn't work	-	18	58,10	0,000*
Self-employed		3	9,70	
Civil servant Private		10	32,3	

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Gestational Age (weeks)				
37-38	38,35±	17	54,80	0,000*
39-40	1,45	8	25,80	
>40	38;	6	19,40	
	35-41			

Table 1 it is known that the majority of respondents are aged 26-35 years, namely 54.8%, with an average value of 26.52. years, the lowest age is 20 years, and the oldest age is 40 years. Most respondents have a high school education, namely 54.8%, not working or as a housewife, namely 58.1% and gestational age 37-38 weeks, namely 19.4%. The mean (average) value of gestational age was 38.35 weeks, with the age of the youngest pregnancy being 35 weeks, and the oldest pregnancy was 41 weeks.

Table 2. Analysis of Primigravida Anxiety in the First Stage of Labor

Anxiety	Mean±SD Median;Min-Mak	N= 31	%	*ρ-value*	
Pre test					
<50% Not Worried	25,71±8,49	10	32,30	0,000*	0,157**
>50% Anxious	25,00;10-44	21	67,70		
Post test					
<50% Not Worried	16,48±11,54	14	45,20	0,000*	
>50% Anxious	19,00;9-35	17	54,80		

Table 2 it is known that the majority of respondents experienced anxiety before being given ear acupressure, 21 respondents (67.70%). After being given ear acupressure, more than half of them, 17 respondents (54.8%) still experiencing anxiety. The average anxiety score before ear acupressure was 25.71, and after being given ear acupressure, it was 16.48, so the average reduction in anxiety was 9.23. Results Shapiro-Wilk test ÿ=0.000 (<0,05) means the data is not normally distributed, so the test is used Wilcoxon signed rank test. The result of the Wilcoxon signed rank test, ÿ=0.157 (<0,05), means there is no effect of Sehn Men ear acupressure on primigravida anxiety during the first stage of labor.

DISCUSSION

The results of this study showed no effect of Shen Men ear acupressure on primigravida anxiety. in the first stage of labor. The average decrease in anxiety was 9.23. Many factors influence anxiety, including age, physical condition, socio-cultural, level of education and knowledge. Respondents in this study were almost half aged 17-25 years (41.9%), and more than half of them have a high school education or equivalent. Mothers who are young when they give birth for the first time, likely to have significant adverse implications for women's mental health, not only in the short term, but also throughout their lives. Previous research results reported that there is strong evidence of a link between teenage births and poor mental health, with average mental health scores being 2.76 to 3.96 points lower for mothers aged under 20 compared to mothers aged 25 and over (Aitken et al., 2016). This is because mothers who give birth at a young age are a vulnerable group at risk. high due to the complexity of the problems faced such as the

readiness of reproductive organs, economic factors, adolescent emotional well-being and sense of personal control. Maternal education level is correlated with the mother's level of knowledge. Mothers who have high knowledge will have the effort to address problems related to pregnancy and childbirth. Previous studies have reported that knowledge obtained in the prenatal class has a positive effect on health anxiety, reducing the duration of labor, and increasing newborn weight (Nikoozad et al., 2024).

Ear acupressure at the Shen Men point, located in the triangular fossa. The triangular fossa is innervated by the vagus nerves and trigeminal nerves. The triangular fossa as a reflex organ in the lower extremities such as the hips, knees, ankles, uterus and pelvic organs. The Shen Men point is the gateway spirit, stimulating this point can reduce anxiety, nervousness and produce a calming effect. calming and relaxing (Nityamo, nd). The Shenmen Ear Point is named after the traditional point on the Heart Channel (HE-7). The actions of the HE-7 point include: calming the Soul, regulating, and strengthening the heart. Shenmen HE-7 (Gate of the Soul) is the most important acupuncture point for calming and regulating the soul. The Shen Men area of the lateral triangular fossa is associated with: Phase 1 musculoskeletal mesodermal structures and spleen; Phase 2 ectodermal thalamus, hypothalamus, and hippocampus; and Phase 3 endodermal liver and pancreas (Stanton, 2024). Therefore, stimulating the point Shen Men stimulates the brain, then the hypothalamus and anterior pituitary to produce ÿ-endorphin hormone . Increasing the ÿ-endorphin hormone makes the mother relaxed so that she can reduce anxiety. The results of this study are in line with previous research, where ear acupressure at the Shen Men point was not significant (ÿ=0.64) in reducing anxiety in primigravida mothers giving birth, but increasing average ÿ-endorphin levels (355.4±224.7) compared to the deep breathing relaxation group (225.1 ± 127.5) with a value of ÿ = 0.004 (Setiawandari et al., 2023). Many factors cause anxiety in mothers giving birth, one of which is the parity factor. Mothers who give birth for the first time feel anxious about the labour process is caused by the mother's inexperience. In addition, there is a lack of knowledge and information about the correct delivery process. Health workers also have a significant influence on the level of anxiety of mothers who have just given birth for the first time, because education plays an important role in increasing the knowledge and understanding of first-time mothers time of giving birth. Social support, such as support from husband and family and support from officers, Health (midwives) can have a positive influence on maternal anxiety (Fauziyah & Anggraeni, 2023). There needs to be a combination of interventions, such as stimulation of more than one point, to get results. maximum information and support from family and health workers in reducing anxiety.

CONCLUSION

The conclusion of this study is that acupressure of the Shen Men ear point has no effect on anxiety experienced by primigravida during the first stage of labor.

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Differences Between Think Pair Share and Stratagem Learning Models in Improving Knowledge of Premature Sex Prevention in Students at SMA Samarinda

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A B S T R A C T

Adolescent growth and development causes physical, cognitive and psychosocial changes, which are followed by sexual maturity, followed by attraction to the opposite sex, thereby triggering the potential for premarital sexual behavior. This problem requires preventive treatment efforts in the form of health education. Health education models that are suitable for upper secondary students are think-pair-share (TPS) and stratagem. This research aims to see the differences in the effectiveness of the think-pair-share and stratagem health education methods on knowledge of premarital sex prevention. This research design uses a quasi-experimental pre- and post-test with a control group design. The population in this study was 120 class X students at SMA 11 Samarinda. The sampling technique used was random sampling with a total of 42 samples each. Adolescent students' prevention knowledge was measured with a questionnaire consisting of 16 items. The research results show a change in knowledge score of 4, given the TPR model education, while the Stratagem model increases by 6. The results of the Mann-Whitney test show a p-value of 0.000 (<0.05), where there is a difference between the TPS and Stratagem models. The stratagem model is suitable for teenagers because of the teenager's character who likes relaxed and fun learning.

INTRODUCTION

Adolescence is a transitional stage from childhood to adulthood, where significant growth and development occur (Handayani, 2020). Adolescent problems in the developmental stage with sexual maturity are followed by an interest in the opposite sex. Lack of sex education from an early age is a risk of premarital sexual behavior. Sex education can help reduce the risk of premarital sex in adolescents (Ekasari et al., 2020).

WHO data in 2018 stated that premarital sexual behavior of adolescents after 18 years of age was 40-80% in most countries in Africa and Asia. The results of the East Kalimantan Indonesian Family Planning Association (PKBI) Survey showed that 300 adolescents (12%) aged 12-21 years had had sex, where 56% of adolescents at the high school/vocational school level had routinely had sexual relations like married couples (Ilmy & Safrudin, 2021).

This tendency for premarital sexual behavior cannot be separated from the character of adolescents, who tend to have a desire to try new things, a high curiosity, so that if it is not balanced with knowledge, a strong religious foundation will lead to premarital sexual behavior (Safrudin & Wibowo, 2021). Lack of knowledge, curiosity, and lack of wisdom in making decisions are triggers for the high incidence of premarital sex among adolescents (Pardede et al., 2021). Lack of information is caused by cultural factors, where sex education is considered taboo for children or adolescents (Safitri & Safrudin, 2020).

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The implementation of sex education in Indonesia is still considered taboo, so it has not been implemented optimally (Faisal et al., 2021). The impact of inadequate sex education is the existence of cases due to premarital sex, such as premarital pregnancy, sexually transmitted diseases, such as HIV/AIDS (Asshiddiq, 2020). Knowledge is strengthened by health education efforts, where sex health education will shape attitudes and stimulate positive behavior.

The Health Education Model that can be carried out by looking at the characteristics of adolescents is the think-pair-share (TPS) and the stratagem models. The TPS model includes aspects of critical thinking (think), conveying ideas in pairs (pair) and conveying discussion results (share) within the scope of group discussions (Ugwu, 2019). TSP provides opportunities to optimise learning outcomes, increase the understanding and activeness of adolescents in discussions (Astuti & Kusumawardhani, 2023; Mbana, 2024).

The stratagem model of learning involving games in health education is suitable for adolescents, considering their cognitive maturity (Pragita et al., 2018). The stratagem education model was carried out in a study Purniasari et al. (2021), explaining that the stratagem method is effective in increasing knowledge from an average of 53.6% to almost entirely good at 96.4% with a p-value of 0.000 <0.05, meaning that the stratagem method affects increasing knowledge about sexuality in adolescents.

From the results of a preliminary study conducted at SMA 11 Samarinda on August 22, 2024, it was found that there was no sexual health education program specifically provided by the school or health workers. After interviewing 10 students, 8 of whom said they had dated and were dating, they also did not understand the impact of premarital sexual behavior. The TPR and stratagem models are effective in increasing adolescent knowledge. So, researchers are interested in seeing the differences in the influence of the two learning models in increasing knowledge about premarital sex in adolescents.

METHOD

This type of research is quantitative research with a Quasi-Experimental pre- and post-design with a control group design (Notoatmodjo, 2018). The population in the study were 120 grade X students at SMA 11 Samarinda. The side technique with stratified random sampling obtained 84 samples for the intervention and control groups. This study was conducted from 12-29 December 2024. Data collection was carried out by dividing into TPR and stratagem groups. Furthermore, a pretest was carried out related to premarital sex knowledge, followed by providing intervention for 2 days with the topic of introducing sexuality; premarital sex and its impacts were carried out in both learning models. On the third day, a posttest was carried out. The measuring instrument used a premarital sex knowledge questionnaire using a Guttmann scale of 16 question items adopted from Junita's research in 2018. The results of the validity

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test with a range of 0.489-0.851, and a reliability test of 0.766 (Junita, 2018). This research has also gone through licensing and passed ethics conducted at Mulawarman University with number: 350/KEPK/FK/XII/2024. Data analysis using the Mann-Whitney test.

RESULT

Respondents' Age and Gender Characteristics

Table 1. Frequency Distribution of Respondent Characteristics

Respondent Characteristics	TPR Model Health Education Group		Stratagem Model Health Education Group	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Gender				
Male	20	47.6	19	45.2
Female	22	52.4	23	54.8
Age				
14 years	3	7.1	3	7.1
15 years	15	35.7	14	33.3
16 years	22	52.4	24	57.1
17 years	2	4.8	1	2.4
Total	42	100	42	100

Primary Data Source 2024

The characteristics of the gender of students in the TPR model education group are mostly female, as many as 22 people (52.4%), most of the respondents are 16 years old, as many as 22 people (52.4%). Strategy model learning is almost all female, as many as 23 people (42%) and 16 years old, as many as 24 people (57.1%).

Results of Normality and Homogeneity Tests

Table 2: Normality Test Results

Shapiro-Wilk	Asymp.sig	Criteria	Conclusion
Pretest model TPR	0.004	< 0.05	Data is not normally distributed
Posttest model TPR	0.000	< 0.05	Data is not normally distributed
Pretest model stratagem	0.003	< 0.05	Data is not normally distributed
Postest model stratagem	0.000	< 0.05	Data is not normally distributed

Primary Data Source 2024

The results of the normality test show that all data have a value <0.05, meaning that the data is not normally distributed, so that parametric test requirements cannot be carried out.

Table 3: Results of Homogeneity Test

Variable	Sig.	Kriteria	Keterangan
Knowledge	0.002	< 0.05	Data homogen

Primary Data Source 2024

The results of the homogeneity test obtained a p-value of 0.001 < 0.05, meaning that the data has different or non-homogeneous variables.

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Univariate Results of Premarital Sex Knowledge

Table 4: Univariate Analysis of Premarital Sex Knowledge

knowledge	Median	Standard Deviation	95% CI	
			Minimum	Maximum
Pretest Model TPR	20	3.057	19.19	21.10
Posttest Model TPR	24	3.052	22.67	24.57
Pretest Model Stratagem	20	1.819	19.53	20.66
Posttest Model Stratagem	26	1.843	25.76	26.91

Primary Data Source 2024

The average score of premarital sex knowledge before receiving TPR model education was 20, increasing to 24. Meanwhile, the average before being given the stratagem model education was 20 and increasing to 26.

Mann-Whitney Test

Table 6: Results of the Mann-Whitney Test on Premarital Sex Knowledge

Variable	Mean	*Z*	*p-value*
Knowledge about Premarital Sex TPR model	32.36	-3.862	0.000
Knowledge about the Premarital Sex Strategem model	52.64		

Primary Data Source 2024

The difference in knowledge after being given health education using the TPR and stratagem models obtained a p-value of 0.000 <0.05, so it can be concluded that there is a difference between the experimental and control groups after being given health education related to premarital sex at SMA 11 Samarinda.

DISCUSSION

The results of the study revealed that females gender dominated the study. In line with research (Berek et al., 2019). Premarital sex in women is lower than in men, related to moral aspects, where these results are reinforced by the difference test obtained p-value <0.05. Other references explain that sexual behavior does not see absolute gender; it does not mean that women do not have the potential to have free sex, but men and women have the same potential (Cooper et al., 2020; Derbyshire & Grant, 2015).

When looking at growth factors in hormonal changes in men, where increased testosterone will arouse a high interest in things related to sex (Markovic, 2019). In contrast to women, if the estrogen hormone increases, it does not have a significant impact. In addition, psychologically, men are generally more aggressive, very active, very frank and not ashamed to talk about sex problems, unlike women (Cooper et al., 2020).

Research shows that women have better knowledge about premarital sex even though they tend to engage in the same behavior (Putri et al., 2021). According to Rothman et al. (2021), women's age has a positive

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correlation with sexual behavior compared to younger women. While for men, it has a more positive tendency for both younger and older ages. This proves that the more mature the reproductive age of adolescents, the higher the tendency of adolescents to engage in sexual behavior (Irwin & Shafer, 2021)

The results of the study on the age characteristics of the TPR group and the stratagem group showed that almost half of the respondents were 16 years old. The Ministry of Health in 2024 explained that in early adolescence, there are significant physical, psychological and social changes. Research states that adolescents have low social self-efficacy so that they are at higher risk of engaging in promiscuous sex. Low social self-efficacy of adolescents means that adolescents will have difficulty in socializing and are less good at carrying themselves so that they are influenced by the surrounding environment, especially their peers (Sartika, 2024).

The results of the study showed that the average score of premarital sex knowledge before receiving TPR model education was 20, increasing to 24. While the average before being given stratagem model education was 20 and increasing to 26. These results show a difference in scores between the TPR model and the stratagem model. These results indicate that the stratagem model is better than the TPS model in increasing the score of premarital sex prevention knowledge.

The stratagem model provides a higher score change because the stratagem model is very suitable for adolescent students. Adolescents tend to like learning models that involve game aspects (Sidiq & Simamora, 2022). In the implementation of the stratagem model, it is carried out by combining discussions about premarital sex with games so that students are not burdened, have fun and increase their competitive spirit (Mubarak et al., 2017). This learning model involves two-way communication, students discuss, and work together in heterogeneous groups to solve problems. Learning with the stratagem method involves two-way communication. The game played will increase competition between groups to excel in winning the game, so that it creates strong motivation to be able to win the game (Pragita et al., 2018). The results of the study Purniasari et al. (2021), show that the stratagem model has an influence on increasing the dangers of sexual behavior in adolescent girls.

Meanwhile, the TPS learning model increases knowledge by opening up new perspectives in more interesting adolescent learning with discussions, pairings that make a teenager's competent soul want to be seen compared to other friends (Sugiarto & Sumarsono, 2024). In addition, the next stage of learning is sharing information with other friends, which strengthens students' understanding in digesting learning outcomes (Kaddoura, 2020). Research conducted by Lianawati et al. (2022), shows the effectiveness of the TPS learning model in strengthening students' understanding of reproductive organ disorders.

These two learning models have differences with the results of the Mann-Whitney test showing a p-value of 0.000 (<0.05). This means that there is a difference between the TPS learning model and the Stratagem

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model regarding premarital sex in students at SMA 11 Samarinda. The researcher assumes that the Stratagem learning model is better used in adolescent groups because of the character of adolescents who like games so that learning is more relaxed and enjoyable with maximum learning outcomes.

CONCLUSION

The TPS and Stratagem learning models are different and still provide changes in premarital sex knowledge scores. However, higher score changes occur in the stratagem learning model. The tendency of adolescents to like games in learning so that this model suitable for adolescents. Further research can use the stratagem model educational intervention with other risks and problems in adolescent groups, such as drug abuse.

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Analysis of Factors Affecting Non-Adherence to Treatment in Type 2 Diabetes Mellitus Patients at Jatilawang Community Health Center

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A B S T R A C T

Diabetes mellitus is a chronic metabolic condition characterised by high blood sugar. Noncompliance with type 2 diabetes therapy raises the risk of complications and failure to regulate blood sugar levels. This quantitative cross-sectional study employed spatial and network analysis to investigate the variables influencing non-adherence among 114 type 2 diabetes patients registered as prolanis participants at the Jatilawang Community Health Centre. Data collecting methods included surveys, interviews, and geographic mapping using Google Maps. SPSS was used for univariate, bivariate, and multivariate analyses, as well as QGIS for network mapping. The study found that access to health information substantially increased non-adherence (p-value=0.006, OR=5.170), although transportation availability (p-value=0.427, OR=0.609) and family support (p-value=0.076, OR=2.622) were confounding variables. Other factors, such as knowledge, attitude, motivation, distance to the community health centre, and health professionals' roles, were not significant. Network mapping revealed that the majority of respondents resided within 3 km of the community health centre. The findings indicate that patients should actively seek health information from healthcare professionals in order to improve treatment adherence.

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder, characterized by increased blood sugar levels and triggering various complications (WHO 2024). Type 2 DM occurs when the body is unable to utilize insulin effectively (Nursucita & Handayani 2021). As many as 422 million people in the world live with diabetes (WHO 2024). Based on data from the 10th edition of the IDF Atlas, 10.6% of the total adult population in Indonesia suffers from DM with a death toll reaching 236,711 people (Kemenkes RI 2022). Based on data Dinas Kesehatan Provinsi Jawa Tengah (2023), the proportion of DM cases in Central Java reached 9.59%. DM cases in Banyumas Regency reached 22,766 people and Jatilawang Community Health Center became one of the areas with a high proportion of DM cases of 4.7% (Dinas Kesehatan Kabupaten Banyumas 2023).

Non-adherence with treatment is one of the factors that increases the risk of complications in type 2 DM patients (Firdiawan 2020). According to Lawrence Green (1980) in Pakpahan et al. (2021), individual behavior in taking action is driven by three main factors, namely predisposing factors, enabling factors, and reinforcing factors. Research Della et al. (2023) stated that adherence with DM treatment is influenced by motivational factors within oneself, family support, gender, age, and the role of health workers. Other results were presented by Araya et al. (2020), Edyawati et al. (2021), and Hutasuhut & Siregar (2024),

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where factors such as distance, availability of access to information, and adequate health facilities can increase patient motivation to be more adherent with their treatment.

Failure of blood sugar control in type 2 DM patients is caused by their non-adherence in undergoing treatment Standar Diagnosis Keperawatan Indonesia (2019) stated that non-adherence with treatment is an individual's behavior when they do not follow an agreed treatment plan and have an impact on the ineffectiveness of treatment results. This condition can result in low achievement of community health center results, increased incidence of complications, and decreased quality of life of patients (Firdiawan 2020). Non-adherence with type 2 DM medication includes behaviors such as delaying or not taking prescribed medication, reducing the frequency of medication use, and not adhering to the dosage of medication prescribed by the doctor (Sasmita 2021).

Based on DM prolanis data for August 2024, of the 172 active prolanis patients at the Jatilawang Community Health Center, there were still patients who were not adherent in undergoing treatment, such as delaying taking medication and not routinely checking their blood sugar (Puskesmas Jatilawang 2024). The emergence of side effects from conventional medicines and boredom in taking medicines encourages them to combine conventional medicines with herbal medicines or even switch to only taking herbal medicines during the healing process (Rahem et al. 2023). Identifying non-adherence with medication in DM patients through multiple logistic regression analysis and network analysis is important to ensure that therapy is effective and complications can be prevented. Therefore, researchers are interested in analyzing factors that influence non-adherence with medication in type 2 DM patients at the Jatilawang Community Health Center.

METHOD

This study is a quantitative analytical study with a cross-sectional design involving spatial analysis in the form of network analysis. The study was conducted in the Jatilawang Community Health Center working area in August - December 2024. The study population included patients diagnosed with type 2 DM and registered as active prolanis participants at the Jatilawang Community Health Center. The number of samples consisted of 114 respondents obtained through cluster random sampling techniques.

Inclusion criteria include respondents aged 20-70 years, communicative, and willing to be respondents, while exclusion criteria include respondents who are not at home when data collection, resign and are not willing to continue the study, and have died or moved house. The independent variables used include knowledge, attitudes, self-motivation, access to health information, distance from home to the community health center, availability of transportation, the role of health workers, and family support, while the dependent variable is non-adherence with treatment for type 2 DM patients. The data collection process

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was carried out using an interview method with a questionnaire and taking the coordinates of the respondent's house using Google Maps.

The research measuring instrument was a questionnaire that had previously undergone validity and reliability testing at the Ajibarang I Community Health Center. The results showed that each instrument was declared valid and reliable. Data were analyzed multivariately using SPSS 20 software through multiple logistic regression analysis with an α value of 5% to analyze the most influential factors. Data analysis was also carried out through network analysis with QGIS to produce a map of the shortest route from home to the community health center. This study has obtained ethical approval from the Ethics Commission of the Faculty of Health Sciences, Jenderal Soedirman University with the number 1627/EC/KEPK/X/2024.

RESULT

Univariate Analysis

Respondent Characteristics

Table 1. Distribution of Research Respondent Characteristics

Characteristics	Frequency (n)	Percentage (%)
Age		
19-59 Years	55	48.2
≥ 60 Years	59	51.8
Gender		
Man	15	13.2
Woman	99	86.8
Education		
higher education	22	19.3
Low Education	92	80.7

(Source: Processed Primary Data, 2024)

Table 1 shows that more respondents were aged ≥ 60 years, namely 59 respondents (51.8%), were female as many as 99 respondents (86.8%), and had low education (elementary-junior high school) as many as 92 respondents (80.7%).

Overview of Independent and Dependent Variables

Table 2. Description of Distribution of Independent and Dependent Variables

Variables	Frequency (n)	Percentage (%)
Knowledge		
Good	70	61.4
Not good	44	38.6
Attitude		
Positive	71	62.3
Negative	43	37.7
Self-Motivation		
Good	64	56.1
Not good	50	43.9
Access to Health Information		
Tall	70	61.4

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Variables	Frequency (n)	Percentage (%)
Low	44	38.6
Distance from Home to Community Health Center		
Near	82	71.9
Far	32	28.1
Transportation Availability		
Easy	58	50.9
Difficult	56	49.1
The Role of Health Workers		
Good	58	50.9
Not good	56	49.1
Family Support		
Good	61	53.5
Not good	53	46.5
DM Treatment Non-Adherence		
Adherent	71	62.3
Non-Adherent	43	37.7

(Source: Processed Primary Data, 2024)

Table 2 shows that more respondents have good knowledge, namely 70 respondents (61.4%), positive attitudes as many as 71 respondents (62.3%), good self-motivation as many as 64 respondents (56.1%), high access to health information as many as 70 respondents (61.4%), close distance from home to community health center as many as 82 respondents (71.9%), easy availability of transportation as many as 58 respondents (50.9%), good role of health workers as many as 58 respondents (50.9%), good family support as many as 61 respondents (53.5%), and adherence with type 2 DM treatment as many as 71 respondents (62.3%).

Bivariate Analysis

Table3. Relationship between Independent Variables and Dependent Variables

Variables	Non-Adherence with Type 2 DM Treatment						*P-Value*	Information
	Non-Adherent		Adherent		Total			
	n	%	n	%	n	%		
Knowledge								
Not good	14	31.8	30	68.2	44	100	0.405	No connection
Good	29	41.4	41	58.6	70	100		
Attitude								
Negative	21	48.8	22	51.2	43	100	0.088	No connection
Positive	22	31.0	49	69.0	71	100		
Self-Motivation								
Not good	21	42.0	29	58.0	50	100	0.523	No connection
Good	22	34.4	42	65.6	64	100		
Access to Health Information								
Low	28	63.6	16	36.4	44	100	0.0001	There is a Relationship
Tall	15	21.4	55	78.6	70	100		
Distance from Home to Community Health Center								
Far	13	40.6	19	59.4	32	100	0.853	No connection
Near	30	36.6	52	63.4	82	100		
Transportation Availability								
Difficult	28	50.0	28	50.0	56	100	0.014	There is a Relationship
Easy	15	25.9	43	74.1	58	100		
The Role of Health Workers								
Not good	29	51.8	27	48.2	56	100	0.004	There is a Relationship
Good	14	24.1	44	75.9	58	100		

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Variables	Non-Adherence with Type 2 DM Treatment						*P-Value*	Information
	Non-Adherent		Adherent		Total			
	n	%	n	%	n	%		
Family Support								
Not good	30	56.6	23	43.4	53	100	0.0001	There is a Relationship
Good	13	21.3	48	78.7	61	100		

(Source: Processed Primary Data, 2024)

Table 3 shows that 14 out of 44 respondents (31.8%) with poor knowledge were not adherent with type 2 DM treatment. Meanwhile, among respondents with good knowledge, there were 29 out of 70 respondents (41.4%) who were not adherent. The chi-square test produced a p-value of 0.405 (p-value > 0.05), which means there is no relationship between knowledge and non-adherence with type 2 DM treatment. In addition, 21 out of 43 respondents (48.8%) with negative attitudes were not adherent with type 2 DM treatment. Meanwhile, among respondents with positive attitudes, there were 22 out of 71 respondents (31.0%) who were not adherent. The chi-square test produced a p-value of 0.088 (p-value > 0.05), which means there is no relationship between attitude and non-adherence with type 2 DM treatment.

A total of 21 out of 50 respondents (42.0%) with poor self-motivation were non-adherent with type 2 DM treatment. Meanwhile, among respondents with good self-motivation, there were 22 out of 64 respondents (34.4%) who were non-adherent. The chi-square test produced a p-value of 0.523 (p-value > 0.05), which means there is no relationship between self-motivation and non-adherence with type 2 DM treatment. In addition, 28 out of 44 respondents (63.6%) with low access to health information were non-adherent with type 2 DM treatment. Meanwhile, among respondents with high access to health information, there were 15 out of 70 respondents (21.4%) who were non-adherent. The chi-square test produced a p-value of 0.0001 (p-value ≤ 0.05), which means there is a relationship between access to health information and non-adherence with type 2 DM treatment.

As many as 13 out of 32 respondents (40.6%) with a far distance from their home to the community health center were not adherent with type 2 DM treatment. Meanwhile, among respondents with a close distance from their home to the community health center, there were 30 out of 82 respondents (36.6%) who were not adherent. The chi-square test produced a p-value of 0.853 (p-value > 0.05), which means there is no relationship between the distance from home to the community health center and non-adherence with type 2 DM patient treatment. In addition, 28 out of 56 respondents (50.0%) with difficult transportation availability were not adherent with type 2 DM treatment. Meanwhile, among respondents with easy transportation availability, there were 15 out of 58 respondents (25.9%) who were not adherent. The chi-square test produced a p-value of 0.014 (p-value ≤ 0.05), which means there is a relationship between transportation availability and non-adherence with type 2 DM patient treatment.

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A total of 29 out of 56 respondents (51.8%) with poor health worker roles were non-adherent with type 2 DM treatment. Meanwhile, among respondents with good health worker roles, there were 14 out of 58 respondents (24.1%) who were non-adherent. The chi-square test produced a p-value of 0.004 (p-value ≤ 0.05), which means there is a relationship between the role of health workers and non-adherence with type 2 DM patient treatment. In addition, 30 out of 53 respondents (56.6%) with poor family support were non-adherent with type 2 DM treatment. Meanwhile, among respondents with good family support, there were 13 out of 61 respondents (21.3%) who were non-adherent. The chi-square test produced a p-value of 0.0001 (p-value ≤ 0.05), which means there is a relationship between family support and non-adherence with type 2 DM patient treatment.

Multivariate Analysis

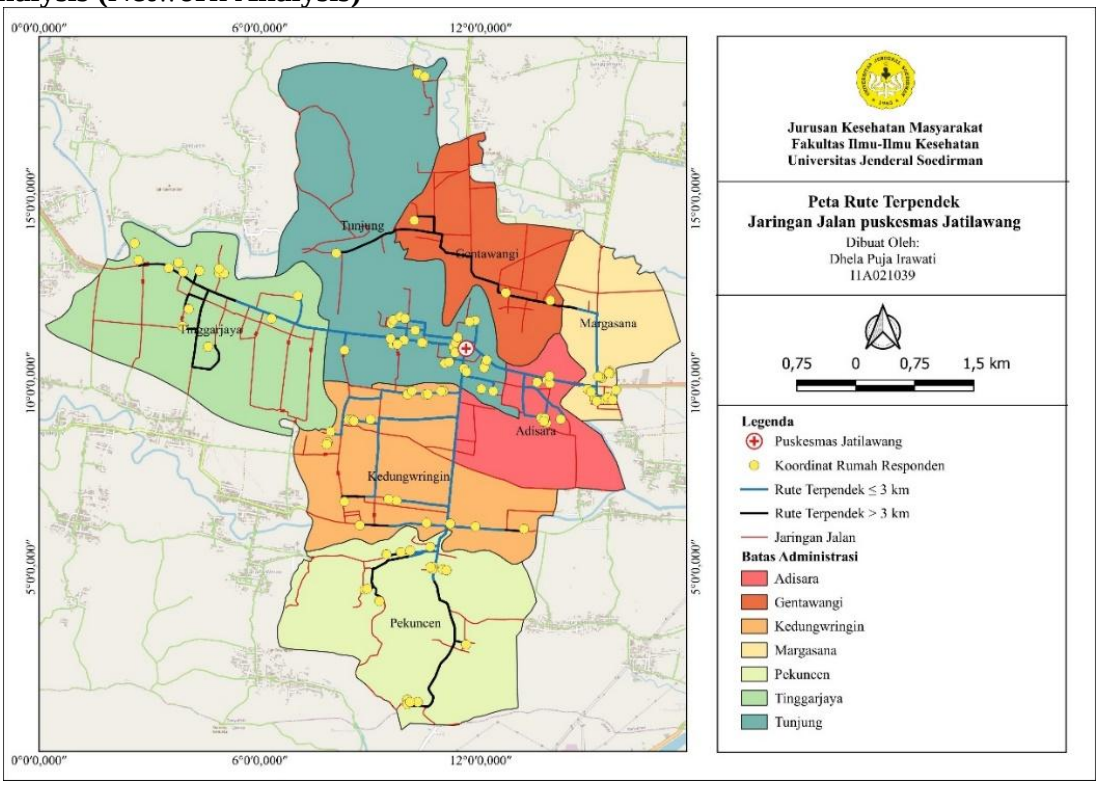
Table 4. Final Modeling of Multivariate Analysis

Variables	*P-Value*	OR	95%CI
Access to Health Information	0.006	5,170	1,595 - 16,765
Transportation Availability	0.427	0.609	0.179 - 2.069
Family Support	0.076	2,622	0.903 - 7.610

(Source: Processed Primary Data, 2024)

Table 4 shows that the factors influencing non-adherence with treatment of type 2 DM patients at the Jatilawang Community Health Center are access to health information (p-value = 0.006, OR = 5.170) with the availability of transportation and family support acting as confounding variables.

Spatial Analysis (Network Analysis)



Picture 1. Shortest Route Map of Jatilawang Community Health Center Road Network

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Based on Figure 1, it is known that the shortest route from home to the Community Health Center is ≤ 3 km (71.9%) marked with a blue road line, while the black road line shows the shortest route to the Jatilawang Community Health Center with a distance of > 3 km (28.1%).

DISCUSSION

The results showed that access to health information was a factor that influenced non-adherence with type 2 DM treatment in Jatilawang Community Health Center (p-value = 0.006, OR = 5.170) with the availability of transportation and family support acting as confounding variables. This means that patients with low access to health information will be at 5.170 times higher risk of non-adherence with type 2 DM treatment compared to patients with high access to health information after being controlled by the variables of transportation availability and family support. A total of 35 respondents (30.7%) stated that health workers did not provide enough education about the importance of blood sugar control. This phenomenon likely occurs because in every DM prolanis activity, health workers only provide medicine without any prior education, so respondents tend to come late or even leave their medicine with their closest neighbors which results in their absence during prolanis activities. As a result, they do not get any information about DM treatment, including the importance of regular blood sugar control.

Not only that, as many as 17 respondents (14.9%) felt that they had never received information about the risks of not complying with DM treatment. Patients who are not given information about the risks of non-adherence may more often miss doses of medication or even not follow the control schedules determined by the doctor. Without adequate information, patients tend to consider treatment as something optional and often do not understand how important routine treatment and self-management are, resulting in low treatment adherence (Edyawati, Asmaningrum & Nur 2021). The lack of efforts to search for health information related to DM treatment also results in low patient ability to manage the disease, making it difficult for them to determine what kind of treatment to choose as an effort to find treatment for their recovery (Pane, Derang & Mendrofa 2022).

The network analysis map shows that most areas of Tunjung Village have adequate shortest routes, except for respondents who live in RW 06. Kedungwringin Village has direct access to the community health center but has a narrow path, while Adisara and Margasana Villages overall have adequate shortest routes. Meanwhile, Pekuncen, Gentawangi, and Tinggarjaya Villages face the challenge of longer distances even though the main road access is adequate. The results of the network analysis of the road network can facilitate the determination of the distance traveled by a person by prioritizing the shortest route (Ni'mah et al., 2016).

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CONCLUSION

More respondents had good knowledge (61.4%), positive attitude (62.3%), good self-motivation (56.1%), high access to health information (61.4%), close distance from home to community health center (≤3 km) (71.9%), easy availability of transportation (50.9%), good role of health workers (50.9%), good family support (53.5%), and adherence with DM treatment (62.3%). There was an influence between access to health information on non-adherence with treatment of type 2 DM patients at Jatilawang Community Health Center.

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The Availability of Basic Sanitation to the Incidence of Stunting in Toddlers in the Coastal Area of Tamangapa Village, Pangkep Regency

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A B S T R A C T

The problem of malnutrition, including stunting, is greatly influenced by environmental sanitation and personal hygiene. This paper examines the influence of the availability of trash bins, Waste Water Drainage Channels (Saluran Pembuangan Air Limbah or SPAL), and toilets on the incidence of stunting in toddlers in the Coastal Area of Tamangapa Village. This paper was a quantitative descriptive study. This study was conducted in Tamangapa Village from September to November 2024. The population was mothers with toddlers in Tamangapa Village, Pangkep Regency. The sample consisted of 72 respondents. The data source used primary data obtained through questionnaires. The analysis test used regression analysis. The results showed that the availability of trash bins (p = 0.000), SPALs (p = 0.000), and toilets (p = 0.003) affected the incidence of stunting in toddlers. In conclusion, the availability of basic sanitation (including trash bins, wastewater disposal channels, and toilets) has a significant impact on the incidence of stunting in toddlers in the coastal area of Tamangapa Village, Pangkep Regency.

INTRODUCTION

Stunting is a physical growth disorder characterized by a decrease in growth rate, resulting from a nutritional imbalance (Losong & Adriani, 2017). According to the World Health Organization (WHO) Child Growth Standard, stunting is defined by the length-for-age index (L/A) or height-for-age index (H/A) with a limit (z-score) of less than -2 SD. The causes of stunting include nutritional intake and health status, which include food security (availability, affordability, and access to nutritious food), social environment (norms, baby and child food, hygiene, education, and workplace), health environment (access, preventive and curative services), and residential environment (water, sanitation, building conditions) (Ministry of Health of the Republic of Indonesia, 2023).

WHO data in 2022 showed that the rate of stunting in Asia reached more than 20%, indicating that stunting remains a persistent community nutrition issue. According to World Bank data, 54% of the workforce experienced stunting as infants, meaning that 54% of the current workforce are survivors of stunting (Slodia et al., 2022; H, 2023). According to data from the Implementation of the Acceleration of Stunting Reduction of South Sulawesi Province in 2023, the number of stunting toddlers in Pangkep Regency increased from 33.1% to 34.2%. Considering the abundant natural resources in Tamangapa

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Village, which boasts a significant agricultural and fisheries sector, the stunting rate should not exceed 20%. However, in fact, the figure was still relatively high, reaching 20% or as many as 59 toddlers. Stunting remains a persistent nutritional issue in Indonesia that has yet to be resolved. It will have long-term impacts, including impaired physical, mental, intellectual, and cognitive development. The management of stunting will be challenging for children when they continue to have stunting up to the age of 5 years, so that it will continue into adulthood, and can increase the risk of the next generation with low birth weight (LBW) (Wicaksono & Harsanti, 2020; Flora, 2021).

Currently, sanitation and clean water are basic human needs. One of the Sustainable Development Goals (SDGs) focuses on the environmental sector to ensure that all people have universal access to clean water and sanitation. Specifically, the six SDGs aim to achieve universal and equitable access to safe and affordable drinking water by 2030, eliminate open defecation, enhance water quality by reducing pollution, and implement environmentally friendly water management systems. (Nations, 2018; Endrinikapoulos et al., 2023; Seyedsayamdost, 2020). Inadequate water and sanitation services, or even their lack of structure, efficiency, and quality, can lead to exponential increases in diseases, especially waterborne diseases. Intestinal infectious diseases, such as diarrhea caused by the consumption of unsafe drinking water, are a significant cause of death for children in low-income countries (Wolf et al., 2014). Good waste management reflects a nation's capacity for adequate waste management and a safe drinking water supply (Freeman et al., 2014). In addition, handwashing to maintain hygiene, especially after contact with feces, acts as an essential barrier against the spread of fecal-oral diseases and reduces secondary transmission of pathogens (Awalia et al., 2023). Poor hygiene practices can lead toddlers to experience diarrhea, which can result in deficiencies in essential nutrients necessary for growth (Puspitasari et al., 2020).

Based on field observations, the sanitation conditions in Tamangapa Village were quite concerning. There was no access to clean water in the village located on the coast of the Pangkep Islands; the community obtained water by purchasing it from a water supplier. Meanwhile, people with a low economic level often relied on dug well water, which did not meet the physical requirements of clean water. The water looked cloudy, was colored, smelled bad, and tasted unpleasant. In this coastal area, "flying toilets" were also frequently found on the edge of community fish ponds, where human waste was discarded into the ponds, potentially polluting the pond habitat. Then, piles of garbage could be found on several sides of the village, both in rivers, ponds, gutters, and around people's homes. Wastewater disposal was also widely channeled around the home environment, seeping into the ground, and some was also channeled directly into fish ponds or rivers. This paper examines the influence of the availability of trash bins, Waste Water Drainage Channels (*Saluran Pembuangan Air Limbah* or SPAL), and toilets on the incidence of stunting in toddlers in the Coastal Area of Tamangapa Village.

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METHOD

This paper was a quantitative descriptive study. The study was conducted from September to November 2024 at Integrated Health Service Post (IHSP), also known as Posyandu, in Tamangapa Village, Pangkep Regency. The population was mothers with toddlers in Tamangapa Village, Ma'rang District, Pangkep Regency. The sample consisted of 72 respondents using the Lameshow formula. The data source used primary data obtained through questionnaires. The analysis test used regression analysis.

RESULT

Table 1 reveals that half of the respondents are between 31 and 45 years old, specifically 43 people (59.7%). In addition, most of the respondents' children are girls (69.4%) and are between 0 and 2 years old (86.1%).

Table 1. The Characteristics of Respondents

The Characteristics of Respondents	Frequency (n)	Percentage (%)
Mother's Age Group		
15-30 Years old	28	39.9
31-45 Years old	43	59.7
46-60 Years old	1	1.4
Child's Sex		
Boy	22	30.6
Girl	50	69.4
Child's Age group		
0-2 Years old	62	86.1
3-4 Years old	10	13.9

Table 2 indicates that half of the respondents' children are stunted (50%), and the other half have a normal height (50%). In addition, most respondents have a wastewater drainage channel that meets the standard (73.6%). However, most have trash bins that do not meet the standard (62.5%), and half have toilets that do not meet the standard (52.8%).

Table 2. The Incidence of Stunting, The Availability of Trash Bins, Wastewater Drainage Channels, and Toilets

Variables	Frequency (n)	Percentage (%)
The Incidence of Stunting		
Normal	36	50
Stunting	36	50
The Availability of Trash Bins		
Meet the standard	27	37.5
Not meet the standard	45	62.5
The Availability of Wastewater Drainage Channels		
Meet the standard	53	73.6
Not meet the standard	19	26.3
The Availability of Toilets		
Meet the standard	34	47.2
Not meet the standard	38	52.8

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Respondents with trash bins that did not meet the standard had children with stunting (44%). The regression analysis yielded $p = 0.000$ ($p < \alpha$), indicating a significant influence of the availability of trash bins on the incidence of stunting in toddlers in the coastal area of Tamangapa Village (Table 3).

Table 3. The Effect of The Availability of Trash Bins on the Incidence of Stunting

The Availability of Trash Bins	The Incidence of Stunting				*p*
	Normal		Stunting		
	(n)	(%)	(n)	(%)	
Meet the standard	23	31.9	4	5.6	0.000
Not meet the standard	13	18.1	32	44.4	
Total	36	50	36	100	

Respondents with wastewater drainage that met the standard had children with normal height (44%). The regression analysis yielded $p = 0.000$ ($p < \alpha$), indicating a significant influence of the availability of wastewater drainage channels on the incidence of stunting in toddlers in the coastal area of Tamangapa Village (Table 4).

Table 4. The Effect of The Availability of Wastewater Drainage Channels on The Incidence of Stunting

The Availability of Wastewater Drainage Channels	The Incidence of Stunting				*p*
	Normal		Stunting		
	(n)	(%)	(n)	(%)	
Meet the standard	32	44.4	21	29.2	0.000
Not meet the standard	4	5.6	15	20.8	
Total	36	50	36	50	

Respondents with toilets that did not meet the standard had children with normal height (34.7%). The regression analysis yielded a *p*-value of 0.003 ($p < \alpha$), indicating a significant influence of the availability of toilets on the incidence of stunting in toddlers in the coastal area of Tamangapa Village (Table 5).

Table 5. The Effect of The Availability of Toilets on The Incidence of Stunting

Availability of Toilets	The Incidence of Stunting				*p*
	Normal		Stunting		
	(n)	(%)	(n)	(%)	
Meet the standard	11	15.3	23	31.9	0.003
Not meet the standard	25	34.7	13	18.1	
Total	36	50	36	50	

DISCUSSION

The Influence of The Availability of Trash Bins on The Incidence of Stunting

Environmental problems and infectious diseases contribute to stunting. Environmental sanitation conditions, including improper waste management, are the primary causes of various contagious diseases. Communicable diseases, such as diarrhea, can disrupt the digestive process and hinder nutrient absorption, potentially leading to weight loss in toddlers. If this condition persists for an extended period and is not balanced with adequate nutritional intake to support the healing process, it can result in stunted growth in toddlers (Rahmuniyati & Sahayati, 2021).

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Based on the analysis conducted in this study, the results indicated that the availability of trash bins had an impact on the incidence of stunting in Tamangapa Village, Pangkep Regency (Table 3). This finding aligns with a previous study. The study found that families with waste management that did not meet the standard had a 1.17 times higher risk of having children with stunting (95% CI 1.05-1.29) compared to families who implemented waste management that met the requirements (Badriyah & Syafiq, 2017).

Waste is a contributing factor to stunting. Trash bins that do not meet the standard are one of the factors contributing to the occurrence of stunting in toddlers due to poor household waste management. For example, irregularities in separating organic and inorganic waste, as well as the absence of a cover on the trash can, cause waste to become a breeding ground for vectors such as flies and cockroaches. These vectors act as intermediate hosts in the spread of environmentally related diseases. In addition, many people only dispose of garbage within their home environment and burn it in the yard. If household waste management is carried out correctly, the likelihood of children experiencing stunting will be reduced. This condition is associated with a lower possibility of toddlers having environmentally transmitted diseases.

Meanwhile, from a regional perspective, Tamangapa Village is situated on the coast, very close to the sea, allowing people to access sources of protein, such as fish. However, in reality, not all family members in this investigation had the habit of consuming fish. It may be because most families had low incomes, so they could not afford to buy fish for the protein needs of toddlers. Fathers were more concerned with buying cigarettes than meeting their children's protein needs. At the same time, mothers were mainly busy working as seaweed farmers, often facing economic and time constraints that prevented them from preparing protein-rich foods. The results of the interviews with respondents also revealed that toddlers frequently buy snacks freely and consume instant noodles.

The Influence of The Availability of Wastewater Drainage Channels on The Incidence of Stunting

Wastewater that is carelessly disposed of into the environment can pollute it. Waste that is discharged into the gutter can attract vectors to nest there. Vectors can act as a medium for transmitting disease. Therefore, when wastewater is not discharged in a sanitary manner, environmental health problems can arise in the area. Waste disposal, as one of the elements of ecological sanitation, can impact infectious diseases such as worms because it has the potential to spread worm eggs into the environment. The requirements for SPAL include having smooth channels and flows, special reservoirs, and being sanitary (the distance between SPAL and the water source must be at least 10 meters) (Balitbangkes, 2015).

The study's results showed that the availability of wastewater drainage channels affects the incidence of stunting in toddlers in Tamangapa Village, Ma'rang District, Pangkep Regency (Table 4). Most respondents had SPALs that did not meet the standard compared to those that met. People in Tamangapa Village generally disposed of wastewater directly into the area around their homes. Additionally, they also discharged wastewater into nearby ponds and rivers. Economic limitations were a predisposing factor in

the people of Tamangapa Village's decision to choose an open drainage system. This research aligns with previous studies, which found that the incidence of stunting is influenced by the availability of SPAL that does not meet health requirements (Soraya et al., 2022; Yuniastuti et al., 2024).

Wastewater drainage channels can be in the form of gutters or pipes used to drain wastewater from its source. Wastewater from households (domestic sewage) includes used bathwater, leftover water from washing clothes, as well as water from cleaning furniture and food ingredients, and other sources. Stagnant wastewater can pollute the environment around the house, cause environmental harm, and become a breeding ground for germs (Opu & Hidayat, 2021).

The Influence of the Availability of Toilets on The Incidence of Stunting

Two critical components of environmental sanitation practices are the presence of toilets in every home that meet hygiene standards and the habit of washing hands with soap. In addition to the availability of clean water, parental education level, and family income, stunting can also be caused by the availability of toilets and handwashing habits. Toilets must meet the requirements set by the Regulation of the Minister of Health of the Republic of Indonesia No. 3 of 2014 to achieve adequate hygiene standards (Regulation of the Minister of Health No. 3 of 2014, 2014).

This paper showed that the availability of toilets had a significant influence on the incidence of stunting in Tamangapa Village. This result is in accordance with several previous studies that showed a relationship between the availability of healthy toilets and the incidence of stunting (Fatmawati et al., 2015) (Puspitasari et al., 2024). However, this finding differs from the study, which found that the availability of toilets (p = 0.313) did not have a significant correlation with the level of stunting (Gea et al., 2023).

Most reports suggest that recurrent diarrheal disease can hinder optimal child growth, leading to decreased growth (Vilcins et al., 2018; Soraya et al., 2022).

A prior study found a significant correlation between the type of toilet used for children and the incidence of stunting. Children who did not have a proper toilet, not goose necks, were 1.3 times more likely to be stunted compared to children who had a proper toilet (Losong & Adriani, 2017). Tamangapa Village is located in the coastal area. Many respondents had fish ponds. There were many "flying toilets" (toilets whose feces were thrown into fish ponds), which contributed to the incidence of stunting in the area. The direct disposal of toddler feces or the improper disposal of toddler feces in unhealthy toilets can cause environmental pollution. Furthermore, it will facilitate the spread of pathogens originating from feces and increase stunting rates in children (Olo et al., 2020).

Family toilets are one of the most important aspects of household hygiene. Having a healthy family toilet will reduce the risk of stunting in children (Susianti & Lestari, 2020). Not only is the lack of food intake causing toddlers to suffer from stunting, but environmental factors also. Thus, stunting management requires cross-sector cooperation to prevent it. Stunting, which can increase susceptibility to infectious

diseases, is often caused by inadequate sanitation. Providing healthy toilet facilities is one way to prevent and stop the transmission of diseases (Angraini et al., 2022).

CONCLUSION

The availability of trash bins, wastewater disposal channels (SPALs), and toilets has an impact on the incidence of stunting in toddlers in the coastal area of Tamangapa Village, Pangkep Regency.

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The Interaction Between Environmental Sanitation and Pregnant Women's Nutritional Intake on the Risk of Stunting in Toddlers

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A B S T R A C T

Stunting is a chronic nutritional problem that impacts the physical growth and development of children. Environmental sanitation factors and maternal nutritional intake during pregnancy play a crucial role in determining toddlers' nutritional status. This study analyzes the relationship between environmental sanitation and pregnant women's nutritional intake on the incidence of stunting in toddlers. In addition, their interactions with stunting incidence. The study used an analytical observational design with a cross-sectional approach. The study population comprised families with toddlers aged 6–59 months. A sample of 100 families was selected using a purposive sampling technique. Data were collected through structured questionnaires, mother interviews, sanitation observations, and height measurements for height-for-age using WHO standards to assess stunting incidence. Data analysis used univariate analysis, the Chi-Square Test for bivariate analysis, and logistic regression to examine variable interactions. Results showed that 38% of toddlers experienced stunting, 45% of families had poor environmental sanitation, and 42% of pregnant women had inadequate nutritional intake. There was a significant correlation between environmental sanitation and the incidence of stunting (p=0.001) and between pregnant women's nutritional intake and stunting (p=0.003). The logistic regression analysis showed that toddlers exposed to poor sanitation and inadequate nutritional intake during pregnancy had a 3.2 times higher risk of stunting than those exposed to only one factor. Stunting is a multifactorial problem influenced by poor sanitation and inadequate maternal nutritional intake during pregnancy. Therefore, efforts to prevent stunting need to be integrated through improving environmental sanitation and enhancing the nutritional quality of pregnant women.

INTRODUCTION

Stunting is a form of chronic malnutrition characterized by a child's height below the standard for the age due to prolonged malnutrition and/or repeated infections (W.H.O., 2021). In Indonesia, stunting remains a national concern. Based on data from the 2022 Indonesian Nutritional Status Study (*Survei Status Gizi Indonesia*, SSGI), the national stunting prevalence was 21.6%, far above the WHO threshold of 20%, and remains a significant challenge for child health development efforts. Stunting not only impairs physical growth but also reduces cognitive development, weakens the immune system, and lowers children's potential productivity in adulthood (Black, Victora and Walker, 2013).

Theoretically and empirically, the causes of stunting are multifactorial. Previous studies have shown that nutritional factors during pregnancy and environmental sanitation conditions play a significant role in determining the risk of stunting in children. Maternal dietary intake, particularly adequate energy and micronutrient intake, is key to supporting optimal fetal growth and preventing low birth weight (Rahmannia, Nurjazuli and Astuti, 2021). In addition, poor environmental sanitation, including the lack of

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safe latrines, clean water, and adequate hygiene, increases the risk of infectious diseases, such as diarrhea, which can interfere with children's nutrient absorption (Fink, Günther and Hill, 2019).

A study by Sulistyoningsih *et al.* (2020) examined the effect of maternal nutritional intake on stunting risk and found a significant association between maternal energy adequacy and child nutritional status. In addition, research by Yanti *et al.* (2021) found that environmental sanitation quality was strongly associated with stunting incidence. However, most of these studies only analyze these factors separately. The survey by Dewi and Pramestuty (2020), for example, highlighted sanitation but did not consider the nutritional status of pregnant women. Similarly, prior research on maternal nutrition often ignored the environmental factors. Interventions to address stunting are insufficient if they target only one factor, given the complex interplay among social, behavioral, and physical environmental determinants. Therefore, an approach that simultaneously integrates environmental sanitation and maternal nutritional intake is crucial for examining their interaction in stunting incidence. This paper is based on the Social Ecology Theory (McLeroy *et al.*, 1988), which holds that an individual's health status is influenced by interactions between individual factors (e.g., maternal nutrition) and environmental factors (e.g., sanitation). In addition, this investigation uses the Developmental Origins of Health and Disease (DOHaD) framework, which posits that pregnancy is a critical period for establishing the risk of future chronic diseases. Malnutrition during pregnancy can have long-term effects, including stunting, due to impaired intrauterine growth (Hanson and Gluckman, 2014). From a sanitation perspective, the F-diagram theory by the WHO (2015) illustrates the transmission pathways of fecal matter to humans via contaminated hands, water, flies, and food, which can trigger gastrointestinal infections and worsen children's nutritional status. By integrating these theories, the research is expected to more comprehensively explain the roots of stunting and provide a basis for designing more effective nutrition and sanitation interventions.

The main problem in this study was the high rate of stunting in toddlers, which stems from a combination of inadequate environmental sanitation and poor maternal nutritional intake. While these two factors had been previously studied separately, few studies explicitly examined their interaction in increasing the risk of stunting. This research gap underpins the scientific contribution and originality of this article. This study differs from previous studies in that it analyzes the interactive effect between two key variables, rather than just a direct (bivariate) relationship. In addition, a population in this investigation from a region characterized by a high risk of stunting, namely rural areas with limited access to sanitation and maternal nutrition education, adds contextual value to the study results. The novelty of this study lies in the interaction analysis model used, which explains how the combination of two key factors exerts a more substantial influence on stunting risk than either factor alone. This investigation will provide new insights into designing comprehensive and targeted interventions. This study aims to: 1. Analyze the relationship

between environmental sanitation and the incidence of stunting in toddlers 2. Analyze the relationship between the nutritional intake of pregnant women and the incidence of stunting in toddlers 3. Analyze the interaction between environmental sanitation and pregnant women's nutritional intake on the risk of stunting in toddlers. This research is also expected to make practical contributions to national programs, such as Integrated Stunting Prevention, that require household- and community-based approaches.

METHOD

The study used an analytical observational design with a cross-sectional approach and was conducted in the working area of the Lamongan Public Health Center (PHC) in Rancangkencono Village. The study population comprised families with toddlers aged 6–59 months. A sample of 100 families was selected using a purposive sampling technique. The inclusion criteria were families with toddlers aged 6–59 months, a mother who had lived with the child since birth, and a willingness to be a respondent. The independent variables were environmental sanitation and pregnant women's nutritional intake; the dependent variable was stunting incidence. Data were collected through structured questionnaires, mother interviews, sanitation observations, and height measurements for height-for-age using WHO standards to assess stunting incidence. Data analysis used univariate analysis, the Chi-Square Test for bivariate analysis, and logistic regression to examine variable interactions. Significant interaction was determined if the $p<0.05$ and the interaction coefficient was significant.

RESULT

Table 1 shows that among 100 toddlers, half are boys (52%) and almost half are girls (48%). Most mothers have a high school education (60%), and almost half have graduated from University. In addition, half of the families have low income (55%), and nearly half have middle- to high-income.

Table 1. The Characteristics of Respondents (n = 100)

The Characteristics of Respondents	Frequency (n)	Percentage (%)
Toddler's Sex		
Boy	52	52
Girl	48	48
Maternal Education		
High School	60	60
University	40	40
Family Income		
Low	55	55
Middle - High	45	45

Based on the results in Table 2, half of the respondents lived in an environment with good sanitation (55%). In contrast, almost half (45%) lived in poor environmental sanitation.

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Table 2. Frequency Distribution of Environmental Sanitation

Environmental Sanitation	Frequency (n)	Percentage (%)
Poor	45	45
Good	55	55
Total	100	100

Based on the results of Table 3, half of the respondents had adequate pregnant women's nutritional intake (55%). On the other hand, almost half (42%) were found to be inadequate.

Table 3. Frequency Distribution of Nutritional Intake of Pregnant Women

Nutritional Intake of Pregnant Women	Frequency (n)	Percentage (%)
Inadequate	42	42
Adequate	58	58
Total	100	100

According to Table 4, 38% of toddlers had stunting. This figure remained relatively high, indicating that stunting risk factors require concern. Meanwhile, most toddlers (62%) had a normal nutritional status.

Table 4. Frequency Distribution of Nutritional Status in Toddlers

Nutritional Status	Frequency (n)	Percentage (%)
Stunting	38	38
Normal	62	62
Total	100	100

Toddlers from families with poor sanitation were more likely to experience stunting (25%) than those with good sanitation (13%). In contrast, those with good sanitation were more likely to have a normal nutritional status (42%) than those with poor sanitation (20%). The Chi-square test results showed a significant relationship between environmental sanitation and stunting incidence (p=0.001) (Table 5).

Table 5. The Correlation between Environmental Sanitation and Stunting Incidence in Toddlers

Environmental Sanitation	Stunting n (%)	Normal n (%)	Total	p
Poor	25 (25)	20 (20)	45 (45)	
Good	13 (13)	42 (42)	55 (55)	0.001
Total	38 (38)	62 (62)	100 (100)	

Toddlers born to mothers with inadequate nutritional intake during pregnancy were more likely to have stunting (25%) than those with adequate nutritional intake (13%). Meanwhile, those with adequate nutritional intake were more likely to have toddlers with normal nutritional status (58%) than those with inadequate nutritional intake (42%). The chi-square test showed a significant association between pregnant women's nutritional intake and stunting incidence (p=0.003) (Table 6).

Table 6. The Relationship between Nutritional Intake of Pregnant Women and the Incidence of Stunting in Toddlers

Nutritional Intake	Stunting n (%)	Normal n (%)	Total	p
Inadequate	25 (25)	17 (17)	42 (42)	
Adequate	13 (13)	45 (45)	58 (58)	0.003
Total	38 (38)	62 (62)	100 (100)	

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Logistic regression analysis results showed that toddlers exposed to both factors, poor environmental sanitation and inadequate nutrition during pregnancy, had a 3.2 times higher risk of stunting (OR = 3.2; 95% CI: 1.8–5.6) compared to those exposed to only one factor (Table 7).

Table 7. The Analysis of the Interaction of Environmental Sanitation and Nutritional Intake on Stunting Incidence in Toddlers

Variables	OR	95% CI	*p*
Poor Sanitation	2.1	1.2 – 3.9	0.008
Inadequate Nutrition of Pregnant Women	2.5	1.4 – 4.6	0.004
Interaction of Poor Sanitation and Inadequate Nutrition of Pregnant Women	3.2	1.8 – 5.6	0.001

DISCUSSION

Based on Table 1, the majority of respondents had a high school education (60%) and low family income (55%). Low socioeconomic status can affect a family's ability to provide adequate sanitation and nutrition for pregnant women. Black *et al.* (2013) discovered that poverty and low maternal education were closely associated with the risk of malnutrition and stunting due to limited access to nutritious food, health services, and sanitation facilities. Furthermore, Nikmah *et al.* (2025) found that increasing pregnant women's knowledge through sanitation education can improve clean, healthy living behaviors, especially among groups with lower levels of education.

This study showed that the incidence of stunting was higher among toddlers living in environments with poor sanitation (25%) than among those with good sanitation (13%), with a significant correlation (p=0.001) (Table 5). Inadequate sanitation increases the risk of infectious diseases such as diarrhea, worm infestation, and gastrointestinal infections, which can interfere with nutrient absorption in children. The WHO (2019) states that poor sanitation contributes to environmental enteric dysfunction (EED), a chronic intestinal disorder that impairs nutrient absorption and contributes to stunting. Torlesse et al. (2016) also reported that children living in homes without sanitary latrines had a higher risk of stunting than children living in environments with good sanitation. This study finding is also consistent with prior research. It showed that environmental sanitation education for pregnant women could reduce the risk of stunting by improving family hygiene practices (Nikmah *et al.*, 2025).

This paper also found that toddlers born to mothers with inadequate nutritional intake during pregnancy had a higher prevalence of stunting (25%) than those born to mothers with adequate nutritional intake (13%), with p=0.003 (Table 6). Inadequate maternal nutritional intake during pregnancy, particularly energy, protein, iron, and micronutrients, can inhibit fetal growth and increase the risk of low birth weight (LBW), a significant risk factor for stunting. Bhutta (2013) discovered that nutritional interventions during pregnancy are crucial for preventing fetal growth disorders and stunting in toddlers. Barker (2012), using the Developmental Origins of Health and Disease (DOHaD) concept, also uncovered that maternal nutritional status during pregnancy influences the child's long-term health and growth. In line with this,

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Nikmah *et al.* (2025) emphasized that balanced nutrition education for pregnant women is crucial for preventing stunting during pregnancy.

Furthermore, logistic regression results in this investigation exhibited that the combination of poor sanitation and inadequate maternal nutritional intake during pregnancy increased the risk of stunting by 3.2 times (OR = 3.2; 95% CI: 1.8–5.6; p=0.001) (Table 7). This finding suggests that stunting is a multifactorial problem influenced by interactions between environmental and biological factors. Dewey and Begum (2011) found that nutritional interventions alone were insufficient if not accompanied by improvements in sanitation and the environment. This finding is also supported by Nikmah *et al.* (2025), who demonstrated that an integrated environmental sanitation education approach with maternal nutrition education was more effective in reducing the risk of stunting than either intervention alone.

The results of this study emphasize the importance of an integrated approach to stunting prevention through: 1. Environmental sanitation education for pregnant women, 2. Increasing knowledge about balanced nutrition, 3. Strengthening the role of health workers and cadres, 4. Community-based family support. Bhutta (2013) and Black (2013) suggest that community-based interventions that combine nutritional and environmental improvements are an effective strategy for reducing stunting prevalence. Sanitation education that actively involves pregnant women has clearly demonstrated increased family health awareness and practices, thereby contributing to sustainable stunting prevention (Nikmah *et al.*, 2025).

CONCLUSION

Stunting is a multifactorial problem influenced by poor sanitation and inadequate maternal nutritional intake during pregnancy. Therefore, efforts to prevent stunting need to be integrated through improving environmental sanitation and enhancing the nutritional quality of pregnant women.

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Working Position, Work Duration, Ergonomics Knowledge Level on The Risk of Musculoskeletal Disorders among Informal Workers in Slipper Sponge Sandal Manufacturing

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A B S T R A C T

The informal sector may be associated with an increased risk of occupational diseases or accidents. This is due to the absence of an ergonomic workplace, insufficient attention to occupational safety and health, and inadequate supervision. The purpose of this study was to determine the effect of working position, work duration, and level of ergonomic knowledge on the risk of Musculoskeletal Disorders (MSDs) among informal workers in slipper sponge sandal manufacturing. The research design in this study was cross-sectional. The number of respondents was 33. Data collection used field observation and the completion of questionnaires using the REBA (Rapid Entire Body Assessment), Nordic Body Map Questionnaires, and questionnaires measuring ergonomic knowledge. Data analysis used bivariate and multivariate analysis. Multivariate analysis used multiple linear regression with α=0.05. Results showed that 63.6% respondents had a high risk of MSDs. Based on bivariate analysis, working position (X1) obtained p=0.018, work duration (X2) p=0.018, ergonomic knowledge level (X3) p=0.023. Multivariate analysis on X1, X2, and X3 got p=0.000. In conclusion, Working position, work duration, and ergonomic knowledge level influence partially and simultaneously the risk of musculoskeletal disorders among informal workers in slipper sponge sandal manufacturing.

INTRODUCTION

Musculoskeletal complaints can affect the skeletal muscles, ranging from very mild to severe. When muscles repeatedly receive static loads for prolonged periods, this can cause damage to muscles, nerves, tendons, joints, cartilage, and the discus intervertebralis. Musculoskeletal complaints are often referred to as MSDs (Musculoskeletal Disorders), RSI (Repetitive Strain Injuries), CTD (Cumulative Trauma Disorders), WMSDs (Work-Related Musculoskeletal Disorders), and RMI (Repetitive Motion Injury).

Musculoskeletal Disorders affect the parts of the body used in performing a job. The prevalence rate of Musculoskeletal Disorders worldwide, according to data from the Labor Force Survey (LFS), showed that MSDs among workers were very high, with 1,144,000 cases, of which 439,000 affected the back, 426,000 the lower limbs, and 224,000 the upper limbs. Similar research results in the European Union, Musculoskeletal disorders were the most common health problem, with 25-27% of workers complaining of back pain and 23% of muscle pain. The lack of movement among workers due to low physical activity may potentially increase the incidence of MSDs (Cheisario and Wahyuningsih, 2022).

One job at risk of Musculoskeletal Disorders is the manufacture of slipper sponge sandals, due to repetitive work and long hours. In addition, non-ergonomic work postures occur during work, such as bending. The process for making slipper sponge sandals includes several activities: sponge plonging, mat cutting,

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processing, rubbing, packing, and quality control. Although informal workers in the sponge slipper industry are at risk of Musculoskeletal Disorders, in-depth research on the effects of working position, work duration, and ergonomic knowledge level on MSDs in this population is limited. Understanding the impact of these variables on the risk of MSDs among informal workers can inform the development of appropriate prevention and intervention strategies. The purpose of this study was to determine the effect of working position, work duration, and level of ergonomic knowledge on the risk of Musculoskeletal Disorders (MSDs) among informal workers in slipper sponge sandal manufacturing.

METHOD

The research design in this study was cross-sectional. The population consisted of informal workers in slipper-sponge sandal manufacturing in Malang Regency. The number of respondents was 33. Data collection used field observation and the completion of questionnaires using the REBA (Rapid Entire Body Assessment), Nordic Body Map Questionnaires, and questionnaires measuring ergonomic knowledge. Data analysis used bivariate and multivariate analysis. Multivariate analysis used multiple linear regression. If $p > 0.05$, then H0 is accepted; if $p < 0.05$, then H0 is rejected.

RESULT

Informal workers in slipper sponge sandal manufacturing had low (36.4%), medium (0%), high (63.6%), and very high (0%) risk of musculoskeletal disorders (Table 1).

Table 1. The Risk of Musculoskeletal Disorders among Respondents

The Risk of Musculoskeletal Disorders	Frequency (n)	Percentage (%)
low	12	36.4
medium	0	0
high	21	63.6
very high	0	0

The significance value (*p*) in this study was 0.05, and the value of the t table = t (a/2; n-k-1) = t (0.025: 29) = 2.045. The Sig. for the working position variable (X1) was 0.018, which was < 0.05. The t value was 2.499 > t table (2.045), so H1 was accepted, indicating that the working position variable (X1) had a significant effect on the risk of musculoskeletal disorders (Y). In addition, the *p*-value for the work duration variable (X2) was 0.018 < 0.05, and the t value was 2.499 > t table (2.045), so that H2 was accepted, which means that the work duration variable (X2) had a significant effect on the risk variable for musculoskeletal disorders (Y). Furthermore, the *p*-value for the level of ergonomic knowledge variable (X3) was 0.023 < 0.05, and the t-value was 2.398 > t-table. H3 was accepted, indicating that the level of ergonomic knowledge variable (X3) had a significant effect on the risk of musculoskeletal disorders (Y) (Table 2).

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Table 2. T Test Results (Bivariate Analysis)

	t-value	*p*
Working Position (X1)	2.499	0.018
Work Duration (X2)	2.499	0.018
Level of Ergonomics Knowledge (X3)	2.398	0.023

The significance value of the multivariate analysis was 0.000 ($p<0.05$). The calculated F value was 17.317> F table 3.34, so that H4 was accepted, meaning that there was an influence between working position (X1), work duration (X2), and the level of ergonomic knowledge (X3) simultaneously on the risk of musculoskeletal disorders (Y) (Table 3).

Table 3 F Test Results (Multivariate Analysis)

Anova[a]		
F Table Value	F Value Count	Sig Value.
3.32	17.317	0.000

DISCUSSION

Musculoskeletal diseases (MSDs) usually stem from excessive activity or improper work postures. Skeletal muscle complaints are related to musculoskeletal problems. According to Tarwaka, uncomfortable work postures can affect the musculoskeletal system (Tamala, 2013). This study found that 21 workers (63.6%) had a high risk of MSDs (Table 1). It may be because workers were in non-ergonomic positions and were required to work long hours. Therefore, sponge slipper workers need to make immediate improvements. Based on field observations, the risk of MSDs increased when performing repetitive tasks or working in non-ergonomic postures during the plong, mat, processing, packing, and sack processes, particularly for long periods with a bent neck. It explained the high frequency of musculoskeletal disorders in the upper body among respondents, namely the back, upper right arm, upper left arm, and waist. In addition, the musculoskeletal complaints occurred in the lower body, specifically in the left knee, left calf, and right calf. Repeated work in non-ergonomic positions and poor manual handling practices can cause musculoskeletal disorders (Apriyan Trio Afandy *et al.*, 2023).

The bivariate analysis between working position and the risk of MSDs showed $p=0.018$ ($p<0.05$), indicating that working position influences the risk of MSDs among informal workers in slipper-sponge sandal manufacturing (Table 2). It is in line with research (Oktavian, Achmad and Mesak, 2021), which found a significant association between working position and Musculoskeletal Disorders ($p=0.004$). Based on field observations, the work environment did not emphasize the importance of working in the right position, as workers focused only on meeting the given target. In terms of facilities and infrastructure, it also did not support an ergonomic work system. Non-ergonomic positions can cause fatigue and indirectly increase workload. One of the health impacts arising from non-ergonomic work postures is Musculoskeletal Disorder (Pratiwi, 2020). The application of ergonomic positions for working will reduce workload, significantly reduce fatigue and work-related health problems, and provide a sense of comfort to

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the workforce, especially for workers who work long hours. Therefore, if ergonomic work positions cannot be adopted, discomfort or pain may occur in certain parts of the body.

In addition, this investigation showed there was an effect of work duration on the risk of musculoskeletal disorders in the respondents, with p=0.018 (p<0.05) (Table 2). It is in line with previous research, which found a significant influence between work duration and Musculoskeletal Disorders (p=0.005) (Laksana and Srisantyorini, 2020). One factor associated with the risk of musculoskeletal disorders is the duration of work. Work duration is strongly associated with muscle complaints and can increase the risk of MSDs, especially among high-strength work (Mustafah, 2022). According to the ILO (International Labor Organization), the recommended workday is 8 hours, and the recommended workweek is 48 hours (Setiawan, 2012). The work duration in this research was influenced by high consumer demand and each worker's sense of responsibility to complete their work. The respondents had to exceed their working hours and had little time to rest, which made their limbs feel sore. Therefore, to reduce the risk of musculoskeletal disorders, there must be a match between work and rest time.

Moreover, this paper showed there was an effect of the level of ergonomic knowledge on the risk of musculoskeletal disorders among respondents, with p=0.023 (p<0.05) (Table 2). It is consistent with a previous study that found a significant association between ergonomic knowledge and musculoskeletal disorders (p=0.000) (Aminullah, Fauzan and Widyarni, 2020). In the home industry, especially in slipper sponge sandal manufacturing, there was no provision for ergonomic work infrastructure. Therefore, workers worked in positions that were not comfortable for them every day. In line with research by Purwantini et al., the lack of knowledge and education led people to be less concerned about the importance of correct positioning in their work and daily activities (Deria, 2021). The accuracy of the information obtained can influence a person's level of knowledge. Thus, information is one of the factors that affect a person's knowledge and changes in behavior. It is necessary to transition to a work environment that meets adequate infrastructure and occupational health and safety (OHS) standards. Through training and education, workers will also better understand their workplace, enabling them to make adaptations and changes to reduce the risk of occupational diseases (Balaputra, 2020).

Based on the multivariate analysis, working position variable (X1), the work duration variable (X2) and the ergonomic knowledge level variable (X3), the significance value was p=0.000 (p<0.05), meaning that there was a simultaneous influence of the working position (X1), the work duration (X2) and the ergonomic knowledge level (X3) on the risk of musculoskeletal disorders (Y) (Table 3). Work that forces workers into non-ergonomic postures causes fatigue to set in more quickly and, in turn, increases the workload. Working position is a major consideration in the risk assessment of musculoskeletal system disorders. Other physical factors, namely static and dynamic work postures, repetitive movements, and manual handling, are also highly correlated with musculoskeletal disorders (Safira Nahar Fitriana and

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Padoli, 2021). Non-ergonomic working positions are risky for MDs when combined with frequent use, a large angle of inclination, and a long work duration. In addition, workers who work more than 8 hours/day without adequate rest can experience decreased productivity, fatigue, illness, and accidents, as well as an increased risk of musculoskeletal disorders. Between work time, rest must be provided, accounting for 15-30% of all working time (Maulana, Jayanti and Kurniawan, 2021). Moreover, the level of ergonomic knowledge supports other variables. Workers with a good level of ergonomic knowledge tend to adopt a positive attitude, which affects their actions in taking precautions. Likewise, a lack of ergonomic knowledge will affect workers' attitudes and actions when taking precautions to reduce the risk of MSDs.

CONCLUSION

Working position, work duration, and ergonomic knowledge level influence partially and simultaneously the risk of musculoskeletal disorders among informal workers in slipper sponge sandal manufacturing.

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Modification of Papercraft Play Therapy Combined with Music Therapy on the Social-Emotional Development of Preschool Children

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A B S T R A C T

The prevalence of emotional development disorders in children is still quite high. Thus, stimulating children's social-emotional development is critical. This paper evaluates whether children's social-emotional development improves after receiving papercraft play therapy combined with music therapy. This study used a quasi-experimental pretest-posttest design. The population was preschool children (5–6 years old) at TK Kristen Dharma Mulya. The sample was 60 children selected using a purposive sampling technique. It was divided into three groups: two intervention groups and one control group—Group A: papercraft play therapy; Group B: papercraft play therapy combined with music therapy; and Group C: routine play activities. The research instruments were the Emotion Regulation Checklist (ERC). Statistical analysis used ANOVA, with $\alpha \leq 0.05$. In Group A, the social-emotional development of children in the pre-test was in the poor category at 70%. Meanwhile, in the post-test, it improved to the good category at 55%. In Group B, social-emotional development in the pre-test was in the poor category at 55%. In the post-test, it increased to the adequate category at 45%. In Group C, 65% of children were in the poor category at the pre-test, and 50% remained in the poor category at the post-test. ANOVA analysis showed significant differences among the three groups ($p=0.001$). Post hoc tests indicated that Group B showed greater improvement in children's social-emotional development than the other groups. In conclusion, papercraft therapy combined with music therapy is more effective for social-emotional development in preschool children than papercraft therapy alone or routine play activities.

INTRODUCTION

Children's social life develops in accordance with their age. The social development of children aged 3–6 years occurs gradually, regarding how to become part of society (Aurora, Meiranny and Susilowati, 2024). Socialization ability is the effort to engage in interactions and relationships with others, whether within the family, with peers, or with society (Anzani and Insan, 2020). At the preschool age, children are expected to distinguish between what is good and what is not, and to interact with peers. One aspect of children's psychological development is the development of intelligence (Nisa *et al.*, 2021). Children's socio-emotional development influences intellectual development. The socio-emotional development of preschool children is an important aspect in preparing them to face future life challenges. However, many preschool children experience difficulties in developing socio-emotional skills, such as controlling emotions, sharing toys with friends, and interacting with others. According to Paramita's (2023) study, one factor contributing to children's inability to control their emotions is the use of gadgets (Ferenț and Turda, 2021). The lack of motor stimulation in children is also associated with their ability to regulate emotions, as when they are unable to complete a task, they are more likely to become emotional (Urayani, Adriani

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and Susmini, 2025). This phenomenon can cause preschool children to have difficulty adapting to the social environment, which, in turn, may affect their quality of life in the future (Putra, 2024).

The prevalence of emotional developmental disorders in children is still quite high. The World Health Organization (WHO) reports that 5–25% of preschool-aged children experience emotional development disorders. The National Institute of Mental Health (NIMH) also states that the prevalence of emotional disorders among preschool-aged children is around 10–15% worldwide (Nisa *et al.*, 2021). The Ministry of Health of the Republic of Indonesia reported that 400,000 toddlers (16%) in Indonesia suffer from developmental disorders (Wadley and Stagnitti, 2024). The East Java Health Office explained that in 2021, as many as 62.02% of children under five experienced socio-emotional developmental disorders (Amanda and Hidayat, 2024). Children's emotional development can be influenced by several factors, including the closeness of relationships, such as parenting style; individual factors; peer interaction; self-maturity; emotions; social status; intelligence; and the presence of parents in children's activities. The emotional development of children is not always stable; their ability to manage emotions also helps them discover their identity and role in real life (Yang and Zhang, 2025).

Children's emotional development is the main factor in their self-control and future success. By teaching emotional skills, children can be better prepared to face future problems and challenges (Nisa *et al.*, 2021). The impact of a lack of socialization skills in preschool children is that they become inferior, hesitant, and fearful of their surroundings and of interacting with peers (Novi *et al.*, 2024). A preliminary study conducted in early February 2025 among preschool children aged 5–6 years at TK Kristen Dharma Mulya, based on observations of 20 children, found that most were unable to control their emotions. It was evident during classroom activities: some children were unable to focus on the teacher's instructions, suddenly became angry, refused to queue during mealtime, and still often fought over toys and refused to give in. Based on these problems, efforts that can be made include providing stimulation or activities that can train children to regulate their emotions. Stimulation activities carried out at TK Kristen Dharma Mulya include coloring, drawing, beading, cutting, and pasting. However, some children still tended to play alone, run around, get angry, and cry when asked to share scissors or beads with friends. Stimulation for children must be delivered in engaging ways, such as through play therapy. Play therapy can simultaneously stimulate children's skills in diverse ways, such as through busy jars, origami, playdough, puzzles, Lego, and more (Ndari, Vinayastri and Masykuroh, 2019). Not only can play therapy improve socio-emotional development, but music therapy can also improve children's focus. In addition, a study by Alvi et al. (2020) explained that Mozart music therapy can increase emotional intelligence in elementary school children (Clark and Kingsley, 2020). Music therapy is an effective form of stimulation for children (Khoerunnisa, I, and R., 2023).

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Thus, this paper evaluates whether children's social-emotional development improves after receiving papercraft play therapy combined with music therapy at TK Kristen Dharma Mulya. The urgency of this research is to modify papercraft play therapy by adding music therapy to improve children's social-emotional development. The expected outcome of this study is to develop more innovative and interesting play therapy that can be easily applied by teachers and preschool children in general, including children with special needs. The outcome is to produce a golden generation with good character in the context of national development.

METHOD

This study used a quasi-experimental pretest-posttest design, with two intervention groups and one control group. This research was conducted from June to November 2025 at TK Kristen Dharma Mulya, Jl. Raya Dukuh Kupang Barat No. 50, Surabaya. The population was preschool children (5–6 years old) at TK Kristen Dharma Mulya. The sample was 60 children selected using a purposive sampling technique. It was divided into three groups: two intervention groups and one control group—Group A: papercraft play therapy; Group B: papercraft play therapy combined with music therapy; and Group C: routine play activities, as carried out at TK Kristen Dharma Mulya. The research instruments were the Emotion Regulation Checklist (ERC). Scoring≥ 75% was Good, 50% – 74.99% was Adequate, and less than 50% was Poor. Before interventions, The Authors assessed social-emotional development with the instrument (pre-test). Interventions were conducted three times a week for four weeks, with each session lasting 45 minutes. After the interventions, post-tests were conducted using an instrument to analyze social-emotional development. Data analysis consisted of univariate and bivariate analyses. Univariate analysis was conducted to describe the frequency distribution of respondents' characteristics. Bivariate analysis determined the influence of independent and dependent variables. Statistical analysis in this study used ANOVA. Statistical significance was determined at $\alpha \leq 0.05$. If $p \leq \alpha$, then H_0 was rejected and the hypothesis accepted. It means that papercraft play therapy combined with music therapy affected the social-emotional development of preschool children. This research was reviewed by the Ethics Committee of STIKes William Booth and received a certificate number: 01-Dosen/STIKES-WB/ETIK/VII/2025.

RESULT

Table 1 shows that most children in Groups A (65%), B (70%), and C (60%) are 5 years old. Most children in Groups A and B are boys (75% and 60% respectively), while Group C is predominantly girls (60%). Parents' ages are mostly between 31 and 35 years in all groups. In Groups A and C, mothers' education is predominantly Senior High School, while in Group B, most have higher education. In

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Group A (80%) and Group C (65%), most mothers do not work, whereas in Group B, the distribution between working and non-working mothers is equal (50%).

Table 1. The Characteristics of Respondents

Characteristics of Respondents	Group A (Papercraft Play)		Group B (Papercraft Play & music)		Group C (Control)	
	f	%	f	%	f	%
Child's Age (Years old)						
5	13	65	14	70	12	60
6	7	35	6	30	8	40
Gender						
Girl	5	25	8	40	12	60
Boy	15	75	12	60	8	40
Mother's Age (Years old)						
25-30 years	4	20	1	5	4	20
31-35 years	13	65	16	80	13	65
≥35 years	3	15	3	15	3	15
Mother's Education						
Senior High School	12	60	9	45	11	55
Diploma/University	8	40	11	55	9	45
Mother's Occupation						
Working	4	20	10	50	7	35
Not Working	16	80	10	50	13	65
Total	20	100	20	100	20	100

In Group A, before papercraft play therapy, the children's social-emotional development was in the poor category (70%). Meanwhile, after the intervention, socio-emotional development improved to the good category at 55%. In Group B, before papercraft play therapy combined with music therapy, social-emotional development was in the poor category at 55%. After intervention, it improved to the adequate category at 45%. In Group C, before routine play activities,65% of children were in the poor category, while after the intervention, 50% remained in the poor category (Table 2).

Table 2. Frequency Distribution and Percentage of Pre-test and Post-test

Group	Social-Emotional Development		Frequency (n)	Percentage (%)
Group A (Papercraft Play)	Before	Good	0	0
		Adequate	6	30
		Poor	14	70
	After	Good	11	55
		Adequate	1	5
		Poor	8	40
Group B (Papercraft Play & music)	Before	Good	0	0
		Adequate	9	45
		Poor	11	55
	After	Good	8	40
		Adequate	10	50
		Poor	2	10
Group C (Control)	Before	Good	2	10
		Adequate	5	25
		Poor	13	65
	After	Good	3	15
		Adequate	7	35
		Poor	10	50

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ANOVA was used to determine whether there were significant differences in the mean post-test results among the three groups: Group A (Papercraft), Group B (Papercraft + Music Therapy), and Group C (Control).

Table 3. Homogeneity Test Results

Levene Statistic	df1	df2	Sig.
4.120	2	57	0.021

The significance value was 0.021 < 0.05, indicating that the data were not homogeneous (i.e., the variance between groups differed significantly). Therefore, in the post hoc test, the Games-Howell interpretation was more appropriate than Bonferroni (Table 3).

Table 4. ANOVA Test Results

Source of Variation	SS (Sum of Squares)	df	MS (mean Square)	F	Sig.
Between Groups	2127.233	2	1063.617	8.406	0.001
Within Groups	7212.500	57	126.535		
Total	9339.733	59			

ANOVA analysis showed significant differences among the three groups (p=0.001). Post hoc test results indicated that Group B (papercraft play therapy combined with music therapy) had greater improvement in children's social-emotional development than the other groups (Table 4).

DISCUSSION

Social-Emotional Development of Preschool Children at TK Dharma Mulya Before and After Receiving Papercraft Play Therapy Combined with Music Therapy

Based on the research results, it was found that before receiving papercraft play therapy, the socio-emotional development of children was in the poor category at 70%. Meanwhile, after the intervention, socio-emotional development improved to the good category at 55% (Table 2).

Social development is the individual's ability to interact with others, while emotional development is the ability to manage and express feelings through actions, such as facial expressions or other activities. Children's socio-emotional development can be influenced by several factors, including heredity (inherited traits from parents), family environment, socioeconomic status, family integrity, attitudes and habits of parents, educators, gender, age, and peers (Aurora, Meiranny and Susilowati, 2024). Early childhood, often called the golden age, is a critical period of growth and development. The stage of socio-emotional development in children involves the development of behaviors that require children to adapt to social rules and norms and to learn to conform to the morals and traditions of a group. Preschool children still have high egocentrism, which can be influenced by the family environment and affect children's socialization (Anzani and Insan, 2020). Socio-emotional skills can be seen in how children socialize with peers. Children who can adapt to the environment and recognize their social-emotional states will not face obstacles when playing with peers (Nisa *et al.*, 2021).

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Socio-emotional skills can be developed through play and art. Papercraft play therapy is a form of therapy that assesses children's creativity as they shape an art pattern, combining creativity, expression, emotion, and fine motor skills (Ferenț and Turda, 2021). Activities such as folding, pasting, and cutting in papercraft therapy stimulate fine motor skills. These activities, which require concentration and fine motor activity, can affect children's emotional abilities when creating artwork. The development of fine motor skills often reflects children's ability to control emotions and to engage in social activities (Urayani, Adriani and Susmini, 2025).

According to the authors, the dominant factors influencing socio-emotional development are environmental influences and peer interaction. The environment, especially the family, plays a crucial role in providing stimuli that enable children to socialize and regulate emotions during interactions with peers.

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Social-Emotional Development of Preschool Children at TK Dharma Mulya Before and After Receiving Papercraft Play Therapy Combined with Music Therapy

Based on the results, before receiving papercraft play therapy combined with music therapy, social-emotional development was in the poor category at 55%. After intervention, it improved to the adequate category at 45% (Table 2).

Family, educators, the environment, and peers can contribute to poor social-emotional development in children. Andika's research showed that parental roles significantly affected social-emotional development. The study reported that parental interaction was a major determinant of children's ability to interact and socialize (Putra, 2024). Play therapy is often used as an intervention for preschool children because it is enjoyable and can have positive effects (Wadley and Stagnitti, 2024). Papercraft play therapy is similar to origami, involving cutting and forming patterns by pasting pieces together. These activities coordinate concentration, finger movement accuracy, and peer cooperation. Such activities train children's emotions while shaping patterns into a product, and they also teach social skills through collaboration (Amanda and Hidayat, 2024).

Music therapy is another intervention to address limited socialization in preschoolers. The use of rhythm, melody, and improvisation makes music an effective therapeutic approach in early childhood education, helping children to socialize and regulate emotions (Yang and Zhang, 2025). Combining play therapy and music provides a stimulating environment for social-emotional development. Music helps children complete play tasks calmly and comfortably, increases concentration, and fosters positive emotions. Positive emotions help children self-regulate while completing papercraft patterns, ultimately stimulating emotional development (Novi *et al.*, 2024).

The authors argue that combining papercraft play therapy with music therapy improves social-emotional development, as papercraft play therapy sharpens children's concentration while music therapy evokes positive emotions. Both work together to enhance preschool children's emotional regulation.

Social-Emotional Development of Preschool Children at TK Dharma Mulya Before and After in The Control Group

The findings in the control group showed that, before the intervention, 65% of children had poor social-emotional development, while after the intervention, 50% remained in the poor category (Table 2).

Social-emotional development can be optimally achieved if stimulation is appropriate to the developmental stage and provided consistently. Stimulation must suit children's needs and involve peers

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to encourage emotional regulation. Negative emotions can hinder children's socialization (Ndari, Vinayastri and Masykuroh, 2019). Occupational therapy can also serve as an activity-based intervention to stimulate socio-emotional development, where engaging in play-based activities helps children regulate emotions during interactions (Clark and Kingsley, 2020). If play therapy is not structured, it can hinder children's developmental responses. Therefore, the type of play therapy chosen should be appropriate to provide a significant impact. Activities involving the small muscles of the fingers (such as cutting and pasting) can improve concentration, focus, and positive emotions—examples include puzzle play (Khoerunnisa, I, and R., 2023). Group play techniques also enhance emotional regulation and socialization by helping children understand peers' feelings and control negative emotions while playing together (Nurmilasari, Afiati and Conia, 2021).

The authors argue that inappropriate play therapy fails to provide a meaningful impact. In the control group, unstructured play therapy did not significantly enhance socio-emotional development due to limited emotional and social interaction.

The Effect of Papercraft Play Therapy Combined with Music Therapy on the Social-Emotional Development of Preschool Children at TK Dharma Mulya

The results showed significant differences in post-test scores among groups (p=0.001). Post hoc tests revealed that the papercraft play therapy combined with music therapy group improved significantly more than the other groups (Table 4).

These findings align with Kuswanto's study (2022). It reported that papercraft therapy affected children's motor development. Papercraft therapy involves cutting, pasting, and pattern creation. Such activities demand focus, concentration, and coordination, stimulating socio-emotional growth (Ifalahma *et al.*, 2024). Other studies confirmed that play activities involving body movements served as problem-solving tools for improving social-emotional skills by engaging in fine motor activities and peer cooperation (Kadar *et al.*, 2020; Koziol *et al.*, 2023).

Huanghao's study showed that music therapy helps stabilize emotions by sending signals to the brain for emotional regulation (Feng, Mahoor and Dino, 2022). Audiolyfe music therapy also influences cognitive development, improving intelligence, memory, and learning motivation (Elfira and Johnling, 2025). Sound waves from music affect neurological activity, especially in the auditory cortex and memory areas of the brain. Audiolyfe stimulation regulates brainwaves, enhancing cognitive and emotional capacities, enabling children to better control emotions, concentrate, and remember (Pratama, 2024). Furher, emotional development is crucial for shaping behavior and social interaction.

The authors conclude that combining papercraft play therapy with music therapy is highly effective for preschoolers. Papercraft play therapy requires fine motor coordination, focus, and emotional control,

while music therapy relaxes the brain, optimizes its function, and allows children to cooperate calmly with peers during play.

CONCLUSION

Papercraft therapy combined with music therapy is more effective for social-emotional development in preschool children than papercraft therapy alone or routine play activities. This intervention can improve focus, emotional regulation, and cooperation. It is recommended as an innovative approach in early childhood education.

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Mental Health Issues Among Indigenous Communities and the Role of Traditional Medicine

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A B S T R A C T

Indigenous populations worldwide face significant mental health disparities stemming from historical trauma, colonization, and marginalization. The World Health Organization reports particularly concerning rates of suicide and self-harm among indigenous youth. These communities struggle with multiple interconnected challenges, including economic hardship, limited access to education, and identity crises. This narrative review es mental health issues among indigenous communities and the role of traditional medicine in addressing these challenges. This review analyzed sources from 2014 to 2024 in English and Bahasa Indonesia, including academic papers, government reports, and grey literature on indigenous peoples, mental illness, and traditional medicine. Using keywords related to indigenous/aboriginal communities, mental health, and traditional/alternative medicine, the review presented findings across 5 themes: Indigenous community challenges; health and cultural perspectives; traditional and biomedical approaches; preservation of traditional medicine; and new healthcare models. Traditional medicine faces challenges from systematic marginalization and younger generations' skepticism. The review advocates for an integrated healthcare approach that combines traditional and biomedical practices while preserving indigenous knowledge systems. This integration requires cultural competency, specialized training for healthcare professionals, and empowerment of indigenous community members in healthcare roles.

INTRODUCTION

Indigenous peoples worldwide have faced profound and far-reaching historical challenges that continue to impact their communities today (Williams, 2021). Over the past century, these populations have endured systematic colonization and persistent marginalization and have developed deeply rooted internalized feelings of inferiority (Sloan and Schmitz, 2021). The complex legacy of these historical traumas continues to shape their present-day experiences and challenges (Clement, 2019; Kronauer, 2019). These communities have traditionally inhabited remote, secluded areas, often due to forced displacement or strategic isolation (Hamza, Eriksson and Staupe-Delgado, 2021). This geographical isolation has led to the systematic exclusion from modernization processes, creating a widening gap between indigenous communities and mainstream society (Malhotra, 2024; Lécuyer *et al.*, 2025). The impact of this exclusion is evident in various aspects of their lives, from limited access to basic services to reduced economic opportunities.

Indigenous populations experience significant health disparities, with notably higher rates of suicide and self-harm among youth compared to non-indigenous groups (Braga *et al.*, 2020). These mental health

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challenges often manifest during adolescence and young adulthood, during critical periods for identity formation and personal development (Eckhoff, Sørvold and Kvernmo, 2020; Kinchin *et al.*, 2020). The root causes of these issues are complex and interconnected, forming a challenging web of social, economic, and cultural factors. Economic hardship remains a persistent challenge, with many communities struggling to achieve financial stability while maintaining their traditional ways of life (Redvers *et al.*, 2023). This economic vulnerability often leads to increased dependency on state support systems, which can further erode community autonomy and self-determination (Malhotra, 2024).

In addition, limited access to quality education remains a significant barrier, with many indigenous youth facing challenges in obtaining culturally appropriate educational opportunities that respect and incorporate their traditional knowledge systems (Maringe, 2023). This educational gap contributes to ongoing cycles of disadvantage and limited economic mobility (Browman *et al.*, 2019).

Furthermore, identity crises and internalized trauma represent significant psychological challenges within these communities (Malhotra, 2024). The struggle to maintain cultural identity while adapting to modern society can create internal conflicts that span generations (Redvers *et al.*, 2023; Malhotra, 2024). It is further complicated by the weight of historical injustices and the challenge of preserving traditional values in an increasingly globalized world (Kania, 2019).

Moreover, the complexity of modern parenting within indigenous communities adds another layer of challenge (Bayod *et al.*, 2021; Hogan and Liddell, 2023). Parents must navigate the delicate balance between preserving cultural traditions and preparing their children for success in the contemporary world (Judijanto and Aslan, 2024). It includes addressing intergenerational trauma while fostering resilience and cultural pride in younger generations (Bayod *et al.*, 2021).

Indigenous adolescents who leave their communities to provide financial support for families often face identity crises as they abandon tribal life and confront modernization (Sokk, 2024). This transition frequently leads to homelessness, mental health challenges, and emotional distress (Eckhoff, Sørvold and Kvernmo, 2020). Additionally, healthcare workers' lack of cultural competence perpetuates racism in mental health services throughout many indigenous communities (Kirmayer and Jarvis, 2019; Kaphle *et al.*, 2022). This situation has led indigenous people to prefer traditional medicine, which is rooted in their values and cultural pride (Redvers and Blondin, 2020; Chali, Hasho and Koricha, 2021). Thus, the role of traditional medicine in adolescent mental health has become increasingly important as communities navigate modern healthcare systems and healthcare workers' insensitive attitudes toward indigenous communities. This narrative study describes mental health issues among indigenous communities and the role of traditional medicine in addressing these challenges.

METHOD

This review identified articles from all evidence related to indigenous/aboriginal people, mental illness, and traditional medicine, including academic papers, government reports, grey literature, and publications from 2014 to 2024 in Bahasa Indonesia and English. Keywords used in the search process included: indigenous, aborigine, indigenous community, indigenous people, aborigine people, mental health, mental illness, traditional medicine, alternative medicine. A total of 11 articles were obtained, which were used to answer the purpose of this article. The review results are presented in 5 themes: Indigenous communities and their challenges; Health, mental health, and culture among indigenous peoples; Traditional medicine and biomedicine; Traditional medicine as a resource to be preserved; and a new health care model for indigenous peoples.

RESULT AND DISCUSSION

Indigenous communities and their challenges

Indigenous peoples predominantly maintain traditional livelihoods as farmers and hunters (Malhotra, 2024; Lécuyer *et al.*, 2025), preserving ancestral practices that have sustained their communities for generations (Malhotra, 2024). They communicate primarily in their native languages, which often include unique linguistic features and cultural knowledge not found in mainstream languages (Holton, Leonard and Pulsifer, 2022; Rice, 2022). While many have received basic education in their national languages, this education frequently presents challenges in bridging traditional knowledge with modern educational systems (Rice, 2022). These communities typically adhere to their local religious practices and spiritual beliefs, which are deeply intertwined with their understanding of the natural world and their place within it (Redvers and Blondin, 2020).

These communities embody an irreplaceable genetic and cultural heritage that has evolved over thousands of years of adaptation to specific environments and social conditions (Kania, 2019). Without careful preservation efforts, this precious heritage faces the risk of disappearing within just a few generations, taking with it its unique adaptations and cultural innovations that could benefit humanity as a whole (Malhotra, 2024). The urgency of preservation becomes more apparent as younger generations increasingly engage with modern society (Bayod *et al.*, 2021).

Their traditional knowledge systems encompass a wide range of insights into local ecosystems, medicinal plants, sustainable resource management, and social organization (Chali, Hasho and Koricha, 2021). However, these valuable knowledge systems often exist primarily in oral traditions and practical demonstrations, making them particularly vulnerable to loss (Redvers and Blondin, 2020). The limited amount of documented information, combined with the challenges of translating traditional knowledge into scientific terminology and methodologies, creates significant obstacles in bridging indigenous

wisdom with contemporary scientific frameworks (Brondízio *et al.*, 2021). This gap makes it especially challenging to preserve and validate these knowledge systems within modern academic and research contexts.

Health, mental health, and culture in indigenous people

Health exists as a deeply cultural concept, with indigenous communities maintaining rich and nuanced perspectives on what truly constitutes well-being and balance in life (Redvers and Blondin, 2020). These ancient cultures have developed and preserved powerful healing traditions within their practices, passed down through generations of wisdom keepers and traditional healers (Chali, Hasho and Koricha, 2021). The way local cultural frameworks shape understanding is profound - they not only determine how communities conceptualize illness and wellness, but also influence how individuals experience health challenges and engage with healing processes (Nguyen *et al.*, 2020; Marques, Freeman and Carter, 2021). Each indigenous group maintains its own sophisticated models for understanding the delicate interplay between physical, mental, and spiritual well-being (Brondízio *et al.*, 2021; Fernández-Llamazares *et al.*, 2021).

Examining protective factors within indigenous communities, we find a remarkable interweaving of narrative identity (the stories people tell about themselves and their people), deeply held religious and spiritual practices, and the powerful cohesion found in community bonds (Reilly *et al.*, 2020). This combination creates a robust protective framework that serves multiple crucial functions (Reilly *et al.*, 2020; Usher *et al.*, 2021). It strengthens indigenous peoples' psychological resilience, provides emotional support through traditional healing practices, maintains cultural continuity across generations, and creates a strong defense against forces that might otherwise erode their unique cultural identity (Nguyen *et al.*, 2020; Marques, Freeman and Carter, 2021). These protective elements work together synergistically, each reinforcing and amplifying the others' positive effects.

Traditional medicine and biomedicine

Traditional medicine represents a profound manifestation of indigenous knowledge and cultural heritage, encompassing a diverse array of therapeutic approaches that have been refined and passed down through countless generations (Brondízio *et al.*, 2021). These healing traditions incorporate carefully selected remedies sourced from the natural world, including medicinal plants with specific properties, animal-derived materials with therapeutic qualities, and minerals known for their healing potential, alongside sophisticated spiritual healing practices that address the metaphysical aspects of wellness (Brondízio *et al.*, 2021; Chali, Hasho and Koricha, 2021). These various therapeutic approaches, whether implemented individually or combined in complementary ways, serve multiple essential functions (Braga *et al.*, 2020; Redvers *et al.*, 2023). They help maintain overall wellness through preventive practices, enable the accurate diagnosis of various conditions through traditional assessment methods, prevent the onset of

illness through protective measures, and provide effective treatments for existing ailments (Redvers and Blondin, 2020; Sokk, 2024).

In traditional societies, the conceptualization of disease and healing emerges from a rich tapestry of prescientific understandings that reflect deep cultural wisdom (Dal Lin *et al.*, 2020). Pre-industrial agrarian communities have developed intricate frameworks for understanding illness, often viewing health challenges through a multifaceted lens that considers various spiritual and supernatural dimensions (Jayawickrama and Madhanagopal, 2025). According to these traditional perspectives, illness might manifest as a consequence of negative encounters with spiritual forces, a temporary weakening of one's spiritual protective barriers, the influence of adverse fate or destiny, or as a form of divine correction or retribution (Dal Lin *et al.*, 2020). These societies have developed sophisticated systems of understanding that position supernatural forces as the fundamental origin of illness, with their religious and spiritual beliefs forming the cornerstone of their healing traditions and practices (Dal Lin *et al.*, 2020; Brondízio *et al.*, 2021; Jayawickrama and Madhanagopal, 2025).

The integration of religious and spiritual beliefs into healing practices creates comprehensive therapeutic systems that address both physical and metaphysical aspects of illness (Sokk, 2024). This holistic approach is exemplified in various indigenous healing traditions, such as among Santal healers, who maintain a sophisticated understanding of how the efficacy of their treatments is intrinsically linked to their ability to correctly identify, interpret, and address the specific spiritual forces involved in each case (Chali, Hasho and Koricha, 2021). This understanding requires not only extensive knowledge of traditional remedies but also deep spiritual insight and cultural wisdom (Sokk, 2024).

Traditional Medicine (TM) exists as a distinct and complementary approach to Western medicine, biomedicine, and pharmacological methodologies (Jayawickrama and Madhanagopal, 2025). Throughout the last century, TM has faced systematic discrimination, with its ancient traditions subjected to ridicule and its legitimate healing techniques and practitioners invalidated (Pal *et al.*, 2015; Jayawickrama and Madhanagopal, 2025). This systematic marginalization has significantly diminished TM's standing and influence within indigenous territories, particularly when compared to biomedical approaches (Brondízio *et al.*, 2021; Fernández-Llamazares *et al.*, 2021). This concerning situation underscores the pressing necessity to formally acknowledge TM practitioners and provide opportunities for them to enhance their capabilities within contemporary medical frameworks (Sinaga, Zuska and Sitorus, 2021; Dewi, 2025), while still preserving their traditional knowledge and practices (Fernández-Llamazares *et al.*, 2021).

For indigenous communities residing in remote and rural regions, where access to conventional healthcare services is severely limited (Redvers and Blondin, 2020) and the cost of transportation to medical facilities presents a significant financial burden, traditional healers continue to play an indispensable role in community health (Wulanyani *et al.*, 2020). A notable example can be found in Bali,

Indonesia, where the Balian (traditional healers) function as the primary healthcare providers, addressing both physical ailments and mental health concerns for their communities (Wulanyani *et al.*, 2020; Suwantana, 2025). Their deep integration into local social structures makes them particularly effective in providing culturally appropriate care (Sadnyana *et al.*, 2023).

The intersection of mental health and traditional healing practices is especially significant, as mental illness in many indigenous communities carries profound stigma and often generates fear regarding potential risks or dangers associated with affected individuals (Dewi, 2025). This deeply rooted stigma frequently results in a resistance to accepting medical or scientific explanations for mental health conditions (Green and Colucci, 2020). Traditional healers, deeply embedded in their communities and with an intimate understanding of local cultural contexts, are uniquely positioned to address mental health concerns (Pal *et al.*, 2015; Sinaga, Zuska and Sitorus, 2021). Their familiarity with community-specific sources of stress and anxiety enables them to provide explanations and therapeutic approaches that resonate with local cultural beliefs and practices (Sinaga, Zuska and Sitorus, 2021). This cultural alignment is exemplified in various indigenous societies worldwide, such as Nepal, where traditional understandings attribute mental illness to supernatural influences, requiring culturally specific approaches to treatment and healing (Pham *et al.*, 2021; Suwantana, 2025).

Traditional medicine as a resource to be preserved

Indigenous communities find themselves in a complex position regarding Western medicine, experiencing both curiosity and skepticism, while their deep-rooted cultural practices and traditional knowledge systems remain fundamentally intertwined with traditional medicine (Green and Colucci, 2020; Sokk, 2024). The younger generation's increasing reluctance to engage with ancestral wisdom poses a significant challenge (Machfiroh, Rohayani and Hidayat, 2024), as they often dismiss their elders' knowledge as outdated and implausible, thereby widening the gap between traditional healing practices and modern biomedical approaches (Green and Colucci, 2020). This generational disconnect makes it increasingly challenging to establish meaningful bridges between these two distinct medical paradigms.

Indigenous peoples continually work to safeguard their traditional cultural practices and spiritual healing methods within their communities (Sinaga, Zuska and Sitorus, 2021; Suwantana, 2025), recognizing the irreplaceable value of their ancestral knowledge. In many cases, healers and shamans are deliberately relocated to remote forest areas or distant locations, separated from village centers, as a protective measure against Western influences (Sokk, 2024). This physical isolation serves to preserve their precious ancestral medicinal knowledge and maintain their vital spiritual connections undisturbed by external pressures (Fernández-Llamazares *et al.*, 2021).

Despite the widespread adoption of Western religious practices among indigenous populations, traditional healers and shamans steadfastly maintain their animistic beliefs and continue their spiritual practices,

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serving as living repositories of ancient wisdom (Brondízio *et al.*, 2021). However, these knowledge keepers face mounting challenges in transmitting their extensive ethnological competence to potential successors (Brondízio *et al.*, 2021; Fernández-Llamazares *et al.*, 2021). The preservation of their profound understanding of medicinal plants becomes increasingly precarious as Western medicine begins to show interest in these botanical resources, sometimes leading to the appropriation of traditional knowledge without proper acknowledgment or preservation of its cultural context (Kania, 2019; Sokk, 2024).

Nevertheless, it has become increasingly apparent that Western medicine cannot afford to dismiss or overlook the role of traditional healers in contemporary healthcare systems (Pal *et al.*, 2015; Judijanto and Aslan, 2024; Sokk, 2024). This recognition highlights the urgent need to create respectful, mutually beneficial dialogues between traditional and modern medical practices.

New health care model of indigenous people

Indigenous healthcare systems require flexibility as they are influenced by community health status, environmental conditions, social factors, and resource availability (Zank, Araujo and Hanazaki, 2019; Barnabe, 2021). For mental health programs to succeed, professionals require specialized training to develop culturally appropriate screening tools, and building trust is crucial when working with indigenous communities (Pham *et al.*, 2021). Additionally, training programs should empower indigenous community members to work as psychologists, anthropologists, and social workers, enabling them to shape policy and bridge the gap between traditional narratives and clinical perspectives (Nguyen *et al.*, 2020).

Cultural competency in therapy can effectively combine traditional knowledge with psychiatric and psychotherapeutic approaches (Venkataramu *et al.*, 2021; Adebayo *et al.*, 2024). Indigenous psychotherapeutic training, based on cross-cultural evaluation models, should incorporate spiritual understanding to interpret symptoms and avoid misunderstandings and feelings of oppression (Venkataramu *et al.*, 2021). Traditional healers need supervision due to gaps in mental health knowledge, legislation, and human rights awareness.

An integrated and comprehensive approach to mental health is essential to build indigenous people's confidence in Western medicine and biomedicine, while promoting meditation practices and managing Post-Traumatic Stress Disorder (PTSD) (Barnabe, 2021). As traditional communities have lost trust in their healing heritage and sometimes view it as inadequate or dogmatic, combining both traditional and biomedical approaches offers the best possibility for these communities (Dal Lin *et al.*, 2020). For example, people may take herbal remedies alongside modern medicine while participating in psychotherapy.

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CONCLUSION

Indigenous communities face distinct and multifaceted challenges that render them particularly susceptible to mental health concerns. These challenges stem from historical trauma, cultural displacement, and ongoing socioeconomic pressures, creating a complex web of vulnerabilities that require careful attention and understanding. The integration between traditional healing practices and biomedical approaches has emerged as a crucial strategy to address these challenges effectively, requiring thoughtful collaboration between healthcare providers from both paradigms. A significant additional challenge arises in standardizing traditional medicine to align with contemporary therapeutic protocols. A process made particularly complex by the limited availability of systematic evidence and the remarkable diversity of indigenous communities across the globe, each with its own unique healing traditions, cultural practices, and medicinal knowledge systems.

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