



Original Article

Maternal Factors Associated with Fine Motor Skills Development in Toddlers with Stunting

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Abstract:

Early childhood is a golden age, where nutrition supports growth and development, including fine motor skills. This development can also be influenced by the mother's education, occupation, household income, and parenting style. This study aims to identify factors associated with the development of fine motor skills in toddlers experiencing stunting. This is a correlational study with a cross-sectional approach. The sample consisted of 59 mothers with stunted toddlers using total sampling. Data collection was conducted using the Parental Feeding Style Questionnaire and KPSP. Statistical analysis was performed using Chi-Square Analysis. The results of the Chi-Square test showed that there was a relationship between the mother's education ($p=0.000$), occupation ($p=0.000$), household income ($p=0.000$), and parenting style ($p=0.000$) with the fine motor development of toddlers. The conclusion shows that there is a relationship between maternal education, maternal employment, household income, and parenting style with the fine motor development of toddlers.

Keywords: fine motor skills, household income income, maternal education, maternal employment and parenting style

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Introduction

Child health issues remain an important issue in the health sector in Indonesia and are a priority in national planning and development ([Qoyimah et al., 2024](#)). The Infant and Child Mortality Rate (ICMR) reflects the level of child health problems and various factors that affect toddler health, such as nutritional status, sanitation conditionSs, infectious diseases, and accidents ([Garina et al., 2024](#)).

Children aged 0–5 years are the group most often affected by malnutrition, making them nutritionally vulnerable. During this period, children are in their golden age because their growth and development are rapid ([Ahmed et al., 2022](#)). Child development encompasses biological, socio-emotional, and cognitive aspects that are interrelated and influence each other throughout human life K

Early childhood development is an important process that determines the quality of a child's growth and development in the future. One aspect of development that needs special attention is fine motor development, which is the ability of children to coordinate small muscles with eye and hand movements to perform activities such as writing, drawing, cutting, arranging objects, and other daily activities ([Zhafira et al., 2024](#)). Optimal fine motor skill development plays a significant role in supporting children's independence, readiness to learn, and future academic success ([Mulyanti & Marlina, 2025](#)).

Various factors can influence a child's fine motor development, both biological and environmental factors. The family environment is one of the main factors because the family is the first place where children receive stimulation and learning (Fatmawati et al.,). A mother's education plays a role in determining her ability to understand her child's growth and development needs and provide appropriate stimulation. In addition, a mother's occupation also affects the time, attention, and interaction patterns she provides to her child, which can ultimately impact the child's fine motor development ([Qoyimah et al., 2024](#)).

The family's household income also contributes to meeting the child's basic needs, including access to educational facilities, educational games, and health and education services that support the child's growth and development ([Meylia et al., 2022](#)). Families with adequate income tend to have greater opportunities to provide an environment conducive to child development. However, high income without proper parenting does not guarantee optimal fine motor development ([Mbabazi et al., 2024](#)).

Previous studies on child development have predominantly focused on the influence of general parenting styles, nutritional status, or socioeconomic factors on overall developmental outcomes, often emphasizing gross motor or cognitive development rather than fine motor skills specifically. In addition, many studies relied on a single determinant and did not comprehensively examine the combined role of parental feeding style and family characteristics. The novelty of this study lies in its focuses on fine motor development and incorporates multiple family-related factors, including maternal education, maternal employment status, and family income, within a single analytical framework. The aim of this study was to examine the association between parental feeding style and family characteristics with fine motor skill development in children.

Methods

This study utilised a correlational research design with a cross-sectional approach. It was conducted in the Limusnunggal sub-district, within the working area of the Limusnunggal Community Health Centre in Sukabumi City, from February to June 2025. The population and sample in this study consisted of all mothers with

stunted toddlers at the Limusnunggal Community Health Centre in Sukabumi City, totalling 59, using total sampling. The inclusion criteria in this study were mothers who had stunted toddlers, resided in the Limusnunggal area of the Limusnunggal Community Health Centre, were willing to be respondents in the study, and were able to communicate well, while the exclusion criteria were mothers with toddlers who had congenital abnormalities or disabilities. Data collection was conducted using a questionnaire. The variables used were maternal education, maternal employment, household income, parenting style, and fine motor development in toddlers.

The categorization of variables in this study was conducted to facilitate data analysis and interpretation of the results. Fine motor skill development was categorized based on the assessment using the Kuesioner Pra Skrining Perkembangan (KPSP) according to the child's age group. The results of the fine motor development screening were classified into normal and suspect. The normal category was assigned when the child was able to achieve fine motor developmental indicators appropriate for their age, while the suspect category was assigned when the screening results indicated that fine motor skills were below the age-appropriate standard but had not yet reached the criteria for developmental delay. Parental feeding style was categorized based on the results of the Parental Feeding Style Questionnaire (PFSQ). The scores obtained from this questionnaire were used to classify parental feeding style into democratic, permissive, and authoritarian styles, reflecting the dominance of control, warmth, and responsiveness dimensions in parents' feeding practices. The results of the validity test of parenting and child development refer to previous studies with a calculated r value $> r$ table, so the variables are considered valid. The reliability test results refer to previous studies and are declared reliable ([Bella et al., 2024; Mulyanti, 2025](#)).

Maternal education was categorized into low and high levels. Low education included mothers who had no formal education or had completed elementary school to junior high school (*no formal education to junior high school*), while high education included mothers who had completed senior high school or higher education. Maternal employment status was classified into employed and unemployed, where employed mothers were those engaged in paid or unpaid work outside the home, and unemployed mothers were those who worked as full-time homemakers. Family income was categorized based on the Regional Minimum Wage (UMR) of Sukabumi City, amounting to IDR 3,192,807. Family income was classified as \leq UMR if the monthly household income was less than or equal to IDR 3,192,807 and $>$ UMR if the monthly household income exceeded this amount.

Data analysis in this study included a description of univariate variables and bivariate analysis using Chi-Square test. The research ethics letter was issued by the Ethics Committee of the Sukabumi College of Health Sciences with the number: No:004082/KEP STIKES SUKABUMI/2025.

Results

Table 1. Univariate Analysis

Table 1 shows that most mothers of toddlers are highly educated, namely

Variables	Category	Fine Motor Skills				Total		P-Value
		Suspect		Normal				
		f	%	f	%	f	%	
Mother's Education	Low	17	81	4	19	21	100	< 0,001
	High	8	21.1	30	78.9	38	100	
Mother's Working Status	Doesn't Work	11	31.4	24	68.6	24	100	0,040
	Working	14	58.3	10	41.7	35	100	
Household income	< UMR	17	58.6	12	41.4	29	100	0.013
	> UMR	8	26.7	22	73.3	30	100	
Parenting Style	Democratic	1	3.4	28	96.6	29	100	< 0,001
	Permissive	11	84.6	2	15.4	13	100	
	Authoritarian	13	76.5	4	23.5	17	100	

38 people (64.4%), are unemployed, totaling 35 people (59.3%), have an income above the Sukabumi City minimum wage (Rp3,192,807), totaling 30 people (50.8%), practice democratic parenting, totaling 29 people (49.2%), and have toddlers with normal fine motor development, namely 34 people (57.6%)

Table 2. Bivariate Analysis

Variables	f	%
Mother's Education		
Low (Not in school – Junior high)	21	35.6
High (Senior high – College level)	38	64.4
Mothers's Working Status		
Working	24	40.7
Doesn't Work	35	59.3
Household income (Monthly)		
≤ UMR	29	49.2
> UMR	30	50.8
Parenting Style		
Democratic	29	49.2
Permissive	17	28.2
Authoritarian	13	22
Fine Motor Development		
Normal	34	57.6
Suspect	25	42.4

Table 2 shows the relationship between several maternal and family

characteristics and children's fine motor skill development. Based on maternal education, children of mothers with low education levels were predominantly in the suspect category (81.0%), while children of mothers with high education levels were mostly in the normal category (78.9%). The bivariate analysis indicates a statistically significant association between mother's education and fine motor skills ($p < 0.001$).

Regarding maternal working status, children whose mothers did not work were more frequently categorized as having suspect fine motor skills (31.4%) compared to those whose mothers worked. Meanwhile, children of working mothers were more likely to have normal fine motor development (41.7%). The analysis shows a significant relationship between mother's working status and fine motor skills ($p = 0.040$).

In terms of household income, children from families with income below the regional minimum wage (UMR) were more often found in the suspect category (58.6%), whereas children from families with income above the UMR were mostly in the normal category (73.3%). The statistical test demonstrates a significant association between household income and fine motor skill development ($p = 0.013$).

With respect to parenting style, children raised with permissive and authoritarian parenting styles were largely classified in the suspect category, with proportions of 84.6% and 76.5%, respectively. In contrast, children who experienced democratic parenting were predominantly in the normal category (96.6%). The bivariate analysis reveals a statistically significant relationship between parenting style and fine motor skills ($p < 0.001$).

Maternal education is related to children's fine motor development because it influences how mothers design and adjust stimulation according to their children's developmental age. This is in line with research by Shiferaw et al (2024) & Dwi et al (2022), which explains that there is a relationship between maternal education and fine motor development. Mothers with higher levels of education are generally better able to understand instructions, information, or guidance related to child growth and development, so that the stimulation provided is not random but targeted. This condition shows that maternal education plays a role in determining the type and timing of stimulation, which directly impacts the maturity of fine motor skills ([Onyango et al., 2023](#)).

In addition to direct stimulation, maternal education is related to children's fine motor development through mothers' ability to utilise health and education services for their children. Mothers with higher levels of education tend to be more responsive to growth and development monitoring results, such as KIA books or development screening, so they are quicker to recognise delays in fine motor skills and take follow-up action. This awareness enables earlier intervention, either through home exercises or consultations with health workers, which ultimately supports the optimal development of children's fine motor skills ([Shrestha et al., 2022](#)).

The results of the study show a significant relationship between mothers' employment and the fine motor development of toddlers with a p-value < 0.05 . This is supported by research conducted by García-sierra (2025), which states that specific skills related to mothers' employment affect children's development processes, including motor and cognitive abilities, through longitudinal data, showing that aspects of mothers' employment are related to child development.

Differences in parenting patterns and interaction time between working and

non-working mothers can affect the provision of stimulation needed by children, such as drawing, block building, and educational play, which play an important role in fine motor development (Fatmawati, Sari, et al., 2024). Although working mothers have limited time with their children, this does not always have a negative impact because it can be offset by good quality interactions, broader access to information, and the ability to provide learning resources (Veldman et al., 2024). These findings are in line with child development theories that emphasise the importance of continuous stimulation and a supportive environment in fine motor development (Ruiz-garcia et al., 2022).

The results of the study show a significant relationship between family household income and children's fine motor development with a p-value <0.05. This is in line with research conducted by Schott et al (2023), which states that high socioeconomic status correlates with better motor development, including fine motor aspects, and that affordances at home reinforce this positive effect. Sufficient family income helps meet children's basic needs, such as nutrition, health services, and the provision of educational play facilities that support fine motor development (Halimatusyadiah et al., 2023). Children who live in good economic conditions tend to have greater opportunities to obtain stimulation in accordance with their developmental stages (Zhang & Lin, 2025).

Families with higher incomes are usually able to provide various learning and playing facilities, such as books, drawing tools, and constructive games, so that children can practise their fine motor skills more often (Cao et al., 2025). Economic limitations can restrict access to these resources and potentially hinder children's development if not balanced with stimulation from parents, in line with theories that emphasise the importance of the environment and continuous stimulation (Rahmadiyah et al., 2024).

Parenting styles can be related to fine motor development. This study is in line with research conducted by Sartika et al. (2025) & Syandri & Latifah (2024), which concluded that there is a significant relationship between parenting styles and the fine motor development of toddlers experiencing stunting. The main process of child development is interrelated between biological processes, social-emotional processes, and cognitive processes. These three things will influence each other throughout human life. During the development process, it is possible for children to face various problems that will hinder further development. This development includes social behaviour, language, cognitive, physical or motor (gross and fine motor) development (Draper et al., 2023).

Parenting styles can also determine the extent to which children have the opportunity to practise hand skills independently and repeatedly. Responsive parenting styles that provide room for exploration encourage children to try activities such as holding writing instruments, arranging small objects, or performing simple self-care tasks, thereby gradually training their fine motor coordination. Conversely, overly restrictive or overly protective parenting styles can reduce the frequency of fine motor practice, resulting in children lacking the movement experience needed to achieve maturity in these skills (Maryam et al., 2025).

Conclusion

A child's fine motor development is related to the mother's education, occupation, household income, and parenting style. These factors influence the quality of stimulation, availability of resources, and opportunities for children to practise their fine motor skills optimally.

Suggestion

Parents are expected to provide age-appropriate fine motor stimulation through supportive parenting, regardless of educational background and economic conditions. Health workers are advised to increase education and guidance to families regarding child development stimulation.

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