

YOUNG CHILDREN'S CONNECTEDNESS TO NATURE: PROFILES AND INFLUENCING FACTORS

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Abstract: Young children's connectedness to nature is a crucial foundation for the development of pro-environmental attitudes and behaviors from an early age. It is closely linked to family characteristics and parental participation in environmental activities. This study aims to describe mothers' educational levels, parental participation in the environment, and young children's connectedness to nature, and to analyze their influence on children's connectedness to nature. This study employed a cross-sectional quantitative design involving 167 parents of children aged 4 to 7 years in Karawang Regency, selected via simple random sampling. Data were collected through questionnaires and analyzed using descriptive statistics and multiple linear regression. The results indicate that mothers' educational levels were generally moderate to high, parental participation in the environment was moderate, and children's connectedness to nature fell in the moderate to high category, especially in enjoyment and awareness of nature. Regression analysis shows that both mothers' education and parental participation significantly predict children's connectedness to nature, with parental participation showing a stronger effect. These findings highlight the importance of active parental involvement in environmental activities for developing young children's connectedness to nature in early childhood education.

Keywords: Connectedness to Nature, Young Children's Connectedness to Nature, Maternal Education, Parental Participation, Environmental Education

A. Introduction

The world is currently confronted with the issue of global warming, the impacts of which are increasingly being felt and are disrupting the stability of human life on Earth. In 2023, the Intergovernmental Panel on Climate Change released a report on the human-induced climate crisis, which has triggered extreme weather events in all regions of the world, such as intense heat waves, droughts, and heavy rainfall with increasing frequency and intensity (IPCC, 2023). These conditions pose a serious threat to the sustainability of human life on Earth.

Indonesia, as a tropical country, is also experiencing the impacts of the global climate crisis. The National Disaster Management Agency (BNPB) recorded a total of 3,544 disaster events in Indonesia, predominantly floods, extreme weather, and landslides. All regions in Indonesia face disaster risks, including Karawang Regency. As one of the buffer regions supporting the Special Capital Region of Jakarta, Karawang Regency plays an important role in national development. Karawang is known as a major rice-producing area that contributes to national food security. In addition to its extensive agricultural land, Karawang Regency is also one of the rapidly developing industrial regions in West Java (Badan Pusat Statistik Kabupaten Karawang, 2022). These conditions make environmental issues, particularly those related to maintaining ecological balance, a critical concern in Karawang Regency. Natural disasters resulting from the climate crisis can affect millions of people, including older adults and children.

Early childhood is one of the most vulnerable groups affected by the global climate crisis. Climate change influences water availability and food production, which indirectly affects food access for parents in meeting their children's nutritional needs, thereby increasing the risk of malnutrition among children (World Bank, 2021). Extreme weather conditions, such as intense heat waves and heavy rainfall occurring in Indonesia, can also have adverse effects on the health of young children.

However, in addition to being a vulnerable group, young children also represent a strategic age group with the potential to become agents of change in mitigating the climate crisis. Early childhood education can serve as a foundation for developing high-quality human resources who are closely connected to and

concerned about the environment. The education system plays a role in environmental preservation through the development of pro-environmental character. One of the subsystems of early childhood education is the family, which serves as the child's closest environment (Bronfenbrenner, 1979). One of the primary functions of the family is education, making it the first and most important educational institution for children. Consequently, parents act as the main educators and role models for their children, particularly in shaping behavior and character during early childhood. Parents play a crucial role in fostering pro-environmental behavior (Jia & Yu, 2021).

Pro-environmental behavior can be defined as conscious actions undertaken by individuals to reduce the negative impacts of human activities on the environment and to improve environmental quality (Sawitri et al., 2015).). In other words, pro-environmental behavior refers to actions that contribute to environmental protection. Numerous factors influence the development of pro-environmental behavior, one of which is connectedness to nature. Research indicates that individuals who are more connected to nature tend to exhibit higher levels of engagement in pro-environmental behavior (Whitburn et al., 2020).

Connectedness to nature refers to a sense of emotional attachment to the natural environment that serves as a prerequisite for individuals to be motivated to protect nature (Mayer & Frantz, 2004). In adults, connectedness to nature consists of three components: cognitive (personal awareness or understanding of being part of nature), affective (emotional concern for nature), and behavioral (active involvement in environmental protection). In contrast, connectedness to nature in early childhood is analyzed through two components: cognitive and affective aspects (Sobko et al., 2018). Environmental concern needs to be cultivated early, and early childhood represents a critical period for building a connection with nature as the foundation of pro-environmental behavior. However, in Indonesia, environmental conservation has not yet become a primary focus in early childhood education institutions or within family parenting practices. As a result, studies that specifically examine the role of families in fostering environmental character remain limited.

Children's connectedness to nature is influenced by various factors within their immediate environment, one of which is the family. Family characteristics, such as parental education level and parental participation in environment, are believed to play a role in shaping children's connectedness to nature. During early childhood, children have strong emotional bonds with their parents, making parental involvement in pro-environmental activities particularly important. Therefore, measuring parental participation in the environment is necessary to understand the extent to which such involvement contributes to the development of young children's connectedness to nature. This study serves as a preliminary investigation aimed at describing green living behaviors among families in Karawang Regency. To date, research in Indonesia, particularly within the field of Early Childhood Education that examines young children's connectedness to nature and explores the role of family factors as determinants remains relatively limited. Overall, the findings of this study are expected to provide empirical evidence and serve as an initial reference for policymaking and curriculum development in environmentally oriented early childhood education.

B. Method

This study adopted a cross-sectional research design and employed a causal associative quantitative approach, which involved 167 parents of children aged 4 to 7 years from Early Childhood Education institutions in Karawang Regency, who were selected through simple random sampling. The study examined several variables, namely mothers' education level, parental participation in the environment (PPE), and young children's connectedness to nature. Data on mothers' education level were collected through a survey by measuring the number of years of formal schooling completed by the mothers. Parental participation in the environment was assessed through a survey administered to parents (primarily mothers) using a modified version of the Parental Participation in Environment Scale (PPE) developed by Jia et al., (2022). This scale was designed to assess the frequency of parental participation in environmental activities with their children. The instrument consists of 18 items rated on a 4-point scale, in which parents were asked to indicate the frequency of

environment-based activities conducted with their children (1 = Never to 4 = Always).

Data on young children's connectedness to nature were collected using a modified version of the Connectedness to Nature Index-Parents of Preschool Children (CNI-PPC), consisting of 20 items rated on a 5-point Likert scale representing four dimensions: enjoyment of nature, empathy for nature, responsibility toward nature, and awareness of nature (1 = strongly disagree to 5 = strongly agree). This instrument was specifically developed to be completed by parents for children who are not yet able to respond independently (Sobko et al., 2018). The data were analyzed using descriptive statistics to describe the characteristics of each variable, while causal relationships among variables were examined using inferential statistics through multiple linear regression analysis.

C. Result and Discussion

Indonesia is currently facing the impacts of global climate change, which have led to increases in the frequency, duration, and intensity of extreme climate events across various regions (Kurniadi, 2024). These conditions may affect the quality of life of the population and threaten the sustainability of future generations. Therefore, systematic efforts are needed to build environmental awareness and pro-environmental behavior as part of climate change adaptation and mitigation strategies in Indonesia. One strategic approach to achieving this goal is the cultivation of environmental values from early childhood. Early childhood represents a critical developmental stage for the formation of attitudes, values, and behaviors, and experiences acquired during this period are likely to have long-term effects. Direct interaction between children and the natural environment enables them to gain contextual and meaningful learning experiences, while also fostering empathy and a sense of responsibility toward the environment. Therefore, young children's connectedness to nature serves as an important foundation for the development of pro-environmental behavior in the future.

In the context of early childhood development, children's connectedness to nature does not emerge spontaneously but is shaped by various factors within their immediate environment,

particularly the family. The family is the child's first environment and plays a crucial role in providing experiences, values, and interaction patterns that shape how children perceive and relate to their environment (Fisher & Lombardi, 2025). Research findings indicate that the family is one of the factors influencing the development of children's connectedness to nature, including family educational background. Other studies have also revealed that parents' own connectedness to nature significantly affects the formation of children's connectedness to nature (Passmore et al., 2021). Through parenting practices, role modeling, and guidance, parents act as primary mediators who bridge children's experiences with the natural environment, thereby contributing to the development of pro-environmental attitudes, empathy, and behaviors from an early age (Chawla, 2007). Therefore, examining family-related factors, particularly mothers' education level and parental participation or involvement in the environment as contributors to the development of young children's connectedness to nature, is an important area for in-depth investigation.

Family characteristics, including parents' educational background and forms of parental involvement in daily activities, are factors that determine the quality and intensity of children's interactions with nature (Mocková et al., 2024). In this study, mothers' education level was measured based on the number of years of formal education completed. Mothers' education was categorized into several levels, ranging from no formal schooling or not completing primary school (< 6 years) to higher education (13–16 years). Based on the results of the descriptive analysis, the majority of mothers in this study had an educational background equivalent to junior secondary school, accounting for 32.3% of the total respondents. This was followed by mothers with a senior secondary school education (26.3%) and those with a primary school education (24.6%). A smaller proportion of mothers had no formal education or did not complete primary school (8.4%), while the same proportion (8.4%) had completed higher education (diploma or bachelor's degree).

This distribution indicates that the majority of mothers were at the secondary education level, with a relatively balanced proportion between primary and upper secondary education. Quantitatively, the average length of mothers' education was 9.09 years, with a range of 0 to 16 years. These findings indicate

variation in mothers' educational backgrounds, ranging from no formal schooling to higher education, which may potentially influence parenting practices and mothers' involvement in supporting children's development. These findings are presented in Table 1.

Table 1. Distribution of participants based on mothers' education level

Mothers' Education Level	Distribution of participants based on mothers' education level	
	n	%
No formal schooling / Did not complete primary school (< 6 years)	14	8.4
Primary school or equivalent (6 years)	41	24.6
Junior secondary school or equivalent (9 years)	54	32.3
Senior secondary school or equivalent (12 years)	44	26.3
Completed higher education (Diploma/ Bachelor's degree) (13-16 years)	14	8.4
Total	167	100
Mean $\pm$ SD (years)	9.09 $\pm$ 3.519	
Min - Max (years)	0-16	

In addition to mothers' education level, another factor that plays a role in shaping young children's connectedness to nature is parental participation in environment-based activities. Mothers' education may influence parents' environmental knowledge and attitudes; however, this influence needs to be translated into parenting practices and real-life experiences encountered by children in their daily lives. Parents serve as role models, facilitators, and motivators in fostering children's environmental awareness and attitudes. Environmental awareness and attitudes developed from an early age are expected to help children form positive environmental attitudes and behaviors in the future (Masykuroh et al., 2022). Thus, parental participation in various environmental based activities becomes an important means for children to gain direct experiences with nature, while simultaneously internalizing pro-environmental values, attitudes, and behaviors.

Parental participation in the environment refers to parents' involvement with their children in activities related to the environment, in which parents act as role models for pro-environmental behavior and facilitate meaningful experiences for children through everyday environmental practices (Jia et al., 2022). In this study, Parental Participation in Environment (PPE) was measured based on the frequency of parents' participation in environmental activities with their children. The results indicate that the level of parental participation in the environment was in the moderate category. Specifically, 68.3% of parents demonstrated a moderate level of participation, while 18.6% were in the high category and 13.2% were in the low category. These findings are presented in Table 2.

Table 2. Distribution of participants by category of Parental Participation in Environment (PPE)

Category of Parental Participation in Environment (PPE)*	Distribution of participants by category of Parental Participation in Environment (PPE)	
	n	%
Low	22	13.2
Moderate	114	68.3
High	31	18.6
Total	167	100
Mean ± SD	64.95 ± 12.2493	
Min – Max	35.3-100	

*Note: *Scores are expressed as percentages.*

The table shows that the average PPE score was 64.95%, which falls within the moderate category, with scores ranging from 35.3% to 100%. These findings indicate variation in the level of parental involvement in environmental activities, ranging from limited to very high engagement. The predominance of the moderate category suggests that most parents have participated in environmental activities with their children, such involvement has not yet been carried out optimally or consistently. Meanwhile, the proportion of parents in the high category indicates that a small number of families have demonstrated strong engagement in environment-based practices, such as sorting and recycling waste with their children, accompanying children in outdoor activities,

introducing environmentally friendly behaviors, and providing direct role modeling in environmental care. Conversely, the presence of respondents in the low category indicates that some parents still have limited involvement in environmental activities with their children. This finding highlights the need to strengthen parental roles through increased awareness, knowledge, and support to ensure that engagement in environmental activities can be conducted more intensively and sustainably.

Parental participation in environment functions not only as a form of support for children's activities but also as a primary means of shaping how children relate to the natural environment. Parental participation in environmental activities with their children provides direct experiences that allow children to observe, imitate, and internalize the values of environmental care. Through consistent guidance, role modeling, and interaction, these experiences contribute to the development of children's connectedness to nature. Children's connectedness to nature is defined as a psychological condition that reflects a sense of attachment and belonging to nature, which is formed through cognitive and emotional aspects and serves as a fundamental factor underlying individuals' attitudes and responses toward the environment (Geng et al., 2015). This definition emphasizes that children's relationship with nature is not merely a physical experience but a psychological condition involving integrated cognitive and emotional processes. During early childhood, children are in a fundamental developmental stage in which interactions with the natural environment provide direct and contextual learning experiences, thereby supporting physical, cognitive, and socio-emotional development, as well as the formation of environmental concern from an early age (Chawla, 2015; Diyana et al., 2018). Meaningful and direct experiences play a crucial role in shaping how children understand the world around them. A sense of attachment and belonging to nature developed early in life enables children to perceive the environment not as a separate object, but as an integral part of themselves.

The cognitive aspect of connectedness to nature plays a role in developing children's understanding of the environment, such as recognizing living organisms, natural cycles, and simple cause-

and-effect relationships within ecosystems. Meanwhile, the emotional aspect encourages feelings of enjoyment, comfort, and security when interacting with nature. The combination of these two aspects serves as an important foundation for the development of children's positive attitudes toward the environment, including care, empathy, and ecological responsibility.

In this study, young children's connectedness to nature was measured based on parents' perceptions of four main dimensions, as proposed Sobko et al., (2018), yaitu: (1) enjoyment of nature, which refers to children's feelings of pleasure and interest when interacting with nature and surrounding living beings. This dimension is reflected in children's liking for natural elements such as plants, animals, and natural environments; (2) empathy for nature, defined as children's ability to feel concern and emotional attachment to nature and living beings, reflected in affectionate attitudes and a desire to protect living organisms in their surroundings; (3) responsibility toward nature, which represents an early form of children's responsibility for the environment, manifested through simple behaviors such as maintaining cleanliness and avoiding damage to nature; and (4) awareness of nature, which refers to children's ability to recognize and pay attention to the presence of natural elements in their surroundings. This dimension emphasizes children's attention to and recognition of the natural environment.

The results of this study indicate that, overall, young children's connectedness to nature falls within the moderate to high categories. The average score of young children's connectedness to nature reached 75.6%, with scores ranging from 51.3% to 95%, indicating that most children have developed a relatively strong connection with the natural environment. Based on the distribution of participants, the majority of children demonstrated a high level of connectedness to nature (54.5%), while the remaining children were in the moderate category (45.5%), and none were classified in the low category. These findings suggest that the children in this study exhibited positive tendencies in establishing relationships with the natural environment, both emotionally and cognitively. The detailed distribution of participants by categories of connectedness to nature is presented in Table 3.

Table 3. Distribution of participants by category of young children’s connectedness to nature

Aspects of young children’s connectedness to nature	Category of Young Children’s Connectedness to Nature*						Total	
	Low (0-50)		Moderate (51-75)		High (76-100)			
	n	%	n	%	n	%	n	%
Young Children’s Connectedness to Nature	0	0	76	45.5	91	54.5	167	100
Enjoyment of Nature	4	2.4	49	29.3	114	68.3	167	100
Empathy for Nature	21	12.6	76	45.5	70	41.9	167	100
Responsibility toward Nature	6	3.6	85	50.9	76	45.5	167	100
Awareness of Nature	1	0.6	71	42.5	95	56.9	167	100
Mean±SD	75.6 ± 99.150							
Min-Max	51.3-95							

*Note: *Scores are expressed as percentages*

Based on the table, in the enjoyment of nature dimension, the majority of children were in the high category (68.3%), indicating that young children tend to show feelings of pleasure, interest, and enjoyment when interacting with nature. The high level of enjoyment of nature suggests that experiences of interacting with the natural environment are perceived as enjoyable activities for children and may serve as a primary entry point for fostering deeper connectedness to nature. This finding is consistent with the study by Kamil & Sope (2024) which reported that visiting animal enclosures directly and creating crafts from recycled materials are enjoyable activities for children and form part of efforts to foster naturalistic intelligence and children’s affection for nature. In addition, the awareness of the nature dimension also showed a relatively high distribution, with 56.9% of children classified in the high category. This indicates that children are beginning to develop awareness of the presence and elements of the natural environment around them. Such awareness represents an important early stage in the formation of connectedness to nature, as it enables children to recognize, attend to, and assign meaning to the natural environments they encounter in their daily lives.

In contrast to the two aforementioned dimensions, the empathy for nature dimension exhibited a more varied distribution. Although a considerable proportion of children were classified in the moderate (45.5%) and high (41.9%) categories, 12.6% of children were still in the low category. This finding indicates that children's ability to experience concern, care, or empathy toward nature has not yet fully developed optimally. Empathy for nature represents a more complex affective dimension that typically develops through repeated experiences, adult guidance, and reflective learning processes. Similarly, in the responsibility toward nature dimension, the majority of children were categorized as moderate (50.9%) and high (45.5%), however, 3.6% of children remained in the low category. This suggests that responsible behaviors toward nature, such as maintaining environmental cleanliness or treating living beings with care, have not yet become habitual for some children. Responsibility toward nature requires a consistent process of habituation as well as role modeling from adults in everyday life. Overall, the findings of this study indicate that young children's connectedness to nature has developed relatively well, particularly in the dimensions of enjoyment of nature and awareness of nature. Nevertheless, dimensions related to empathy for nature and responsibility toward nature still require further strengthening. This suggests that the development of children's connectedness to nature cannot rely solely on providing enjoyable experiences, but must also be accompanied by continuous guidance, habituation, and active involvement of parents and educators in instilling values of environmental care and responsibility from an early age.

Young children's connectedness to nature develops through experiences that occur within their everyday environments, particularly within the family context. In this regard, the family not only provides children with access to natural environments but also shapes how children interpret, respond to, and interact with nature through parenting practices, habituation, and parental role modeling. Mothers' educational level is associated with parents' capacity to provide meaningful stimulation, to link children's experiences with environmental care values, and to guide children toward more reflective behaviors toward

nature. Meanwhile, parental participation in environment-based activities offers concrete experiences that enable children to learn directly through shared involvement, observation, and behavioral modeling. The combination of mothers' education and parental involvement creates diverse environmental learning contexts for children, which is reflected in the variation in levels of young children's connectedness to nature. Therefore, variations in family characteristics can be conceptually understood as being associated with the degree of young children's connectedness to nature. This relationship is further reflected in the analysis of the influence of family factors on young children's connectedness to nature.

The analysis results indicate that 19.7% of the variance in young children's connectedness to nature can be explained simultaneously by mothers' educational level and Parental Participation in Environment (PPE), while the remaining 80.3% is influenced by other factors beyond the variables examined in this study. This finding is consistent with the study by Price et al., (2022) which revealed that children's connectedness to nature is influenced by various factors, including children's gender and the environmental context in which they engage in activities. Girls tend to demonstrate higher levels of connectedness to nature than boys, and children attending schools in urban areas show lower connectedness to nature scores compared to those in rural areas. These results are also strengthened by research by Pirchio et al., (2021), who reported that the more frequently children explore and interact with natural environments through outdoor activities, the stronger their connectedness to nature becomes. In this context, Karawang Regency, which is characterized by rural areas with relatively extensive agricultural and plantation land, represents a potentially supportive environment for fostering young children's connectedness to nature. Such conditions enable children to access and directly interact with natural settings, such as rice fields and plantations, which are assumed to contribute as additional factors influencing children's connectedness to nature, although these environmental factors were not specifically examined in the present study. However, despite these findings, the analysis also shows that mothers' educational level and Parental Participation in Environment

(PPE) jointly have a significant effect on young children’s connectedness to nature. The results of this effect analysis are presented in Table 4 below.

Table 4. The Effects of Family Factors on Young Children’s Connectedness to Nature

Independent variable	Young Children’s Connectedness to Nature		
	β Unstandardized	β Standardized	Sig
Maternal Education	0.344	0.165	0.019
Parental Participation in Environment (PPE)	0.357	0.406	0.001
F	20.137		
Sig	< 0.001		
R Square	0.197		
Adjusted R Square	0.187		

Based on the table, the regression coefficient test results indicate that maternal education level has a positive and significant effect on young children’s connectedness to nature, with a coefficient value of $\beta = 0.344$, $t = 2.362$, and $p = 0.019$. This finding suggests that the higher the mother’s level of education, the stronger the young children’s connectedness to nature. This result is consistent with the study by Ahmetoglu (2017), which also reported that children whose parents have higher educational attainment tend to exhibit higher levels of connectedness to nature. These findings indicate that maternal educational background plays an important role in shaping the quality of children’s experiences in interacting with the natural environment. Mothers with higher levels of education are more likely to have a better understanding of the importance of environmental stimulation and awareness of environmental values, thereby enabling them to provide more optimal support for children’s interactions with nature.

Mothers play a central role as primary caregivers who determine children’s activity choices, play environments, and types of learning experiences. Higher maternal education enables the development of more open attitudes toward experiential learning and environmental exploration, which in turn supports the development of children’s emotional and cognitive relationships with nature. However, the influence of maternal education is limited if it is not accompanied by active involvement

in environmental activities.

The results of this study also indicate that Parental Participation in the Environment has a positive and significant effect on young children's connectedness to nature, with a coefficient value of $\beta = 0.357$, $t = 5.801$, and $p < 0.001$. The standardized beta coefficients show that Parental Participation in the Environment ($\beta = 0.406$) has a stronger influence than maternal education level ($\beta = 0.165$), indicating that PPE exerts a greater effect compared to maternal education. These findings emphasize that young children's connectedness to nature is more strongly shaped by parents' concrete practices of involvement rather than solely by mothers' formal educational background. Parental Participation in the Environment reflects the extent to which parents are directly involved in environment-related activities, such as accompanying children in interacting with nature, modeling pro-environmental behaviors, and creating opportunities for children to play and learn directly in natural settings

The dominance of parental participation in environment effect indicates that young children develop connectedness to nature through contextual and relational learning processes. Parents who actively participate in environmental activities serve as behavioral models, enabling children to internalize pro-environmental values through everyday experiences. This finding is consistent with the study by Oh et al., (2021) which reported that family values and spending time in nature together as a family are effective in enhancing human connectedness to nature. Thus, parental participation in environment functions as a reinforcing factor that bridges parental knowledge and children's concrete experiences in the development of connectedness to nature.

Overall, the findings of this study indicate that young children's connectedness to nature is influenced by a combination of family background factors and parental involvement. Although maternal education level plays a role in shaping parents' readiness and awareness of the importance of the environment, young children's connectedness to nature is more strongly developed when such awareness is translated into active participation through Parental Participation in Environment. Therefore, efforts to strengthen young children's connectedness to nature should focus not only on increasing parental knowledge but

also on developing parental involvement practices in direct and meaningful environment-based activities for children.

D. Conclusion

This study provides an initial overview of family characteristics, particularly mothers' education level and parental participation in the environment and their association with young children's connectedness to nature in Karawang Regency. Descriptively, the findings indicate that mothers' education levels generally fall within the lower and upper secondary education categories, while parental participation in the environment is predominantly at a moderate level. This condition suggests that although parents have relatively adequate educational backgrounds, their active involvement in pro environmental practices with their children has not yet been fully optimized. From the children's perspective, young children's connectedness to nature ranges from moderate to high, with the dimensions of enjoyment and awareness of nature being more dominant than empathy and responsibility.

The results of the influence analysis reveal that mothers' education level has a positive effect on young children's connectedness to nature, highlighting the role of maternal education in shaping children's understanding and environmental stimulation. However, parental participation in the environment exerts a stronger and more significant influence on children's connectedness to nature. These findings indicate that young children's connectedness to nature is more strongly determined by parents' direct involvement in environmental activities with their children than by educational background alone.

Therefore, this study demonstrates that family factors, particularly parental participation in the environment, constitute an important determinant in fostering young children's connectedness to nature. These findings underscore that strengthening environmental education in early childhood should focus not only on enhancing parents' knowledge but also on developing parenting practices that actively involve children in meaningful environmental based experiences.

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