

The Effect of Gadget Use on Child Development: A Path Analysis Evidence from Melawi, West Kalimantan

Livia Calorina¹⁾, Pawito²⁾, Hanung Prasetya³⁾

¹⁾Masters Program in Public Health, Univeritas Sebelas Maret

²⁾Faculty of Social and Political Sciences, Universitas Sebelas Maret

³⁾School of Health Polytechnic, Ministry of Health, Surakarta

ABSTRACT

Background: The use of gadgets in early childhood can affect the mental and physical development of children. The Indonesian Pediatric Association (IDAI) estimates that 5-10% of children experience developmental delays. Children's development is influenced by environmental factors, parents, nutritional status, and the use of gadgets. This study aimed to analyze the effect of gadget use on child development in Melawi, West Kalimantan, using path analysis model.

Subjects and Method: This was a cross sectional study conducted in Melawi, West Kalimantan, Indonesia, from August to September 2019. A total 200 children aged 3 to 5 years old was selected by fixed exposure sampling. The dependent variable was child development. The independent variables were gadget usage, maternal age, maternal education, maternal employment, family income, number of children, and family type. The data were collected by questionnaire. The data were analyzed by path analysis run on Stata 13.

Results: Child development was directly and positively affected by maternal aged ≥ 20 years old ($b = 1.52$; 95% CI = -0.29 to 3.35; $p = 0.101$), high maternal education ($b = 2.53$; 95% CI = 1.23 to 3.84; $p < 0.001$), family income \geq Rp 2,288,000 ($b = 1.38$; 95% CI = 0.01 to 2.77; $p = 0.049$), and

core family type ($b = 1.61$; 95% CI = 0.43 to 2.80; $p = 0.008$). Child development was directly and negatively affected by gadget use ($b = -2.74$; 95% CI = -3.99 to -1.49; $p < 0.001$), mother working outside the house ($b = -1.98$; 95% CI = -3.06 to -0.90; $p < 0.001$), and number of children > 2 ($b = -2.48$; 95% CI = -3.67 to -1.29; $p < 0.001$). Child development was indirectly affected by maternal education and maternal employment.

Conclusion: Child development is directly and positively affected by maternal aged ≥ 20 years old, high maternal education, high family income, and core family type. Child development is directly and negatively affected by gadget use, mother working outside the house, and number of children > 2 . Child development is indirectly affected by maternal education and maternal employment.

Keywords: gadget use, child development, path analysis

Correspondence:

Livia Calorina. Postgraduate of Public Health Sciences, Sebelas Maret University, Jl. Ir. Sutami 36 A, Surakarta, Central Java 57126. Email: liviacalorina41@gmail.com. Mobile: 081346595-497

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BACKGROUND

The first five years of life are very sensitive to the environment and this period is very short and cannot be repeated, therefore, the period of toddler is called the "golden period", "window of opportunity" and "critical period"

(Ministry of Health, 2014). The role of mothers, fathers, families and communities as well as the environment becomes important considering that at this time the "golden age" is very dependent on how we fulfill the children's basic rights to compassion, hone

and foster, so that children can grow optimally (Ministry of Health, 2015).

Data from the Indonesian Pediatric Association (IDAI) in 2013, an estimated that 5 to 10% of children experience delays in development. The results of a survey conducted by Communication and Information in 2014, found that 98% of children and adolescents in Indonesia know about the internet and 79.5% of them are internet users. Communication and Information Technology also found that more than half of respondents (52%) used mobile phones to access the internet (Communication and Information, 2014).

The use of gadgets is one of the factors that can inhibit children's emotional development because their emotions are less stimulated so that children do not have stable emotions, because emotional development itself is obtained when children interact with their environment (Suhana, 2017). Yasin et al. (2017) states that speech delays are more common in children who spend time with electronic media such as watching television, using gadgets and the internet, this is due to the limited time spent with interactive communication with friends and family via cellphones or gadget. Komaini (2017) explains that children's motor skills can be improved through play activities, because active children tend to have good motor skills compared to inactive children.

SUBJECTS AND METHOD

1. Study Design

This was observational analytic with cross sectional approach conducted in Melawi, West Kalimantan, from August to September 2019.

2. Population and Sample

The population in this study were toddlers aged 3 to 5 years old in Melawi Regency, West Kalimantan. A total of 200 study sub-

jects was selected for this study by fixed exposure sampling.

3. Study Variables

The dependent variable was child development. The independent variables were gadget use, maternal age, maternal education, maternal occupation, family income, number of children, and family type.

4. Operational Definition of Variables

Child development was measured based on the ability of coarse motion, fine motion, speech, language, socialization, and independence. The data were measured by pre-screening child development questionnaire. The measurement scale was continuous and transformed into dichotomous, coded 0 for inappropriate (score < mean) and 1 for appropriate (score ≥ mean).

Gadget use was measured based on activities carried out by toddlers by using gadgets in their daily lives. The data were collected by questionnaire. The measurement scale was categorical, coded 0 for did not use and 1 for use gadget.

Maternal age was measured based on the length of life of the mother which is calculated from the date of birth until the stated time of the study in years. The data were collected by questionnaire. The measurement scale was continuous and transformed into dichotomous, coded 0 for <20 years and 1 for ≥20 years old.

Maternal education was measured based on the last formal school level taken by the mother. The data were collected by questionnaire. The measurement scale was categorical, coded 0 for <Senior high school and 1 for ≥Senior high school.

Maternal employment measured based on routine activities carried out by mothers in an effort to earn income or wages to fulfill economic needs. The data were collected by questionnaire. The measurement scale was categorical, coded 0 for working at home and 1 for working outside the house.

Family income was measured based on the amount of income earned by the family in 1 month. The data were collected by questionnaire. The measurement scale was continuous and transformed into dichotomous, coded 0 for low family income and 1 for high family income.

Number of children was measured by the total number of children owned by the mother who lives in one house and is a family dependent. The data were collected by questionnaire. The measurement scale was continuous and transformed into dichotomous, coded 0 for < 2 and 1 for ≥ 2 .

Type of family measured based on the shape of the respondent's family based on the type of family ties between family members who live in a place/house. The data were collected by questionnaire. The measurement scale was categorical, coded 0 for huge family and 1 for core family.

5. Data Analysis

Univariate analysis to describe in general each of the variables studied included child development, gadget use, maternal age, maternal education, maternal employment, family income, number of children, and family type.

Bivariate analysis was explained the effects of gadget use, maternal age, maternal education, maternal employment, family income, number of children, and family type on child development.

Path analysis was used to determine the direct and indirect effects of independent variables on child development. The steps of path analysis were model specification, model identification, model fit, parameter estimation, and model re-specification.

6. Research Ethic

This study was conducted based on study ethics, namely informed consent, anonymity, confidentiality, and ethical eligibility. Ethics permission was obtained from the Research Ethics Committee Dr. Moewardi Hospital, Surakarta, Indonesia, No.994/VIII/HREC/-2019.

RESULTS

1. Sample Characteristics

Continuous data sample descriptions described continuous data on each study variable including child development, maternal age, family income and number of children. The results of the analysis of continuous data sample descriptions were shown in table 1.

2. Univariate analysis

Table 2 showed that the appropriate child development were 138 (69%). Number of children who used and did not use gadget was equal. 185 children (92.5%) who had mother aged 20 years. 133 children (66.5%) had mothers with high education (\geq Senior high school). 74.5% children living in the family with high income (\geq Rp 2,288,000).

3. The result of path analysis

Multivariate analysis examined the effects of gadget use, maternal age, maternal education, maternal employment, family income, number of children, and family type on the child development. Multivariate analysis was conducted by path analysis.

Figure 1 showed the structural path model on the determinants of child development with estimated value. The exogenous variables were child development, gadget use, and family income. The independent variables were maternal age, maternal education, maternal employment, and family type.

Table 1. Sample characteristics of continuous data

Variables	n	Mean	SD	Min.	Max.
Child development	200	8.08	1.37	6	10
Maternal age (years)	200	28.87	6.20	18	49
Family income (Rupiah)	200	2,981,500	1,100,620	1,000,000	8,000,000
Number of children	200	2.07	1.13	1	7

Table 2. Sample characteristics of categorical data

Independent Variables	Frequency (n)	Percentage (%)
Child Development		
Not appropriate	62	31.0
Appropriate	138	69.0
The use of Gadget		
Not using	100	50.0
Using	100	50.0
Maternal Age		
< 20 years old	15	7.5
≥ 20 years old	185	92.5
Maternal Education		
<Senior high school	67	33.5
≥Senior high school	133	66.5
Maternal Employment		
Not working	122	61.0
Working	78	39.0
Family Income		
Low (< Rp 2,288,000)	51	25.5
Normal (≥ Rp 2,288,000)	149	74.5
Number of Children		
≤ 2 children	135	67.5
> 2 children	65	32.5
Type of Family		
Huge/Big Family	78	39.0
Core Family	122	61.0

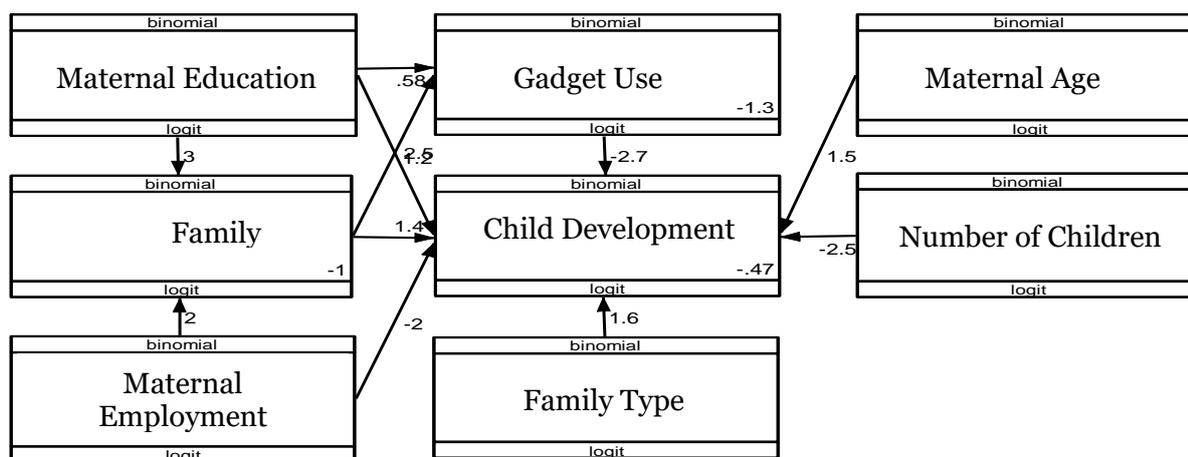


Figure 1. Structural models that affect child development

Table 3 showed that child development was directly and positively affected by maternal

age ≥20 years old (b= 1.52; 95% CI= -0.29 to 3.35; p= 0.101), maternal education ≥Senior

high school (b= 2.53; 95% CI= 1.23 to 3.84; p<0.001), high family income (b= 1.38; 95% CI= 0.01 to 2.77; p= 0.049), and core family (b= 1.61; 95% CI= 0.43 to 2.80; p=0.008).

Child development was directly and negatively affected by gadget use (b= -2.74; 95% CI= -3.99 to -1.49; p<0.001), mother

who working outside the house (b= -1.98; 95% CI= -3.06 to -0.90; p<0.001), and number of children >2 (b= -2.48; 95% CI= -3.67 to -1.29; p<0.001).

Child development was indirectly affected by maternal education, maternal employment, and family income.

Table 3. The results of the path analysis on the effect of using gadgets on the development of children aged 3 to 5 years old

Dependent Variable	Independent Variable	b	95% CI		p
			Lower Limit	Upper Limit	
Direct Effect					
Child Development	← Use gadget	-2.74	-3.99	-1.49	<0.001
	← Maternal age (≥20 years old)	1.52	-0.29	3.35	0.101
	← Maternal education ≥Senior high school	2.53	1.23	3.84	<0.001
	← Mother working at the house	-1.98	-3.06	-0.90	<0.001
	← Family income (≥Rp 2,288,000)	1.38	0.01	2.77	0.049
	← Number of children (>2 children)	-2.48	-3.67	-1.29	<0.001
	← Family type (core family)	1.61	0.43	2.80	0.008
Indirect Effect					
Family Income	← Maternal education ≥Senior high school	3.00	2.13	3.86	<0.001
	← Mother working at the house	2.01	0.96	3.05	<0.001
Use gadget	← Maternal education ≥Senior high school	0.58	-0.15	1.32	0.123
	← Family income (≥Rp 2,288,000)	1.19	0.34	2.03	0.006

DISCUSSION

1. The effect of gadget use on child development

The use of mobile devices was mostly in children aged 3 to 4 years old. The daily use of this electronic device was not related to gender, ethnicity or parental education. Activities of children who were actively using mobile devices can influence cognitive, social and emotional development. In addition, it also has an impact on time management and social interaction of children both at school and at home (Kabali et al., 2019).

The use of mobile devices can hinder a child's opportunity to interact socially with family and friends so that it can interfere the children's emotional social development and

behavior (Jamil, 2019; Katsura, 2018; Radesky et al., 2016).

2. The effect of maternal age on child development

Children born to both young mothers and mature mothers did not show differences in gross motor function, fine motor skills, language and social independence (Wu et al., 2016).

Different results were explained by Wulandari et al. (2014), who also explained that young mothers have lack of ability to care for children so that it would have an impact on children's development. Children born to young mothers can experience appropriate development if their family or closest people and health personnel were able to provide

good stimulation to help the child development in accordance with his/ her age.

Efevbera (2017) explained that toddlers born to mothers under the age of 18 were at risk of having deviant development and in four development sectors. Toddlers have the potential to experience delays compared to toddlers born to mothers who married at an older age.

Kurniawati and Mardiyanti (2018) stated that mothers aged between 20 to 40 years old were considered to have sufficient maturity and stable emotions. The age range would tend to think more mature in acting and making decisions and more thinking about the possible side effects that would arise. So that age can affect the way parents think in toddler's development.

3. The effect of maternal education on child development

Maternal education was one of the factors that influenced children's development. Highly educated parents would provide greater intellectual stimulation and create a home environment that encouraged and facilitated children's development. The mother remained the primary caregiver for her child, it was likely that the level of education would have a strong impact on the child's development. Maternal education affected the maternal knowledge in providing developmental stimulation to the child (Kusumasari et al., 2016).

According to Kusuma (2017), mothers with high education have a positive impact on the development of gross motor skills of children under two years old. The family environment played a very important role in the formation of children, from the personality and motor development of toddlers, because the family was the closest external factor that affected the growth and development of children.

The same opinion was stated by Vilaseca et al. (2019), that mothers with a bache-

lor's degree have children with better language development than mothers who only complete secondary school.

4. The effect of maternal employment on child development

Working mothers tend to have less time to provide developmental stimulation to children, so children tend to experience developmental delays (Muslihatun and Widiyanto, 2014).

This was in line with Handayani et al. (2017), who stated that growth and developmental deviation in children by 7.1% in parents who both worked for 8 hours or more while doubtful development by 3.4% in one parent who worked less than 8 hours.

Maternal employment status can affect the child's development. Heinrich (2014) explained that working parents were important to continue to build togetherness with children and working parents have an important goal in improving children's development, this mean that parents' work should not be an obstacle in achieving optimal child growth and development.

5. The effect of family income on child development

A study by Babatunde (2014) found a significant relationship between low family income levels and the development of toddlers and found children who were below the poverty line have 1.3 times greater risk than those who were not poor to experience growth and development barriers.

Hosokawa and Katsura (2017) also explained that family income was directly related to childcare practices. High-income families were able to provide better stimulation such as providing learning media that supports child development and were able to provide more favorable environmental conditions in child development. This study also explained that children who live in underprivileged families have worse development. Limited access to resources, lack of facilities

that help stimulate development and an environment that did not support child development were factors that can cause developmental delays in children.

6. The effect of the number of children on child development

Parents who have more than one child with the age gap that are not too far would be more difficult to carry out their role in caring for children, because they have to share attention, affection, and good care for their children. So, it was very likely that one of the children was lacking good care and attention about their development (Kurniawati and Mardiyanti, 2018).

Elmanora et al. (2015) and Fauziyah (2017) stated that the impact of small family on social and economic life was quite large. The small amount of social support such as caring for children from family members was increasingly focused and has better educational opportunities compared to families with many children. The greater the number of children in the family, then there was a tendency that parents did not really apply the pattern of maximum care for children because attention and time were divided between one child with another child.

7. The effect of family type on child development

Children who live with a core family have a development that was in line with their age greater than children who live with a big family (Halilah et al., 2018). Study by Vilaseca et al. (2019) explained that there is an influence of big family type with children's cognitive development. The influence of family type was more on aspects of cognitive development than on child behavior.

Das and Priya (2017) also explained that children who live with a big family type were more prone to experience language development delays than children who live in the nuclear family. The bigger the family, the greater the delayed development in children.

This finding applied to all social classes although the effect was less visible in families with high economic status.

8. The effect of maternal education on family income

Jagielski et al. (2017) explained that a person's income was influenced by education. People who have higher education would work in high positions so that they were able to earn a large income. The same opinion was explained by Hanum (2017), that there was a positive influence between maternal education on family income because the higher the maternal education, the greater the creativity to take advantage of opportunities so as to increase family income.

9. The effect of maternal employment on family income

Elmanora et al. (2015) explained that maternal employment can increase family income so that the family has resources that can be used to fulfill the needs of daily life.

Telaumbanua and Nugraheni (2018) explained that housewives can help husbands in terms of increasing family income to meet family needs through work. Families with good work productivity have a significant effect on socioeconomic status because they can show an increase in living standards through increased family income. Unstable economic conditions with family expenses were still far higher than the income of the husband as the head of the family which cause mothers were required to be able to work to increase family income so that they were able to fulfill the needs of family life.

10. The effect of maternal education on the gadget use

Irmayanti (2018) explained that both highly educated mothers and mothers with low education still allow their children to use gadgets. Mothers with higher education oversee the use of gadgets in children so that mothers can guide children with educational games and stimulate their development. Poorly

educated mothers free their children to use gadgets without any time limit so that children have a greater chance of being exposed to things that were not educational such as pornographic videos or videos that contain violence. Indriyani et al. (2018) stated that the use of very easy gadgets at very cheap market prices caused many parents to give gadget to children.

11. The effect of family income on the gadget use

According to Kabali et al (2019), there was a general exposure to the use of mobile devices in children in urban areas and low-income families. The same opinion was raised by Kothgassner et al. (2019), who stated that there was a significant relationship between family income and the use of cell phones in children. Indriyani et al. (2018), also explained that the use of very easy gadgets at very cheap market prices caused many parents to give gadgets to their children.

AUTHOR CONTRIBUTION

Livia Calorina collected data, did data analysis, and wrote article. Pawito formulated of research framework. Hanung Prasetya formulated study method and discussion

CONFLICT OF INTEREST

There was no conflict of interest in this study.

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