Biopsychosocial Factors, Life Course Perspective,and Their Influences on Language Development in Children

Latifah Safriana[1,2], Harsono Salimo[3], Yulia Lanti Retno Dewi[4]

[1] School of Health Polytechnics Permata Indonesia, Yogyakarta
[2] Masters Program in Public Health, Universitas Sebelas Maret
[3] Department of Pediatrics, Dr. Moewardi Hospital, Surakarta
[4] Department of Nutrition, Faculty of Medicine, Universitas Sebelas Maret

ABSTRACT

Background: Speech and language disorder if untreated may cause deficiency in reading, verbal, psychosocial, behavioral, and academic abilities. Studies have shown that birthweight, body length at birth, maternal education, parenting style, maternal stress, incomeat pregnancy, and current income can influence child development. This study aimed to determinethe biopsychosocial factors, life course perspective, and their influences on language development in children.

Subject and Method: This was an analytic observational study using case control design.The study was conducted in Surakarta, Central Java, from February to May 2017. A sample of 140 children aged 2 to 5 years old were selected for this study by fixed disease sampling with 1:3 ratio between case (children with speech and language disorder) and control (children without such disorder). The dependent variable was child speech and language development. The independent variables were birth weight, body length at birth, maternal education, maternal stress, parenting style, family income at pregnancy, and current family income. The data were collected by a set of questionnaireand medical record. The data on speech and language ability was measured by Denver II questionnaire. Path analysis was employed for data analysis.

Results: Language developmentwas directly and positively affected by democratic parenting style (b=0.46; SE=0.08; p<0.001), permissive parenting style (b=0.10; SE=0.11; p=0.020), birthweight (b=0.12; SE=0.02; p=0.002), maternal education (b=0.11; SE=0.31; p=0.007), maternal stress (b=-0.13; SE=0.04; p=0.013). Language development directly and negatively affected by authoritarian parenting style (b=-0.37; SE=0.09; p<0.001). Language development was indirectly affected by body length at birth, family income at pregnancy, and current family income.

Conclusion: Language developmentis directly affected by parenting style, birthweight, maternal education, maternal stress.

Keywords: biopsychosocial, life course,language development,children2 to 5 years old, path analysis

Correspondence:
Latifah Safriana. School of Health Polytechnics Permata Indonesia, Yogyakarta. Email: latifsafri-@gmail.com. Mobile: +6282225246917.

BACKGROUND

Language development involves cognitive, sensory motor, psychological emotion, and the surrounding environment. Language disorder will cause reading disorder, verbal, psychosocial adjustments, behavior, and academic abilities. Language acquisition requires the interaction of biological systems and complex behaviors and learning, combined with responsive environmental stimuli (Mueller, 2016).

Language development disorder is the inability or limited ability to use linguistic symbols to communicate verbally.

This disorder occurs in the development phase of children under three years who are learning to speak and to use language (Hidajati, 2009). Language and speech disorder can be observed in 3 years old and

their conversation is difficult to understand (Soetjiningsih, 2012). The prevalence of speech and language disorder is between 1% and 32% (Busari, 2004). Speech disorder in the form of language delay with expressive vocabulary that lack or no word combination occur in 15% of children aged 24-29 months (Buschman, 2008; Mcleod, 2009).

Maternal education has a role in child development because education can create a positive attitude for mothers so that they can stimulate language development in preschool age, especially children less than 3 years old (Hidayat, 2005). Children with a low socio-economic history have a higher developmental disorder than children with a high socioeconomic history (Soetjiningsih, 2012).

Children who are raised by permissive parents tend to lose their sense of responsibility, poor emotional control, poor performance. Children who are raised from democratic parents have better personal and social adjustment so that children have the opportunity to optimize their development. Democratic parents can provide a comfortable environment for children so that it will affect the development of better language (Hurlock, 1978). Body length at birth affects the body size of the baby which then affects the birth weight of the baby (Morgan et al., 2016). Low birth weight can affect child development slower than normal weight babies (Hurlock, 1978, Verkasalo et al., 2004).

Smith et al., (2011) stated that stress in parents can affect children's speech. Parents with mild stress who teach children to talk have a positive impact on children's language development.

Given the many factors that are thought to influence children's development, studies on biopsychosocial factors and a lifelong perspective as well as their

influence on language development in children 2 to 5 years are needed.

SUBJECT AND METHOD

1. Design of the Study
This was observational analytic study with control case study design (control case study). The study was conducted at Regional Public Hospital Dr. Moewardi, Surakarta and the Integrated Islamic Early Childhood Education of Nur Hidayah, Aisyiyah, Baitul Ilmi, and Umm Salamah in Surakarta.

2. Population and Sample
The population of this study was children aged 2 to 5 years in Surakarta. The samples in this study were 140 subjects using fix disease sampling technique.

3. Variables of the Study
There were 9 variables in this study which consisted of dependent and independent variables. The dependent variable was child language development. The independent variables were birth weight, birth length, maternal education, family income at pregnancy, current family income, authoritarian parenting, permissive upbringing, democratic parenting, and maternal stress.

4. Operational Definition of Variables
Birth weight was the baby's weight that measured immediately after the baby was born. Body length at birth was the length of the baby's body right after the baby was born. Maternal education was the last formal education taken by mothers of study subjects. Family income at pregnancy was income earned by parents of the study subjects during pregnancy. Current income was income earned by parents of study subjects in the last 1 month.

Stress was a condition that suppressed a person's psychological state in reaching an opportunity. Parenting was the application of the mother's way of educating and nurturing children. Language

development was the ability of receptive and expressive language in children.

5. Instruments of the Study

Data collection used were Denver II, questionnaires (covering data on mother and child identity, maternal education, income, maternal parenting, maternal stress), medical records (including child names, date of birth, and Denver II test results sheets), MCH books (including birth weight, birth length) and student documents from Early Childhood Education (name and date of birth).

Based on the results of the reliability test that had been done, the measurement results for the parenting instrument obtained Cronbach alpha value 0.98, so that all items from the parenting instrument question were declared reliable.

6. Data Analysis

Quantitative data analysis was done univariately to display data on subject characteristics and description of study variables.

Bivariate analysis analyzed the effect of exogenous variables on endogenous variables using the Pearson product moment test. Multivariate analysis with path analysis used AMOS 22 to analyze the effect of exogenous variables on endogenous variables through intermediate variables and to know the exogenous direct and indirect effects on endogenous

RESULTS

1. Characteristics of Study Subject

Table 1 showed that the study subjects were 54 study subjects (38.57%) who were 4 years of age. The majority of maternal education at the college level is 57 study subjects (40.71%). Most mothers work in the private sector as many as 64 study subjects (45.71%).

Table 1. Characteristics of Study Subject

Characteristics	Criteria	Language Development	
		N	%
Child age (years)	2 years	31	22.14
	3 years	35	25.00
	4 years	54	38.57
	5 years	20	14.29
Maternal Age	Elementary School	18	12.86
	Junior High School	17	12.14
	Senior High School	48	34.29
	University	57	40.71
Maternal Occupation	Private employee	64	45.71
	Entepreneur	54	38.57
	Civil Servant	11	7.86

2. Univariate analysis

Univariate analysis was applied to display the subject characteristics data and description of the study variables. Table 2 showed that each variable had a relatively small diversity of data. The mean described the average value while the SD (standard deviation) described how far the data

varies. The minimum value described the smallest data value and the maximum represented the largest value in the data. A small SD value was an indication of representative data. The highest SD value was birth weight variable with units of grams per 100 was 5.49 and the smallest SD in permissive parenting was 1.29.

Table 2. Univariate analysis of study variables

Variable	N	Mean	SD	Min.	Max.
Birth weight (x 100 g)	140	30.13	5.49	12	41
Body length at birth (cm)	140	48.89	2.23	40	58
Family income at pregnancy (x Rp 100,000)	140	15.51	4.49	8	20
Current family income (x Rp 100,000)	140	16.50	4.16	8	20
Maternal stress	140	22.03	4.57	12	38
Authoritarian parenting	140	4.91	2.39	1	9
Permissive parenting	140	3.54	1.29	1	7
Democratic parenting	140	6.87	2.60	1	10

Table 3. Bivariate analysis of factors that influence language development

Independent Variable	Language Development	
	r	p
Birth weight (gram per 100)	0.26	0.002
Body length at birth (cm)	0.28	0.001
Maternal education	0.41	<0.001
Family income at pregnancy (per 100.000)	0.21	0.011
Current family income (per 100.000)	0.31	<0.001
Authoritarian parenting	-0.80	<0.001
Permissive parenting	-0.26	0.002
Democratic parenting	0.83	<0.001
Maternal stress	-0.64	<0.001

3. Bivariate analysis

Table 3 showed the bivariate analysis of factors that influence language development consisting of birth weight, birth length, maternal education, family income at pregnancy, current family income, authoritarian parenting, permissive parenting, democratic parenting, and maternal stress.

Bivariate analysis showed that birth weight (r= 0.26, p= 0.002), body length at birth (r= 0.28, p= 0.001), maternal education (r= 0.41, p <0.001), family income at pregnancy (r= 0.21, p= 0.011), current family income (r= 0.31, p<0.001), and democratic parenting (r= 0.83, p <0.001) had a positive influence on language development in children and was statistically significant.

Authoritarian parenting (r= 0.80, p <0.001), permissive parenting (r= 0.26, p= 0.002), and maternal stress (r = 0.64, p <0.001) had a negative influence on language development in children and was statistically significant.

4. Path Analysis

Structural models were estimated using IBM SPSS AMOS 22 to analyze the effect of exogenous variables on endogenous variables through intermediate variables and to know the exogenous direct and indirect effects on endogenous.

Indicators that indicated the suitability of the path analysis model in Table 4 showed the presence of a goodness of fit measure (measurement of model fit) and the fit index (match index) obtained CMIN = 1.32 p = 0.139 (> 0.05), NFI = 0.96 (> 0.90), CFI = 0.99 (> 0.90), and RMSEA = 0.05 (<0.08).
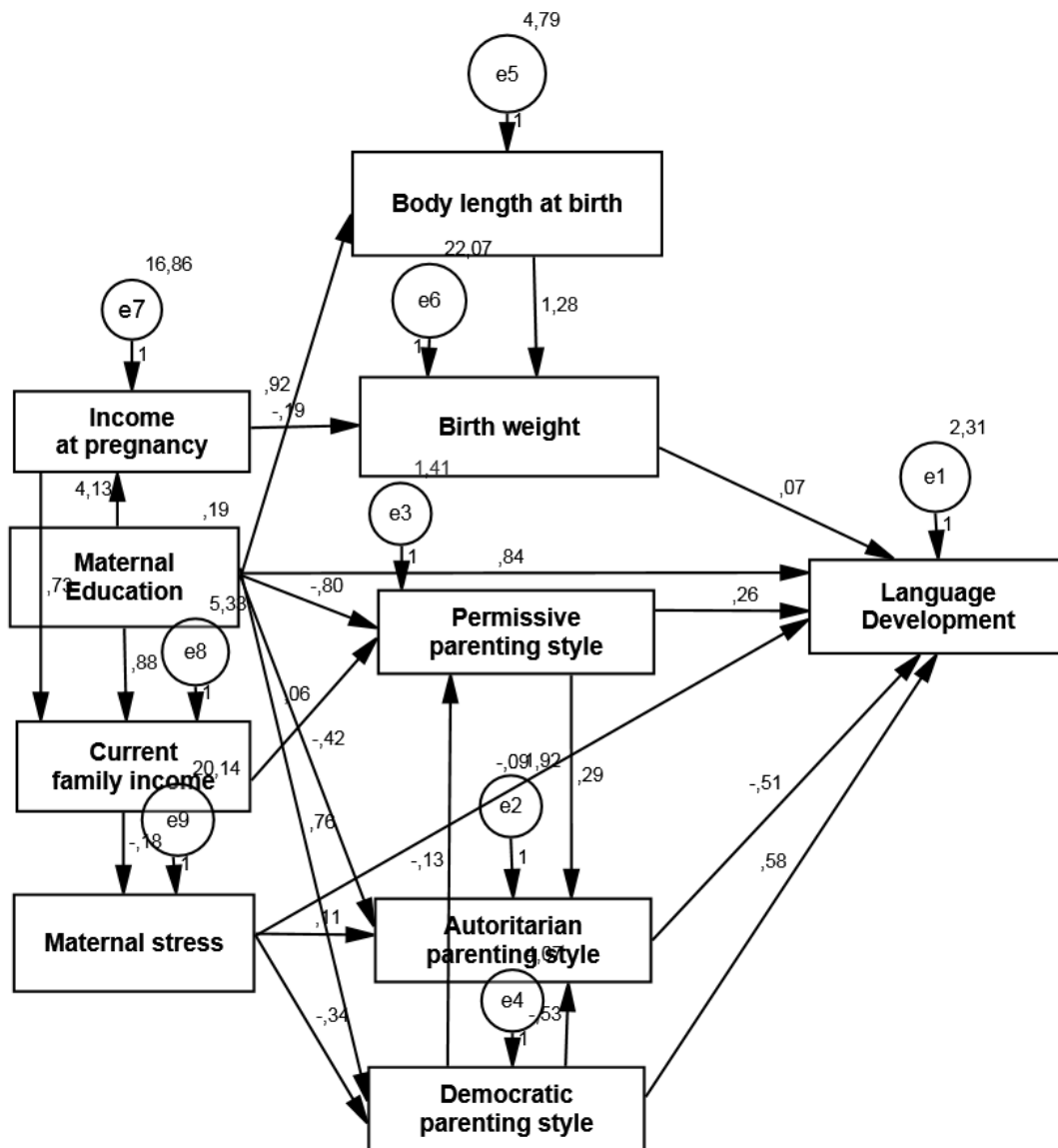
Figure 1. Structural Model of Path Analysis

The results of estimation obtained values as in Figure 1 which showed the variables causal effect relationship indicated by variable coefficients on each path. The path coefficient showed the relationship of the independent and dependent variables in the original measurement unit.

Language development was directly influenced by democratic parenting, birth weight, authoritarian parenting, maternal education, permissive parenting, and maternal stress. Language development was indirectly influenced by family income at pregnancy, current family income, and birth length.

Democratic parenting would improve language development by 0.46 units (b = 0.46; SE = 0.08; p <0.001).

Each unit increase of birth weight would increase language development by 0.12 units (b = 0.12; SE = 0.02; p = 0.002).

Each unit increase of authoritarian parenting would reduce language development by 0.37 units (b = -0.37; SE = 0.09; p <0.001).

Table 4. The result of path analysis of the independent variables toward language development

Endogenous Variables		Exogenous Variable	b*	SE	p	β**
Direct influence						
Language development	←	Democratic	0.46	0.08	<0.001	0.58
Language development	←	Birth weight (x 100 g)	0.12	0.02	0.002	0.07
Language development	←	Authoritarian parenting	-0.37	0.09	<0.001	-0.51
Language development	←	Maternal stress	0.11	0.31	0.007	0.85
Language development	←	Permissive parenting	0.10	0.11	0.020	0.26
Language development	←	Maternal stress	-0.13	0.04	0.013	-0.09
Indirect influence						
Family income at pregnancy (x Rp 100,000)	←	Maternal education	0.39	0.80	<0.001	4.13
Current family income (x Rp 100,000)	←	Maternal education	0.09	0.49	0.076	0.88
Current family income (x Rp 100,000)	←	Family income at pregnancy (x Rp 100,000)	0.79	0.05	<0.001	0.73
Maternal stress	←	Current family income (x Rp 100,000)	-0.17	0.09	0.047	-0.18
Democratic parenting	←	Maternal stress	-0.59	0.05	<0.001	-0.34
Democratic parenting	←	Maternal education	0.13	0.39	0.054	0.76
Permissive parenting	←	Maternal education	-0.27	0.26	0.002	-0.80
Permissive parenting	←	Current family income (x Rp 100,000)	0.20	0.03	0.018	0.06
Birth length	←	Maternal stress	0.18	0.43	0.031	0.92
Permissive parenting	←	Democratic parenting	-0.27	0.04	<0.001	-0.13
Birth weight (g per 100)	←	Body length at birth(cm)	0.51	0.18	<0.001	10.3
Birth weight (g per 100)	←	Family income at pregnancy (per 100.000)	-0.15	0.09	0.034	-0.19
Authoritarian parenting	←	Maternal stress	0.21	0.03	<0.001	0.11
Authoritarian parenting	←	Maternal education	-0.08	0.28	0.136	-0.42
Authoritarian parenting	←	Permissive parenting	0.16	0.09	0.003	0.29
Authoritarian parenting	←	Democratic parenting	-0.58	0.06	<0.001	-0.53
Fit Model						

CMIN = 1.32 p=0.139 (≥0.05)
NFI = 0.96 (≥0.90)
CFI = 0.99 (≥0.90)
RMSEA = 0.05 (≤0.08)

*: non-standardized path coefficient   **: standardized path coefficient

Each unit increase of maternal education would improve language development by 0.11 units (b = 0.11; SE = 0.31; p = 0.007).

Each unit increase of permissive parenting would improve language development by 0.10 units (b = 0.10; SE = 0.11; p = 0.020)

Each unit increase of maternal stress would reduce language development by 0.13 units (b = 0.13; SE = 0.04; p = 0.013).

Each unit increase of maternal education would increase maternity income by 0.39 units (b = 0.39; SE = 0.80; p <0.001).

Each unit increase of maternal education would increase current family

income by 0.09 units (b = 0.09; SE = 0.49; p = 0.076).

Each unit increase of family income at pregnancy would increase current family income by 0.79 units (b = 0.79; SE = 0.05; p <0.001).

Each unit increase of current family income would reduce maternal stress by 0.17 units (b = 0.17; SE = 0.09; p = 0.047).

Each unit increase of maternal stress would reduce democratic parenting by 0.59 units (b = 0.59; SE = 0.05; p <0.001).

Each unit increase of maternal education would increase democratic parenting by 0.13 units (b = 0.13; SE = 0.39; p = 0.054).

Each unit increase of maternal education would reduce permissive parenting by 0.27 units (b = 0.27; SE = 0.26; p = 0.002).

Each unit increase of current family income would increase permissive parenting by 0.20 units (b = 0.20; SE = 0.03; p = 0.018).

Each unit increase of democratic parenting would reduce permissive parenting by 0.27 units (b = 0.27; SE = 0.04; p <0.001).

Each unit increase of maternal education would increase body length at birthby 0.18 units (b = 0.18; SE = 0.43; p = 0.031).

Each unit increase of body length at birth would increase birth weight by 0.51 units (b = 0.51; SE = 0.18; p <0.001).

Each unit increase of family income at pregnancy would reduce birth weight by 0.15 units (b = 0.15; SE = 0.09; p = 0.034).

Each unit increase of maternal stress would increase authoritarian parenting by 0.21 units (b = 0.21; SE = 0.03; p <0.001).

Each unit increase of maternal education would reduce authoritarian parenting by 0.08 units (b= 0.08; SE = 0.28; p = 0.136).

Each unit increase of permissive parenting would increase authoritarian parenting by 0.16 units (b = 0.16; SE = 0.09; p = 0.003).

Each unit increase of democratic parenting would reduce authoritarian parenting by 0.58 units (b = 0.58; SE = 0.06; p <0.001).

DISCUSSIONS

1. The influence of maternal education on children's language development

There was a positive relationship between maternal education and children's language development. Maternal education would improve language development (b = 0.85; SE = 0.31; p = 0.007).

Higher maternal education will increase the use of democratic parenting in children which can directly improve child language development and reduce the use of authoritarian parenting which directly reduce children's language development. Mothers with higher education try to find information in order to improve their knowledge and skills, especially in parenting. Parents with higher education tend to easily receive information and apply it in behavior change (Hastuti, 2010).

Low education is thought to be linearly related to the lack of knowledge and skills of the mother (Dharmayanti et al., 2015). Maternal education has a role in children development because education can create a positive attitude for mothers so that it can stimulate an increase in language development in pre-school children, especially children less than 3 (three) years (Hidayat, 2005). Stimulation of children development with various therapies must also be given to children who experience language delays (Santrock, 2012).

An overview of the educational background of the mother as a study subject showed that most mothers are highly educated. A good level of maternal education

increases the ability to absorb information about language development in children. This information can be obtained from the mass media, information from trusted people (family, relatives and others) and health workers. The results of the study showed that there was a positive and significant influence between the level of maternal education and family income on language development in children. The level of education influences one's work. Higher level of education causes a person to get a higher income than the regional minimum wage. On the contrary, the lower the level of education, the ability to find jobs to get higher income than the regional minimum wage is difficult or not easy (Hastuti, 2010).

The income received by the family is influenced by the level of education. Higher education causes families to get wider opportunities to get better jobs and higher income. Families with higher income have a high awareness of health efforts. The level of family income that is less than the regioinal minimum wage affects family awareness to make prevention efforts (Maidartati and Persaulian, 2015).

The results of this study are consistent with the study conducted by Dharmayanti et al. (2015) which stated that households with high socio-economic status, in terms of education, income and occupation, have higher economic capacity to maintain the health condition of their families and will strive so that his family can live a healthy life. High educational attainment increases family income and productivity. Education is the path to progress and achievement of family social and economic welfare (Thakur et al., 2013). So, it can be concluded that the results of this study are in accordance with previous studies because maternal education affects language development in children.

2. The ifluence of body length at birth and body weight on children's language development

Normal birth weight improve children's language development (b = 0.07). Baby size consists of body weight and body length. The average weight of a baby at birth is between 3,000 g to 4,000 g. However, there are some babies born below or exceeding the average. Child's birth weight is classified as low birth weight (LBW) if the body weight is under 2,500 grams. Normal birth weight (NBW) is when a baby is born with a weight above 2,500 grams to 4,000 grams. High birth weight (HBW) is when the weight is above 4,000 grams. The normal birth length of a child is body length ≥48 cm (Soetjiningasih, 2012).

In the first week of birth, babies experience weight loss. Premature babies have difficulty adapting to the environment at the time of adulthood (Hurlock, 1978). The newborn's body length affects the baby's body size which then affects the baby's birth weight (Morgan et al., 2016).

Birth weight influences directly on language development. Normal birth weight improves children's language development (b= 0.07). The results of this study are in accordance with previous studies conducted by Verkasalo et al., (2004) which stated that preterm infants with very low birth weight would have lower language comprehension scores at 2 years and have difficulties in language comprehension, name mentioning, and auditory perception discrimination at 4 years compared to babies with normal birth weight.

3. The influence of parenting style on children's language development

The first three years of life is a critical period in early language development and concentration of attention due to increased brain synapse density during childhood and it reaches the maximum at 1-2 years

(Hutten-locher, 1979). Hence, parenting at this stage greatly determines the child's development in the future. Parenting is all activities carried out as an effort to increase physical and brain growth (Musaheri, 2007).

The pattern of parenting consists of authoritarian, permissive and democratic parenting. Parenting has a contribution to children's development. Differences in parenting also have different developmental outcomes for each child. These three patterns will affect children's development. Liet al. (2013) stated that good parenting in the first three years of life affects memory, cognitive and language development in children. Mothers who can always provide time for their children can pay attention to each child's growth and can choose flexible ways of nurturing in accordance with the child's development stage, character, and situation at hand (Lestari, 2012).

Children who are raised with permissive parenting tend to be less responsible, have poor emotional control, and lower achievement. Children who are raised with democratic parenting will have better personal and social adjustment, be more independent and responsible (Soetjiningsih, 2012).

The results showed that parents with high democratic parenting improved language development (b= 0.58). Parents who apply high authoritarian parenting can reduce language development (b= -0.51). Parents with high permissive parenting can improve children's language development (b= 0.26). The results of this study are supported by the study of Pong and Johnston (2010) which stated that children who are raised with democratic parenting showed higher psychosocial, social development, self perception, and mental health compared to children raised with permissive and authoritarian parenting. Children

who are raised by permissive parents tend to lose their sense of responsibility, poor emotional control, and poor achievement. Children who are raised by democratic parents have better personal and social adjustments so that parents provide opportunities for children to be able to optimize their development. Democratic parents can provide a comfortable environment for children so it will affect the development of a better language (Hurlock, 1978).

Higher maternal education reduce the use of permissive parenting, increase the use of democratic parenting, and reduce the use of permissive parenting. Rahayu et al. (2003) stated that there was an influence between parenting and child development. Mothers who can always provide free time for their children can pay attention to each child's growth and can choose flexible ways of nurturing in accordance with the child's development stage, child's character, and situation (Lestari, 2012).

4. The influence of family income at pregnancy on children's language development

Income is an addition of economic capability received or obtained by taxpayers from both Indonesia and outside that can be used for consumption or to increase the taxpayer's wealth, with any name and form (Law No. 17/2000).

Family income at pregnancy and current family income indirectly affect children's language development through birth weight. The higher is the family income, the easier it is to meet daily needs and other needs. Conversely, the lower is the family income, the more difficult it is for the family to meet their daily needs and other needs. Income will affect a person's social status, especially in materialist and traditional societies that value high socio-economic status that will affect children. Income in the family also contributes to the

development of children. Families with sufficient income allow parents to provide game equipment as the means of stimulating child development. The family also tends to provide an environment that indirectly causes children to interact so that developmental stimulation occurs both physically and verbally (Freitas, 2013; Martini, 2012; Hastuti, 2009).

Family income now interacts synergistically with aspects of the family as well as outside the family, especially in this case is the selection of daycare centers (Brady et al., 2001). Households with high socioeconomic status have higher economic capacity to maintain the health condition of their families and can strive for his family to live a healthy life. Low socio-economic parents are unable to provide basic needs for children which can stimulate child growth optimally (Soetjiningsih, 2012). A study conducted by Ellingsen et al., (2014) suggested that socio-economic status had an effect on health status. Poor economic status will affect health in the future.

Higher maternal education will increase family income at pregnancy and current family income. The increase in education will affect the opportunity to get a better job so that it can increase family income both at pregnancy and current income. Low education and income are the cause of lack of food availability in the family, one of which is the availability of healthy and nutritious foods that can affect the growth and development of children since in the womb until adulthood (Mohd et al., 2015).

Current family income that is getting higher will increase the use of permissive parenting. With high income parents will meet the needs of children. This is slightly different from the study conducted by Anton et al. (2015) which stated that there was an influence of family income on parenting style. Higher family income increases the use of democratic parenting and decreases permissive parenting.

5. The influence of maternal stress on children's language development

There is a direct influence between maternal stress and children's language development. High maternal stress can reduce children's language development (b= 0.09). Parental stress can affect the use of parenting. Parents with severe stress levels increase the use of authoritarian parenting to children which causes a decline in language development. This is consistent with the study of Smith et al. (2011), which stated that stress in parents can affect children's speech. Parents with mild stress who train children to speak have a positive impact on children's language development.

Monk et al. (2012) stated that severe psychological stress increases the risk of prematurity, low birth weight, inhibition of neuronal and cognitive development in children, hyperactivity disorder, and other mental health disorder.

A study from Dunkel and Tanner (2012) suggested that mothers who experience various physical or psychological stresses are caused by various factors and one of them is mother's bad experience before pregnant. Effects of pregnancy that have an impact on life, especially if the mother is a career woman is the anxiety about being a mother, financial and household matters, acceptance of pregnancy by others, and discomfort during pregnancy such as nausea, fatigue, and changes in appetite. This condition triggers an increase in hormone cortisol and stimulates the hormone prostaglandin for the uterus to contract prematurely which causes blood vessels to constrict so that the fetus experiences a deficiency of nutrients through

the placenta and has the potential to give birth a baby with low birth weigt.

Based on the results of the study, it can be concluded that language development is directly influenced by democratic parenting, birth weight, authoritarian parenting, maternal education, permissive parenting, and maternal stress. Democratic parenting is influenced by maternal stress and maternal education. Birth weight is influenced by body length at birth and family income at pregnancy. Body length at birth and family income at pregnancy are influenced by maternal education. Authoritarian parenting is influenced by maternal stress, maternal education, permissive parenting, and democratic parenting. Permissive is influenced by maternal education, current family income, and democratic parenting. Maternal stress is affected by current family income. Current family income is influenced by maternal education and family income at pregnancy.

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