ORIGINAL ARTICLE

Information Motivation Behavior Skills (IMB) Model in Predicting Maternal Behavior for Healthy Child Development

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ABSTRACT

Introduction: The early years of life are important for a child's health and development. Positive parenting and quality interactions were needed to develop all children's abilities according to their age by meeting their social, emotional, and educational needs for stimulation. A mother plays an important role in encouraging a child's growth and development. This research aims to determine the influence of social psychological factors that influence maternal behavior on healthy child development using the Information Motivation Behavior Skills (IMB) model. **Materials and methods:** A cross-sectional study was conducted on 400 pairs of mothers and children under five years old. Respondents were measured using questionnaires and observation sheets. The maternal behavior level was measured using the Daily Development Stimulation for Children (DDSC) questionnaire. Path analysis was applied to analyze the relationship between IMB and maternal behavior in improving the development of children. **Results:** Healthy maternal behavior in improving the development of children was directly and positively related to maternal behavioral skills (b= 1.00, p<0.001). Then, it is indirectly and positively related to information (b= 0.28, p<0.001), self-efficacy (b= 0.18, p<0.001), and motivation (b= 0.51, p<0.001). The goodness of fit path analysis indicated values of p= 0.57, RSME< 0.001, TFI= 1.00, TLI= 1.00, and SRMR= 0.003. **Conclusion:** A mother's healthy behavior that improves child development is directly and positively related to the behavioral skills that a mother has. Furthermore, it is indirectly and positively related to the information and motivation that a mother has.
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INTRODUCTION

Indonesia is a developing country that has a large percentage of the population aged children (1). This is an opportunity to increase human resources by improving the quality of children's growth and development. Optimal child development is demonstrated by achieving physical, cognitive, motoric, and socio-emotional development according to their age (2). According to the results of the 2018 basic health research data analysis (RISKESDAS), 10.3% of children under five years old had experienced developmental delays (3). Yogyakarta is one of the provinces that has access to adequate and affordable health and education service facilities. However, as of 2020, the coverage of early detection of growth and development problems in children had only reached 51.1% and the majority were children aged 36-59 months, which has been the result of collaboration with teachers working in preschools (known as PAUD or Early Childhood Care and Education) (4). According to the PAUD Statistics report of the Indonesian Ministry of Education and Culture, the number of children participating in PAUD programs in 2021 was still dominated by those children who were aged four years and over, and intervention to optimize early childhood development is, therefore, an important goal that needed to be carried out immediately (5).

The World Health Organization (WHO) recommends the promotion of health to increase children's development through positive parenting by providing developmental stimulation from an early age (6). Developmental stimulation carried out by the family can improve children's cognitive, language, social, and emotional abilities (7,8). Providing stimulation to children depends

on the role of a mother. According to reports from several studies, in general, mothers are considered to be the main person responsible for caring for children under five years old (9,10). Children who grow up with a healthy attachment to their mothers stand a better chance of developing positive behaviors (11). However, there are still many mothers who have limitations in stimulating their children's development due to a lack of knowledge and the stress of busy households (12).

One important step in developing interventions to change maternal behavior to promote effective child development is understanding the relationships and interactions of all factors that influence maternal behavior within a conceptual framework. The IMB model, developed by Fisher and Fisher, in 2002 conceptualizes the social psychological determinants of behavioral performance to improve health status (13,14). The IMB model suggests that changes in maternal behavior in stimulating the development of children under five require sufficient information (15), high motivation, and adequate skills (16,17).

The IMB model constructs are able to facilitate changes in maternal behavior that improves the development of children under five years old. Individuals who are well-informed and motivated to act, and who have the behavioral skills necessary for effective action, are more likely to initiate and maintain health-promoting behaviors and have positive health outcomes (14). The relationships between the constructs in the IMB model are considered to be capable of explaining maternal behavior that improves the development of children under five years old, both directly and indirectly. The purpose of this study was to analyze the direct and indirect effect of IMB model constructs on maternal behavior in improving the development of children in Yogyakarta Provinces, Indonesia.

MATERIALS AND METHODS

Study Population

This research is an analytical observational study with a cross-sectional design. This research was conducted in Yogyakarta Province, Indonesia, from July to October 2023. The research population was 59,942 pairs of mothers and children under five years old (12-59 months) (4). The sample size was determined by calculating based on the Slovin formula (5% margin of error), the minimum sample size was 397.3 (total of 400). The sampling technique in this research went through two stages. First, determine the sub-district area where the sample will be taken using the cluster random sampling technique. Researchers determine clusters as the sample selection unit and then sample these clusters randomly (18). Selecting 20 sub-districts as sampling locations, namely 10 areas in Yogyakarta City and 10 areas in Bantul Regency. Then, the researchers identified mothers and children according to predetermined criteria. The criteria for the mothers of children were: (1) being able to read and write fluently; and (2) living at home with their partner (husband). Criteria for children include: (1) not diagnosed with a developmental disorder, (2) not currently sick, and (3) not twins.

Variable Measure

To measure information, self-efficacy, motivation, behavioral skills, and maternal behavior, researchers used instruments modified from standard instruments (mother and child health books published by the Ministry of Health) and based on theoretical studies appropriate for each (19). The research instruments used were questionnaires and observation sheets. The questionnaire measures information, self-efficacy, motivation, maternal behavior, and an observation sheet to measure maternal behavioral skill variables. Maternal behavior was measured using the Daily Development Stimulation for Children (DDSC) questionnaire, this instrument is used to ask about developmental stimulation activities carried out in the last week to minimize memory bias. The indicator for measuring maternal behavior consists of 10 statements with a 3-point Likert scale (0 = not done, 1 = 3-4 days, and 2 = every day). The indicator for measuring information consisted of 15 statements with "true" and "false" answers. The indicators for measuring self-efficacy consist of five statements with a 3-point likert scale (0= no, 1= not sure, and 2= yes). The indicators for measuring motivation consisted of 10 statements with a 3-point Likert scale (0 = disagree, 1 = disagree, and 2 = agree). The observation sheet consisted of 10 statements with a 3-point Likert scale (0 = not done, 1 = done but not correctly, and 2 = done correctly).

The research was carried out after obtaining ethical feasibility approval from the research ethics committee and permission from the regional heads of the city of Yogyakarta and Bantul Regency. Data collection was carried out by home visits, each mother signed a letter of consent to become a respondent before completing the survey. Filling out the questionnaire and assessing the mother's skills in stimulating development took around 30-45 minutes. If the respondents had more than one child in this age group, then they were asked to respond to survey questions with the youngest child in mind.

Statistical Analysis

The analysis used in this research is path analysis. The benefit of using path analysis is that it allows testing mediation between variables and provides an estimate of the magnitude of the effect indicated by the regression coefficient value (b), significance ($p<0.05$), and direction of the relationship between variables as suggested by the hypothesized model (17). Data analysis was carried out using the Stata 13 statistical software application.

The path analysis carried out by researchers went through the following stages: first, creating a path diagram based on the IMB model (model specification). The path

diagram of the variables to be measured is shown in Figure 1. The next step is model identification to find out which theoretically determined path model analysis can be estimated using available observation data which is indicated by the degrees of freedom. In determining model similarity, researchers tested the influence between variables according to the IMB model. Based on these relationships, a model is obtained consisting of direct relationships and indirect relationships. The parameters in the structural model were estimated using goodness of fit and path coefficients. The structural model estimation results show ideal goodness of fit values, by looking at: Chi2 between models compared to the saturated model p > 0.05, Root Mean Square Error of Approximation (RMSEA) < 0.05, Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) is close to 1, and Standardized Root Mean Square Residual (SRMR) <0.08.

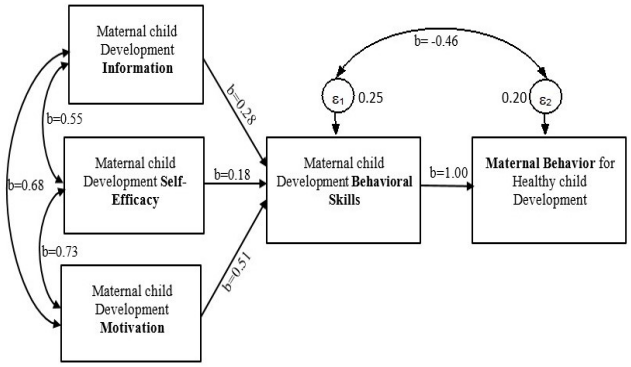

Figure 1: Path Analysis of Information, Self-Efficacy, Motivation, Behavioral Skill, and Mother's Behavior to Improve the Development of Children Under Five Years Old.

Path analysis is carried out by connecting each construct from the information motivation behavior skill model. Each model created is estimated to find goodness of fit. The model is a good fit by looking at the Chi2 between the model compared to the saturated model (p>0.05), the Root Mean Square Error of Approximation (RMSEA <0.05), the Comparative Fit Index (CFI>0.9) and the Tucker-Lewis Index (TLI>0.9), and the Standardized Root Mean Square Residual (SRMR<0.8). The selected model has measurement results p= 0.53, RMSEA<0.001, CFI=1.00, TLI=1.00, and SRMR=0.002.

Ethical Clearance

This study was approved by Research Ethics Committee, Faculty of Medicine Sebelas Maret University No. 128/ UN27.06.11/KEP/EC/2023.

RESULTS

Descriptive Statistics

A total of 400 respondents completed the survey. The characteristics of the respondents were known: the majority (64.50%) of mothers were aged 31-45 years and 22.75% still had education in the low category (primary school). Most mothers do not work (55.00%) and have more than one child (65.25%). According to previous researchers, the combination of maternal characteristics is the reason why mothers are limited in caring for their children well. The low level of education and the large number of children in care will reduce mothers' capacity to stimulate their children due to the stress of busy households and tiredness from work (20).

The descriptive statistics of the IMB model construct and maternal behavior in improving the development of children under five under five years old are presented in Table I. The results showed that mothers' motivation to improve children's development had the highest mean score, 15.67. Respondents also had good behavior to improve children's development, mean score of 14.44. Information about child development has a mean score of 11.10, higher than the behavioral skills mean score of 7.88 and the self-efficacy mean score of 7.28.

Table I: Results of Univariate Analysis of the IMB Model Construct

Variable	Mean	SD	Min	Max
Information	11.10	2.26	5	15
Self-Efficacy	7.28	1.36	4	10
Motivation	15.67	3.01	8	20
Behavioral Skills	7.88	1.58	4	10
Maternal Behavior	14.44	3.21	7	20

The Measurement Model

Each statement item to measure the variables studied has been tested for validity and reliability on 20 respondents. The Pearson correlation test shows that the correlation coefficient ranges from 0.48 to 0.90 (p < 0.05). All statement items on each variable have a correlation coefficient value of >0.46 and p< 0.05, Indicating that all are declared valid. The reliability test used Cronbach's alpha test, the test results showed: information 0.94, self-efficacy 0.83, motivation 0.88, behavior skills 0.89, and the mother's behavior 0.91. All variables have a Cronbach's alpha value > 0.70 which confirms internal consistency and reliability. The degree of freedom value was used to identify the model, the value df=1.25 (overidentified). This means that path analysis can be carried out and path analysis was carried out using continuous data.

The Structural Model

The structural model was tested with all the paths depicted in Figure 1. The path diagram of the variables that influence maternal behavior in the development of children under five years old appears in Figure 1. The results of the IMB model path analysis to predict maternal healthy behavior that improves the development of children under five years old are shown in Figure 1 and Table II.

Table II. The Direct and Indirect Effects of Information-Motivation-Behavior Skill Model on Maternal Behavior for Healthy Child Development

Independent Variable				Dependent Variable	Path Coeff.(b)	CI (95%)		p
						Upper Limit	Lower Limit	
Direct Effect								
Behavioral Skills			→	Maternal Behavior	1.00	0.976	1.024	<0.001
Indirect Effect								
Information	→	Behavioral Skills	→	Maternal Behavior	0.28	0.224	0.344	<0.001
Self-Efficacy	→	Behavioral Skills	→	Maternal Behavior	0.18	0.115	0.242	<0.001
Motivation	→	Behavioral Skills	→	Maternal Behavior	0.51	0.436	0.577	<0.001

p = 0.568
RMSEA < 0.001
CFI = 1.000
TLI = 1.000
SRMR = 0.003

Direct relationship: behavioral skills have a positive and significant relationship with maternal behavior (b=1.00 and p<0.001). Indirect relationship: variables related to maternal behavior through behavioral skills, that have positive and significant values, namely information (b=0.29, p<0.001), self-efficacy (b=0.18, p<0.001), and motivation (b= 0.51, p<0.001). Model suitability values (goodness of fit) p=0.57, RMSEA< 0.001, CFI= 1.00, TLI= 1.00, and SRMR= 0.003.

DISCUSSION

Relatively little is known about the factors that influence the development of children under five years old in Indonesia. This study investigated the direct and indirect effects of the IMB model construct (information, self-efficacy, motivation, and behavioral skills) on maternal behavior that improves the development of children under five years old. By exploring and developing an understanding of the interactions between the constructs according to the IMB model, it is hoped that researchers will find opportunities for health promotion interventions that focus on improving child development.

The results of path analysis conducted on the direct and indirect relationships in the construction of the IMB model and maternal behavior in the development of children under five years old yield several key findings: Behavioral skills are the final critical prerequisite for successfully performing desired health behaviors. Behavioral skills consist of an individual's objective abilities as well as their perceived self-efficacy regarding the performance of appropriate health behaviors (13). The findings in this study follow the results of previous research conducted by Blizzard et al. (21), Emmers et al. (12), and Araujo et al. (22), the results of this research prove that parents who have quality parenting skills tend to have positive behavior in improving children's development through effective communication practices, being more sensitive, and showing warmth when interacting with children. Mothers with better developmental stimulation skills are also more likely to consistently engage in quality parenting practices (16). The behavioral skills possessed by mothers are not only in practicing developmental stimulation but also the ability to innovate in using things from around the house as tools to play with children and choosing play tools that are appropriate to the child's age (23).

The information that a mother has about the development of children under five years old is positively and significantly related to her behavioral skills in improving the development of children under five years old. Their information will equip mothers to adapt their practices to their children's biological, physical, cognitive, and socio-emotional needs (24,25). Mothers who have accurate information about efforts to improve the development of children under five years old will be more confident in practicing behavioral skills to stimulate children's development. The findings in this study are in line with previous research, which has shown that mothers who have good information exhibit self-confidence to interact more often with their children, have better quality developmental stimulation skills, and provide a quality environment to provide developmental stimulation for children under five years old (26–29). Other research findings also show that sufficient information about parenting competencies provides confidence that parenting actions will have the desired consequences in the form of optimal child development. Next, parents strive to improve competence and provide the best care to encourage children's development. Curiosity, wanting to improve competence, and having self-esteem as an ideal mother stimulate mothers to seek information and stimulate development (26).

The findings in this study indicate that mothers who have high self-efficacy have a greater possibility of adopting healthy behavior that improves children's development. Self-efficacy in parenting refers to parents' self-confidence about how well they can carry out their responsibilities as parents. Parents who feel more confident in their abilities in caring for children will take a greater role in caring for them. This finding is in accordance with the results of previous research that sowed that mothers who have high self-efficacy are more initiative and the ability to innovate during play

interactions with their children (31,32).

Maternal motivation is directly related positively and significantly to maternal behavioral skills. Motivation consists of attitudes and environmental support, and mothers who have a positive attitude and good social support will make better efforts to improve children's development. A mother's positive attitude, and the availability of support for play facilities, will increase her desire to interact and play with her child. An increased desire to interact more in playing with children can improve her practical skills of developmental stimulation. The findings in this study are in line with previous research findings, attitudes, interests, and the availability and ease of access to the means of playing with children improve the quality of a mother's care (33). This association suggests that, to improve child development, it is important to focus on addressing maternal motivation by increasing positive attitudes about stimulating child development, not only from mothers but also from other social networks, including family and friends (23,34,35).

This research has several limitations. The number of questions that respondents need to answer is quite large. This can give rise to the possibility of recall bias or response bias. However, researchers used an instrument that provided a time limit for recall of a week, to minimize recall bias. This study had a fairly large sample size (N=400), although it had sufficient power to detect the effects required in the statistical analyses performed. The multivariate analysis carried out only involved the IMB model construct, because this research aims to obtain a goodness-of-fit model. Apart from being based on the mother's answers to the questionnaire, this research was also supported by observations, thereby reducing information bias. Our study was conducted with regard to children aged 12–59 months, so the findings may not be generalizable to other age groups.

CONCLUSION

The IMB model can be used to explain the complex relationship between the construction of maternal social psychological factors and maternal behavior that improves the development of children under five years old in Yogyakarta, Indonesia. This model can serve as an aid in understanding the predictors of maternal behavior and future programs to improve the development of children under five years old. This research provides important insights into variables associated with maternal behavior in the population of Yogyakarta, Indonesia. Future research should utilize these findings to develop healthy behavior change programs for mothers to improve the development of children under five years old through interventions that focus on addressing motivation and behavioral skills.

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