

THE EFFECT OF MATERNAL SEPARATION DURING THE MOTHERS TAKING MEDICAL RESIDENCY EDUCATION PROGRAM TO BEHAVIOR-PSYCHOSOCIAL-EMOTIONAL OF CHILDREN

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ABSTRACT

Introduction: Mental health problems in children and adolescents include behavioral, psychosocial, and emotional disorders. Factors causing the disorder can come from the family, namely maternal separation. Currently, no studies focus on the mother taking a medical residency education program. This study aims to know the effect of maternal separation during the mothers taking medical residency education program to behavior-psychosocial-emotional of children based on beginning of separation. **Methods:** An observational analytic study with a cross-sectional design was conducted in November 2021-January 2022 at Dr. Soetomo General Hospital, Surabaya, Indonesia. The sample was children aged 4-17 years who experienced maternal separation during the mother's period of medical residency. The instrument was Pediatric Symptom Checklist-17 (PSC-17) questionnaire. Analyzing the effect of the beginning of separation on the risk of behavioral-psychosocial-emotional disorders using the Kruskal Wallis test and the Post Hoc test used the Mann-Whitney. **Results:** Children who experienced the beginning of separation since the age of > 5 years had a significant risk of internalization scale disturbances more severe than those since < 2 years. **Conclusion:** The more delayed beginning of maternal separation, the more severe risk of internalization scale disturbances. The author suggests that residents should be more aware of the risk of internalization scale disturbances if maternal separation occurs when the child is over five years old.

Keywords: Children Emotional-Psychosocial-Behavioral, Maternal Separation, Medical Residency Education Program.

INTRODUCTION

Mental health problems in children and adolescents include behavioral, psychosocial, and emotional disorders. Children's behavior disorders not only cause significant damage to social, academic, or occupational functioning but can also harm others (Setiawati, 2021). Factor causing behavior disorders in children can come from family factors, one of which is the result of maternal separation (Cao et al., 2020).

Maternal separation is often used as a model of trauma/stress in a person's early stages of a child's life (Lehmann et al., 2000) and an environmental risk factor that harms the development of behavior in later stages (Nylander and Roman, 2013). Maternal separation can be caused by working mothers, education, and maternal death. Based on research by Cao et al., maternal separation causes depression and dysfunctional behavior in secondary school children in rural China due to the factor of mothers migrating to work in cities (Cao et al., 2020). The migration of a mother to another city can also be caused by the educational process. One of them is the specialist doctor education program (resident) which requires mothers to study and work simultaneously. Maternal separation will affect a child's mental health status, such as depression and anxiety (He et al., 2012).

The number of female residents in Indonesia is comparable to that of men. Based on the 2016-2017 report, women's residence in Indonesia is more than that of men, reaching 60% (Fitria and Muhdi, 2017). Specialist doctor education programs are a significant source of conflict for female residents with families, vulnerable to dual role conflicts as resident and mother, which will impact children. A resident must meet clinical, academic, physical, and social demands with a length of education of about 6 to 10 semesters, and even more, working up to 80 hours per week (Herwanto and Umboh, 2018).

Currently, no study in Indonesia focuses on the effect of maternal separation on the behavior, psychosocial, and emotions of children during the mother's education program for specialist doctors. This study aims to know the effect of maternal separation during the mothers taking medical residency education program to behavior-psychosocial-emotional of children based on beginning of separation.

METHODS

This research was conducted using observational analysis with a research design of cross-sectional. The sample of this study was children aged 4-17 years who experienced maternal separation during the mother's education program for specialist doctors at Dr. Soetomo General Hospital, Surabaya. The inclusion criteria used were children aged 4-17 years experiencing maternal separation during the mother's education program for specialist doctors at Dr. Soetomo General Hospital. The child's parents agreed and signed the research informed consent form. Exclusion criteria are maternal separation due to divorce and parents do not know the child's condition.

The sample size in this study was based on total sampling technique from children aged 4-17 years who experienced maternal separation due to their mother taking a specialist doctor education program at Dr. Soetomo Surabaya, using the Slovin formula.

Operational Definition and Group Division

The risk of behavioral-psychosocial-emotional disorders is a measure of the tendency of children to be at risk of having behavioral-psychosocial-emotional disorders, measured using PSC-17 questionnaire. Measurement results are expressed in the number of score values. It is said to have a risk of behavioral-psychosocial-emotional disorders when the number of internalization scores (≥ 5), or externalization (≥ 7), or attention (≥ 7), and/or total value (≥ 15) (Gardner and Kelleher, 2007).

The beginning of separation is the first age when the child begins to experience separation from the mother, divided into three groups, namely before the age of 2 years, between the ages of 2-5 years, and after the age of 5 years (Cao et al., 2020).

Research Instruments

The research instrument used was the PSC-17 questionnaire.

Research Procedure

Research ethics eligibility was obtained on November 15, 2021, by the Health Research Ethics Committee No. 0302/KEPK/XI/2021, Dr. Soetomo General Hospital, Surabaya. Primary data collection starts from November 2021 to January 2022 in Dr. Soetomo General Hospital. The initial procedure is to collect data from female residents who have children aged at least four years old and separated from children to the dean of the Faculty of Medicine Universitas Airlangga and the Education Coordination Committee of Dr. Soetomo General Hospital. Then, the female resident filled out a questionnaire regarding her willingness to participate in the study, followed by filling out the PSC-17 questionnaire regarding the child's condition.

Statistic Analysis

The data were statistically analyzed with the normality test (Shapiro-Wilk) and homogeneity (Levene) using the program SPSS 26.0. Analysis of the effect of separation beginning on the risk of behavioral-psychosocial-emotional disorders using the Kruskal Wallis test. If the score reaches $p < 0.05$, a Post Hoc test is carried out using Mann-Whitney.

RESULT

Based on the result of the data, 55 residents experienced separation from their children while taking the specialist doctor education program, but one resident refused to participate. 104 children were recorded as experiencing separation, but only 91 children met the inclusion criteria (figure 1).

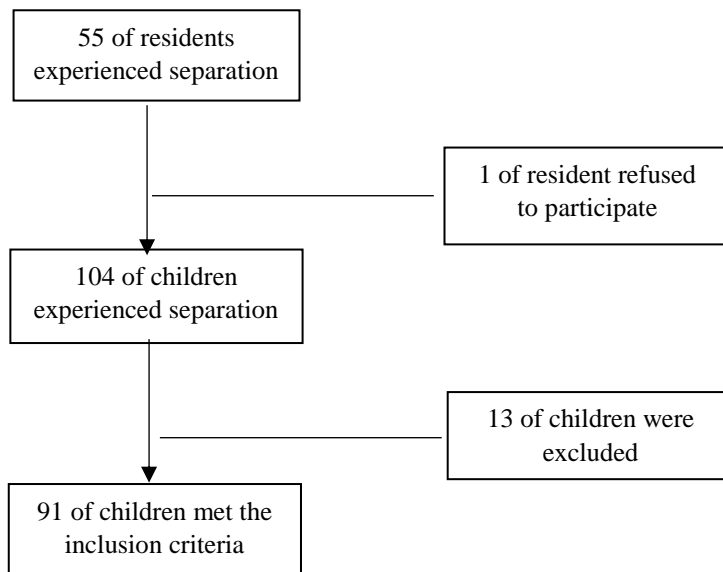


Figure 1. The number of population and research sample

Table I shows that the youngest child is four years old, and the oldest is 15. The youngest resident is 30 years old, and the oldest is 40. Most of the resident respondents are from the pediatrics study program.

Table I. Characteristics of resident profiles and children’s age

Variable	N (person)	Minimum (year)	Maximum (year)	Mean (year)	Std. Deviation	Total (%)
Child’s age	91	4	15	6.85	2.60	-
Resident age	54	30	40	34.80	2.67	-

Resident study program

Andrology	1 (1.9)
Pediatric Surgery	1 (1.9)
Neurosurgery	1 (1.9)
General Surgery	2 (3.7)
Dermatology Venereology	3 (5.6)
Forensics	1 (1.9)
Ophthalmology	3 (5.6)
Pediatrics	15 (27.8)
Physical Medicine and Rehabilitation	2 (3.7)
Internal Medicine	4 (7.4)
Cardiology	2 (3.7)

Clinical Microbiology	1 (1.9)
Neurology	3 (5.6)
Obstetrics and Gynecology	2 (3.7)
Anatomical Pathology	2 (3.7)
Clinical Pathology	2 (3.7)
Psychiatry	3 (5.6)
Pulmonology	2 (3.7)
Radiology	3 (5.6)
Urology	1 (1.9)
Resident amount	54 (100)

Table II shows that the number of male respondents is 48 (52.7%) and female respondents is 43 (47.3%). The majority of children who experienced beginning of separation from the age of 2-5 years amounted to 49 (53.8%), while the least was from age <2 years, amounting to 19 (20.9%). Based on the criteria for the resident's education year level, the majority of the resident's education level is in the 4th year, amounting to 35 (38.5%), while the least is the 1st year, which amounted to 4 (4.4%). Based on the criteria for meeting frequency, the majority of child respondents have a frequency of meeting with their mother (resident) >1x in 6 months 72 (79.1%). The result shows that 15 children (16.5%) risk behavior-psychosocial-emotional disorder. Most children respondents experiencing the risk of the disorder are on the internalization of 4 (4.4%) and externalization of 4 (4.4%).

Table II. Characteristics of child respondent profile

Criteria	Total amount (%)
Gender	
- Male	48 (52.7)
- Female	43 (47.3)
Beginning of separation	
- <2 years old	19 (20.9)
- 2-5 years old	49 (53.8)
- > 5 years old	23 (25.3)
Resident's Education Year Level	
- 1 st year	4 (4.4)
- 2 nd year	15 (16.5)
- 3 rd year	19 (20.9)
- 4 th year	35 (38.5)
- 5 th year	9 (9.9)
- \geq 6 th year	9 (9.9)
Meeting Frequency	
>1x meet in 6 months	72 (79.1)
\leq 1x meet in 6 months	19 (20.9)

Risk of the disorder

- Internalization scale	4 (4.4)
- Externalization scale	4 (4.4)
- Internalization and attention scale	1 (1.1)
- Internalization and total score	1 (1.1)
- Externalization and total score	1 (1.1)
- Internalization, externalization, and total score	3 (3.3)
- Internalization, externalization, attention, and total score	1 (1.1)
- Normal	76 (83.5)

Table III shows at-risk respondents with an average score of PSC-17 internalization, externalization, attention, and total scores higher than those who are non-risk. The result of the Kruskal Wallis test is internalization difference measure of disorders based on beginning of separation has a value of P-value (0.019) < 0.05. Children who experience beginning of separation at the age of >5 have the highest average score of PSC-17 internalization, which is 2.96.

Table III. PSC-17 score of at-risk and non-risk children

Disorder Risk	At-Risk (Mean ± SD)	Non-Risk (Mean ± SD)
Internalization scale	4.27 ± 2.37	1.77 ± 1.28
Externalization scale	6.40 ± 3.40	2.50 ± 1.85
Attention scale	4.07 ± 2.22	1.73 ± 1.45
PSC-17 Total Score	14.73 ± 4.54	6.00 ± 3.63

Table IV shows the result of the Kruskal Wallis test about the difference in externalization, attention scale, and PSC-17 total score based on the beginning of separation shows no significant difference. Then on the internalization scale, a Post Hoc test is carried out using Mann Whitney as shown in table V. There is a significant difference between beginning of separation of <2 years old and > 5 years old.

Table IV. The result of the Kruskal Wallis test based on beginning of separation

Disorder risk	Beginning of separation	Mean	SD	P-Value
Internalization	<2 years old	1.47	1.43	0.019*
	2-5 years old	2.12	1.73	
	> 5 years old	2.96	1.87	
Externalization	<2 years old	2.84	3.10	0.491
	2-5 years old	3.08	2.24	
	> 5 years old	3.57	2.94	

Disorder risk	Beginning of separation	Mean	SD	P-Value
Attention	<2 years old	1.84	1.57	0.817
	2-5 years old	2.18	1.95	
	> 5 years old	2.17	1.75	
PSC-17 Total Score	<2 years old	6.16	4.44	0.436
	2-5 years old	7.39	4.73	
	> 5 years old	8.70	5.88	

Note: * = significant different (P-Value < 0.05)

Table V. Mann Whitney test result of internalization scale based on beginning of separation

Disorder Risk	Beginning of Separation	<2 years old	2-5 years old	> 5 years old
Internalization	<2 years old	-	-	-
	2-5 years old	0.155	-	-
	> 5 years old	0.005*	0.065	-

Note: * = significant different (P-Value < 0.05)

Figure 2 is a visual description of the internalization scale disorder risk score based on the beginning of separation.

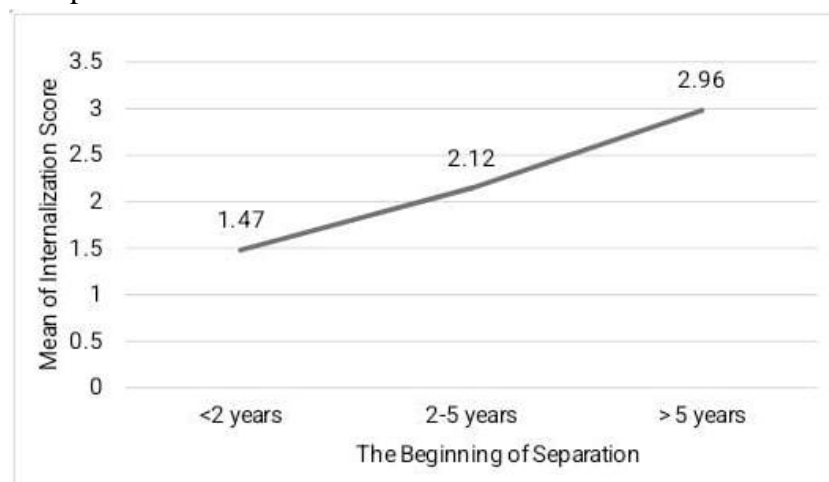


Figure 2. Internalization scale disorder risk score based on the beginning of separation.

DISCUSSION

In this study, there was a significant difference between the PSC-17 scores on the risk of internalization scale disorders who experienced beginning of separation at the age of <2 years old, 2-5 years old, and >5 years old. From the average score, it can be seen that the children who experience beginning of separation from the age of > 5 years old have the highest PSC-17 average score in the internalization scale than the age of 2-5 years old and <2 years old.

In the Mann-Whitney test result, the internalization scale has a significant difference at the beginning of separation from the age of <2 years old with >5 years old. This shows that children who experience separation at the age of >5 years old are at risk for a more severe internalization scale disorder than children who experience separation at the age of <2 years old. This does not follow the results of previous studies that said the earlier maternal separation occurred, the higher depression and children's dysfunctional behavior (Cao et al., 2020). In this study, it was found that the earlier separation, the lower risk of behavioral-psychosocial-emotional disorders in children.

This difference is due to the role of caregivers at an earlier age. Also, the emotional development of children is played by the pre-frontal cortex, which is optimally formed when children are over three years old (Sherwin et al., 2019). Thus, when the child is separated from the mother at three years, the child's emotional and psychological development will develop and become more aware of the emotions felt during the separation, thereby increasing the risk of a child's internalization scale disorder.

In other research by Crawford et al., maternal separation before five years of age was evaluated as a predictor of long-term risk of developing borderline personality disorder (BPD) symptoms in children (Crawford et al., 2009). Besides that, Csoka et al. found that early maternal separation was associated with an increased frequency of nightmares in adolescents (Csóka et al., 2011).

Stress in early life can cause changes in brain development and cause persistent limbic circuit sensitization, so adults become more susceptible to mood and anxiety disorders due to mild stress (Branchi and Cirulli, 2014). Early maternal separation increases the risk of depression by reducing the mesolimbic dopamine system, including decreasing serotonin levels (Adhikari et al., 2014).

The role of this caregiver is the same as being associated with a "nurturing touch." Researchers have shown that in the presence of "nurturing touch", the brain begins to block transcriptional suppression of the ornithine decarboxylase gene by stimulating the cell's ability to transduce growth hormone-induced activating signals. Studies suggest that the central endorphinergic pathway can mediate this suppressive action by downregulation of specific immediate early genes (c-myc and max) in the brain and peripheral organs, which generally promote the synthesis of growth-regulatory enzymes (Kuhn and Schanberg, 1998).

Meanwhile, based on the beginning of separation, there was no significant difference between the externalization, attentional, and total PSC-17 scores on the risk of disorders since the child was <2 years old, 2-5 years old, and >5 years old. This score shows that the separation of mother and child has a more dominant impact on the internalization scale. Meanwhile, the externalization and attention scale can be cared for by the family environment or child caretakers other than the mother.

In this study, most child respondents experienced beginning of separation from 2-5 years, while the least in the age of <2 years. A mother with a physician (resident) as a profession prefers to continue her education as a specialist when their child is more than two years old. Facts show that proper nutrition for 1000 days of life between the beginning of a woman's pregnancy to the age of 2 years provides healthy children in life. The Indonesian government calls it the First 1000 Days of Life, 270 days during pregnancy and 730 days from birth to 2 years of age.

Maternal separation causes neurochemical and molecular changes in which the hypothalamic-pituitary-adrenal axis is impaired due to increased 5-HT in the hippocampus, striatum, and pre-frontal cortex. Changes in receptor subunit expression NMDA (*N-Methyl D-Aspartate*) hippocampus after maternal separation is associated with impaired learning and memory later in life (Janetsian-Fritz et al., 2018). The derivation of brain-derived neurotrophic factor (BDNF) has been detected in the hippocampus, which is essential for brain maturation, including neuronal cell survival, plasticity, and differentiation (Kuma et al., 2004). O'Mahony et al. stated that one prolonged episode of maternal separation was sufficient to increase corticosterone and ACTH levels in both basal and stress-induced conditions (O'Mahony et al., 2011).

There is limitation in this research. The number of research subjects is still relatively small, so the authors suggest that a larger-scale study be conducted between universities in Indonesia.

CONCLUSION

The more delayed beginning of maternal separation occurs during the mother taking a medical residency education program, the more severe risk of internalization scale disturbances, but it does not affect externalization and attention scales. The author suggests that parents (residents) should be more aware of the risk of internalization scale disturbances in the event of maternal separation when the child is over five years old. The results of this study can be used as a reference for the education coordination committee team in teaching hospitals.

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Conflicts of interest

There are no conflicts of interest.

Ethical Approval

Research ethics eligibility is obtained before research, issued on November 15, 2021, by the Health Research Ethics Committee No. 0302/KEPK/XI/2021, Dr. Soetomo General Hospital, Surabaya.

Declaration of patient consent

Each research subject has obtained written consent from parents or guardians with an informed consent form. The identity as names and initials will not be mentioned to maintain aspects of confidentiality.

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