# Indonesian Parents' Evaluation of Developmental Status (PEDS) as Developmental Screening Tool for 0-3 Years Old Children

## Amelia Sholikhah[1*], Irwanto[1], Budi Utomo[2]

[1]Department of Pediatrics, Faculty of Medicine Universitas Airlangga,
Dr. Soetomo General Academic Hospital, Surabaya, Indonesia

[2]Public Health and Preventive Medicine, Medical Faculty,
Universitas Airlangga, Surabaya, Indonesia

*Corresponding author details: Amelia Sholikhah; amelia3smile@gmail.com

## ABSTRACT

*Background:* Child development is an individualized, dynamic, and complex process. Screening for developmental delays in children is challenging. Parents have important roles in recognizing developmental delays in children, hence parent-completed questionnaire is a feasible option to screen for any developmental delays. The objective of this study is to analyze the items of Indonesian PEDS in 0-3 years old children as a screening tool for their development and behavior.

*Methods:* This cross-sectional study was performed in Surabaya from August to September 2020. The questionnaire was distributed to mothers whose children were 0-3 years old. The item discrimination analysis was grouped into 0-17 months and 18-36 months. A point-biserial correlation test was carried out with a minimum significant correlation coefficient was 0.3 and a p-value <0.05.

*Results:* A total of 92 mothers were enrolled in this study. Forty mothers were included in the 0-17 months group and 52 mothers in the 18-36 months group. There were four significant aspects of child development in the 0–17-month group, yet only expressive language and articulation had a strong correlation coefficient. While in the 18–36-month group, global/cognitive and social-emotional had a strong correlation coefficient. The other aspects had a correlation coefficient of > 0.3 (p<0.05) in both groups.

*Conclusion:* The Indonesian PEDS is a potential developmental screening tool for Indonesian children aged 0-3 years old.

*Keywords:* child development; screening tool; developmental delay parents' evaluation of developmental status

## INTRODUCTION

Child development is an individualized, dynamic, and complex process. Uncountable stage and timing variations are present during achieving developmental milestones, hence recognizing developmental delays are extremely challenging. Early recognition of developmental delays is crucial for their children's prosperity in the future. The American Academy of Pediatrics recommended developmental surveillance should be performed at every visit and regularly at the 9, 18, and 30 months of visits [1-4].

Parent-completed screening questionnaire is an effective, efficient, inexpensive, and feasible option to screen for developmental delays in busy practices. Parents Evaluation of Developmental Status. It is a parent-completed developmental screening questionnaire that is composed of 10 questions and only takes two minutes to complete [5-6]. PEDS was firstly developed on 771 children aged 0 – 8 years in the United States using English and Spanish language. The sensitivity is marvelous, ranging from 74%-79% and specificity of 70%-80% across age levels [7-9]. It had been translated into multiple languages and it proved to be beneficial in disadvantaged populations across countries.

Indonesia has different culture compared to the United States. The majority of Indonesians are a group or family gathering, while others are more individualistic.

These cultural differences may influence PEDS performance in assessing developmental and behavioral impairment in Indonesian children. This study aimed to analyze the items of Indonesian PEDS in 0-3 years old children as a screening tool for their development and behavior.

## SUBJECTS AND METHODS

### ● Study Design

This cross-sectional study was conducted from August to September 2020 in Surabaya, Indonesia. The participants were mothers whose children were 0–3 years old. The PEDS item analysis was divided into two following groups, 0-17 and 18-36 months old. The mothers whose children were diagnosed with physical impairment, neurological abnormalities, or developmental delay by health consultants were excluded from this study. All included participants had signed informed consent forms and completed a demographic information form. This study was approved by the Health Research Ethics Committee of Medical Faculty, Universitas Airlangga, Surabaya, Indonesia (33/EC/KEPK/FKUA/2020).

### ● Instrument

This study utilized the Indonesian version of Parents' Evaluation of Developmental Status (PEDS) which was developed in 2006.

This version was evaluated and had been granted an official license by Frances Page Glascoe. The PEDS is composed of ten questions, assessing ten domains of child development and behavior, namely cognitive, expressive, and receptive language, fine and gross motor, behavior, social-emotional, self-help, academic/pre-academic, and others (medical concerns), accordingly. This questionnaire applies to children between 0 and 8 years old [5-7].

The outcome of PEDS has been classified into five groups (e.g., path A to E) based on concerns and characteristics of the parent, and the developmental and behavioral status of the children. Path A demonstrated a high risk of developmental problems; paths B and D demonstrated a moderate risk; while paths C and E demonstrated a low risk. Each group had various interventions from health care professionals [6-7].

● **Statistical analysis**
The demographic characteristics were presented as median, range, or percentage. The analysis of PEDS components was performed using a point-biserial correlation test. All statistical analysis was carried out in SPSS 21.0. A minimum correlation coefficient (r) of 0.3 with a p-value <0.05 was considered statistically significant. A r value of (0.3 – 0.5) was considered weak, (0.5 – 0.7) was considered moderate, while > 0.7 was considered strong correlation.

**RESULTS**
● **Characteristics of patients**
A total of 92 mothers were included in this study. Forty mothers were included in the 0-17 months group and 52 mothers in the 18-36 months group. The median age of the mothers was 31. The majority of the participants work outside the house and were assisted by close family in taking care of the children.

**TABLE 1:** Subjects' Characteristic

| Characteristics | *n* = 92 |
|---|---|
| **Child characteristics** | |
| Age (months), median (range) | 21 (2-36) |
| Sex, *N* (%) | |
| Boy | 53 (57.6) |
| Girl | 39 (42.4) |
| **Mother characteristics** | |
| Age (years), median (range) | 31 (26-39) |
| Mother's occupation, *N* (%) | |
| Housewife | 29 (31.5) |
| Work in house | 9 (9.8) |
| Work outside house | 54 (58.7) |
| Child caregiver, *N* (%) | |
| Mother only | 32 (34.8) |
| Mother assisted by close family | 37 (40.2) |
| Mother assisted by other caregivers | 23 (25.0) |
| **Children's developmental risk, *N* (%)** | |
| High risk | 15 (16.3) |
| Moderate risk | 21 (22.8) |
| Low risk | 56 (60.9) |

● **Item analysis of Indonesian PEDS aged 0-17 months old**
There were four significant aspects of the PEDS score in the 0-17month group, namely global/cognitive, expressive language and articulation, social-emotional, and the presence of other medical concerns.

was Expressive language and articulation yielded the strongest correlation coefficient with an r-value of 0.74, followed by global/cognitive, social-emotional, and medical concerns with moderate correlation. Table 2 shows the other PEDS item that showed significant, yet weak correlations T.

**TABLE 2:** Item analysis of Indonesian PEDS aged 0-17 months old

| Domain | | *N* = 40 |
|---|---|---|
| Cognitive | *r* | 0.519 |
| | *p* | 0.001* |
| Expressive language | *r* | 0.740 |
| | *p* | 0.001* |
| Receptive language | *r* | 0.317 |
| | *p* | 0.046* |
| Fine motor | *r* | 0.419 |
| | *p* | 0.007* |
| Gross motor | *r* | 0.399 |
| | *p* | 0.011* |

| Domain | | N = 40 |
|---|---|---|
| Behavior | r | 0.323 |
| | p | 0.042* |
| Social-emotional | r | 0.669 |
| | p | 0.001* |
| Self-help | r | 0.377 |
| | p | 0.016* |
| Academic/ pre-academic | r | 0.323 |
| | p | 0.042* |
| Other (medical concerns) | r | 0.645 |
| | p | 0.001* |

*Point-biserial correlation test the result was significant at *p*<0.05

● **Item analysis of Indonesian PEDS aged 18-36 months old**
The analysis in the 18-36 month group demonstrated four significant predictors of child development on the PEDS assessment, which were global/cognitive, expressive language and articulation, receptive language, and the presence of other medical concerns.

Two aspects, global/cognitive and medical concerns, had the strongest correlation coefficient. Subsequently, expressive language and receptive language had moderate correlation coefficients. The remaining aspects had significant and weak r-values.

**TABLE 3:** Item analysis of Indonesian PEDS aged 18-36 months old

| Domain | | N = 52 |
|---|---|---|
| Cognitive | r | 0.717 |
| | p | 0.001* |
| Expressive language | r | 0.672 |
| | p | 0.001* |
| Receptive language | r | 0.506 |
| | p | 0.001* |
| Fine motor | r | 0.390 |
| | p | 0.004* |
| Gross motor | r | 0.305 |
| | p | 0.028* |
| Behavior | r | 0.308 |
| | p | 0.027* |
| Social-emotional | r | 0.380 |
| | p | 0.005* |
| Self-help | r | 0.338 |
| | p | 0.014* |
| Academic/ pre-academic | r | 0.390 |
| | p | 0.004* |
| Other (medical concerns) | r | 0.717 |
| | p | 0.001* |

*Point-biserial correlation test, the result is significant at *p*<0.05

**DISCUSSION**
Our study revealed were four significant PEDS aspects in Indonesian children aged 0-17 months old. Expressive language and articulation had the strongest correlation, while three aspects, which were global/cognitive development, social emotions, and medical concerns, demonstrated a moderate correlation. The remaining six aspects of development were significant with a weak correlation. Meanwhile, analysis of the group showed that both global/cognitive aspects and the presence of other diseases had a strong correlation of 0.717. While language aspects of expressive and receptive had a moderate correlation.

Parents often compare their child's development progress to another child as a developmental model. Parents usually conclude that there is a developmental problem if their child's developmental progress is not linear to the developmental model. The majority of parents have high concerns regarding their children's expressive language. Language disorder mainly impairs child's ability to interact and socialize with their peers, hence interfering with their social and emotional development [4,7,10].

The language was the main domain of development that arose from the interaction between communication skills related to children's cognitive functions and environmental influences. A previous study had explored child's expressive language in their first two years of life by comparing parental reports and direct examination of language development. The participants were then followed for one year to evaluate any language delays. Direct examination outperformed parental reports for language delays evaluation. However, these methods showed no significant difference at age of 3 years [11].

At the age of 1-3 years, a child's receptive language abilities could be evaluated by observing their ability to perform a series of actions following instructions. Children with receptive disorder hardly understand or hear what was being instructed [12,15].

Cognition a form of was sensory perception. Cognition yields the child's ability to learn, understand, retain and apply information as needed, hence they could solve problems through their intuition, perception, and verbal and nonverbal reasoning.

Two major features in cognition include curiosity and creativity. Curiosity drives the children to learn and explore. While creativity reflected imagination. Child's imagination is dominantly formed during the age of 1-5 years and is dependent on their playtime activities and surrounding social environment [12].

One interesting study showed that parents have different concerns about children following children's age. About 99.8% of parents are concerned about their child's physical disease during 0 to 2 years old. Acute infectious diseases, allergies, and asthma were the most concerning diseases [13]. Conditions such as retarded-looking children, incapability to do something that other children could do, sluggishness, and slow learning would trigger parents' response during their child's development [14].

Screening of child development is crucial were to identify those who had a high risk of developmental problems. In addition, physical impairment is also a determinant factor in a child's development process. Most early physical diseases child development in the future. Therefore, comprehensive examinations are needed to acknowledge any specific developmental disorder, hence early therapeutic intervention could be initiated [2].

## CONCLUSION
The Indonesian version of PEDS is a potential developmental screening tool for Indonesian children aged 0-3 years old.

## CONFLICT OF INTEREST
None declared.

## ETHICAL CLEARANCE
Ethical approval was granted from the Health Research Ethics Committee of Medical Faculty, Universitas Airlangga, Surabaya, Indonesia (33/EC/KEPK/FKUA/2020).

## REFERENCES
[1] Thomas SA, Cotton W, Pan X, Ratliff-Schaub K. Comparison of systematic developmental surveillance with standardized developmental screening in primary care. Clin Pediatr. 2012;51(2):154–9.

[2] American Academy of Pediatrics. Identifying infants and young children with developmental disorders in the medical home: an algorithm for developmental surveillance and screening. Pediatrics. 2006; 118:405–20.

[3] Bellman M, Byrne O, Sege R. Developmental assessment of children. British Med J. 2013;346: e8687.

[4] Scharf RJ, Scharf GJ, Stroustrup A. Developmental milestones. Pediatr Rev. 2016;37(1):25-37.

[5] Glascoe FP. Parents' concerns about children's development: prescreening technique or screening test? Pediatrics. 1997; 99:522–8.

[6] Glascoe FP. The value of Parents' Evaluations of Developmental Status in detecting and addressing children's developmental and behavioral Problems. Diagnostique. 1998;23(4):185–203.

[7] Glascoe FP. Using parents' concerns to detect and address developmental and behavioral problems. J Soc Pediatr Nurs. 1999; 4:24–35.

[8] Vitrikas K, Savard D, Bucaj M. Developmental delay: when and how to screen. Am Fam Physician. 2017;96(1):36–43.

[9] Woolfenden S, Eapen V, Williams K, et al. A systematic review of the prevalence of parental concerns measured by the Parents' Evaluation of Developmental Status (PEDS) indicating developmental risk. BMC Pediatrics. 2014; 13:231.

[10] Glascoe FP and MacLean WE. 1990. How parents appraise their child's development. Fam Relat 1990; 39:280–3.

[11] Sachse S and Von Suchodoletz W. Early identification of language delay by direct language assessment or parent report? J Dev Behav Pediatr. 2008; 29:34-41.

[12] Aly Z, Taj F, and Ibrahim S. Missed opportunities in surveillance and screening systems to detect developmental delay: a developing country perspective. Brain Dev. 2010; 32:90–7.

[13] Garbutt JM, Leege E, Sterkel R, Gentry S, Wallendorf M, and Strunk RC. What are parents worried about? health problems and health concerns for children. Clinical Pediatrics. 2012;51(9):840-7.

[14] Dhamayanti M. Buku panduan pemantauan perkembangan anak dengan metode kuesioner wawancara orang tua: Parents' Evaluation of Developmental Status (PEDS). 2018. Bandung: Trikarsa Aksi Mandiri.

[15] Weitzman C and Wegner L. Promoting optimal development: Screening for behavioral and emotional problems. Pediatrics. 2015; 135:384–95.