Research Article

Screening for Developmental Delays: Descriptive Study of Children Between the Ages of Two-and-a-Half and Six Years

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Abstract.

Developmental delays remain a concern for educators, parents, and policymakers. Early identification of developmental delays can facilitate the provision of early intervention treatments. This research aims to show the characteristics of developmental delays in children aged two-and-a-half to six years and to investigate the influence of gender on the prevalence of these delays. This study is a descriptive quantitative non-experimental investigation. The sample comprised of 155 participants, and data were collected via the Denver Developmental Screening Test II (DDST II), performed individually. The research findings indicated that 52% of participants exhibited poor growth. The linguistic dimension appears as the most significant indicator of developmental delay relative to other dimensions. Men and women have notable developmental disparities in adaptive fine motor skills. Based on empirical evidence, educators, guardians, and policymakers can implement preventative and promotion initiatives.

Keywords: children; DDST II; developmental delay

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1. Introduction

Several developmental delays in Indonesia are still the main concern for the Government and practitioners. Based on data from the Ikatan Dokter Indonesia (IDI), in 2018, 5-10% of Indonesian children experienced developmental delays; by 2022, this will increase to 30% (1). This statement is supported by a report from the Indonesian Ministry of Health, which showed that 0.4 million or 16% of children under five in Indonesia experience developmental delay in areas such as gross motor, fine motor, and speech (2). Developmental delay can best describe a child's failure to reach developmental milestones compared to peers from the same age group or population (3,4). More specifically, it is characterized by performance in developmental milestones that falls two or more standard deviations below the age-appropriate average on a standardized test (5). The extent of developmental delay can be categorized as mild (functional age less than

33% below chronological age), moderate (functional age between 34% and 66% of chronological age), and severe (functional age less than 66% of chronological age) (6)

Any of the following domains—gross and fine motor, speech and language, cognitive, social and emotional, and activities of daily living (ADL)—can be impaired and lead to this condition. It might be global (affecting most developmental regions), multifaceted (involving two or more domains), or isolated (involving a single domain) (3,7). Screening developmental milestones is beneficial for detecting children with developmental delays early. Developmental milestones are skills that progressively emerge and establish a basis for acquiring further developed abilities. An illustrative example is the progression from crawling, walking, and running. Children are varied and master abilities at their own rates.

Nevertheless, developmental milestones are generally observed to develop in a predictable sequence and by a specific age in the majority of children residing in the same cultural context. Consequently, they can be employed as indicators of typical development. The absence of one or more milestones in children may indicate a developmental delay (8).

A critical component of the early identification process is developmental screening. Developmental screening is a formal assessment of a child's development compared to other children of the same age, utilizing standardized instruments. A developmental screening can determine whether a further assessment of the kid is necessary. If this is the case, the subsequent step is to conduct a developmental evaluation to determine whether the child is experiencing a delay that could be remedied through treatment (8). Numerous nations offer suggestions regarding the optimal timing for conducting developmental screenings in children. Most studies suggest that screening should be conducted between the ages of one and four or when parents have specific concerns regarding their child's development. In addition to developmental screening, several nations advocate for early screening methods, including detecting signs of autism (9).

The Denver Developmental Screening Test II (DDST II) is a reliable and valid approach for identifying potential developmental delays in children. The DDST II was initially released in 1967 to assist healthcare practitioners in identifying probable developmental issues in young infants. Since its first release, the DDST has been extensively utilized. It has been modified for use and standardized in over twelve countries, facilitating the screening of more than 50 million children globally. The DENVER II is intended for use with seemingly healthy children from birth to six years old and is conducted by

evaluating a child's performance on a range of age-appropriate tasks. The assessment is essential for screening asymptomatic infants for potential issues, validating intuitive concerns with an objective metric, and monitoring children at risk for developmental complications, particularly those who have had prenatal challenges. DENVER II has 125 tasks, or items, organized into four sectors on the exam form to assess the following functional areas: Personal-social (interpersonal relations and self-care); fine motor adaptive (hand-eye coordination, manipulation of small objects, and problem-solving skills); language (auditory processing, comprehension, and verbal expression); gross motor (sitting, walking, jumping, and overall large muscle coordination) (10).

Management of developmental delay is centered around early identification and early intervention with initiation of specific treatment wherever relevant (7). Early identification and treatments are necessary to prevent long-term impairment (3). Detecting developmental delays early on and providing proper treatment can change the child's developmental course in a positive way (4). Identifying children with developmental delays as early as possible can result in early intervention, enhancing developmental skills and intellectual functioning (11). This can also enable families to advocate for services, supporting their child's learning and growth (12,13).

Comprehensive prior research has concentrated on detecting developmental deficits. Fundamentally, the majority of prior research concentrated on particular domains of development or on presenting overarching findings on development (14–17). DDST II has been employed in previous research, but it was not specifically examined as a growth and development screening method or was limited to a small number of samples (18,19). This study aims to characterize the development of kindergarten children between the ages of 2.5 and 6 in accordance with all four aspects of DDST II: personal social, fine motor adaptive, language, and gross motorbike. By identifying the developmental patterns in these four areas, it will be feasible to determine the most prevalent developmental delays. In addition, it will be feasible to determine if developmental delays in boys and girls follow different patterns. Acquiring sufficient data on children's development patterns would aid parents and teachers in delivering suitable stimulation. Furthermore, charting developmental delays might assist practitioners and the government in formulating promotional and preventive initiatives.

2. METHODS

2.1. Participants

The total sample size for this study is 155 children, with an age range of 2.5 to 6 years. Of the 155 participants, 67 are male, and 88 are female. They share similar characteristics, such as the willingness to participate in this research and the absence of any diagnosis of developmental delay, including neurodevelopmental disorders. Children who have previously received a diagnosis of neurodevelopmental disorder or developmental delay are not eligible to take part in this study. This criterion was established as the DDST II serves as a screening tool for kids with usual development. The method of sampling employed was accidental sampling.

2.2. Research Instruments

Denver Developmental Screening Test II (DDST II) was employed as the study instrument. DDST II has already been demonstrated to be a valid and reliable developmental screening method. The average examiner-observer reliability for the items in the Denver I is 99, with a range of.95 to 1.00 and a standard deviation of.016. The average test-retest reliability for identical items over a 7- to 10-day period is 90, with a range of.50 to 1.00 and a standard deviation of 12. The global adoption of the exam has acknowledged the content validity of the original DDST items. The new pieces were authored and curated by experts in child development and pediatric assessment. The test's validity depends on its standardization rather than its association with other tests, as all tests are built with modest variations. The data collection was individually conducted, and the data collector was already provided with training to ensure that the data was collected accurately and in conformance with the DDST II manual. A licensed psychologist evaluated the final outcome to guarantee that the data analysis was conducted professionally.

2.3. Data Analysis Techniques

The employed statistical analysis consists of descriptive statistics and crosstabulation. Crosstab was selected to ascertain gender disparities in developmental delays among

research participants. The study emphasizes the application of crosstabs with the chi-square test due to the nominal nature of the data, categorized as normal, cautious, or untestable results.

3. Results

The descriptive analysis results suggest that a significant number of children continue to indicate that their development is not in line with their chronological age. This is typically observed in the four developmental domains represented by DDST II: personal social, fine motor adaptive, language, and gross motor skills. The detailed results from the DDST II are shown in Table 1.

Table 1: Descriptive result of DDST II findings.

	Personal Social		Fine motor adaptive		Language		Gross motor	
	N	%	N	%	N	%	N	%
Normal	113	72.9%	104	67.1%	103	66.5%	133	85.8%
Caution	34	21.9%	39	25.2%	38	24.5%	13	8.4%
Untestable	8	5.2%	12	7.7%	14	9%	9	5.8%

Note. The DDST II assessment is conducted individually by allowing the child and the primary caregiver to participate in the data-gathering procedure.

Children will receive normal conclusions if they exhibit abilities in specific areas that correspond to their age. Cautionary conclusions will be rendered when children are unable to complete tasks that are appropriate for their age or have not yet mastered skills that should have been mastered at a previous age. The child's refusal to respond or comply with instructions will result in an untestable conclusion, rendering it impossible to ascertain whether the child has mastered a specific developmental task. Table 1 indicates that the most significant indicators of developmental issues were observed in the language domain, followed by the fine motor adaptive domain in second place. Indicators of delays in languages suggest that children have not yet attained adequate language processing ability. Many individuals continue to exhibit challenges in executing tasks requiring hand-eye coordination and object manipulation. Conversely, the most optimal development was observed in the gross motor domain, with 85.8% of participants accomplishing developmental tasks associated with big muscular movements, including jumping and maintaining balance.

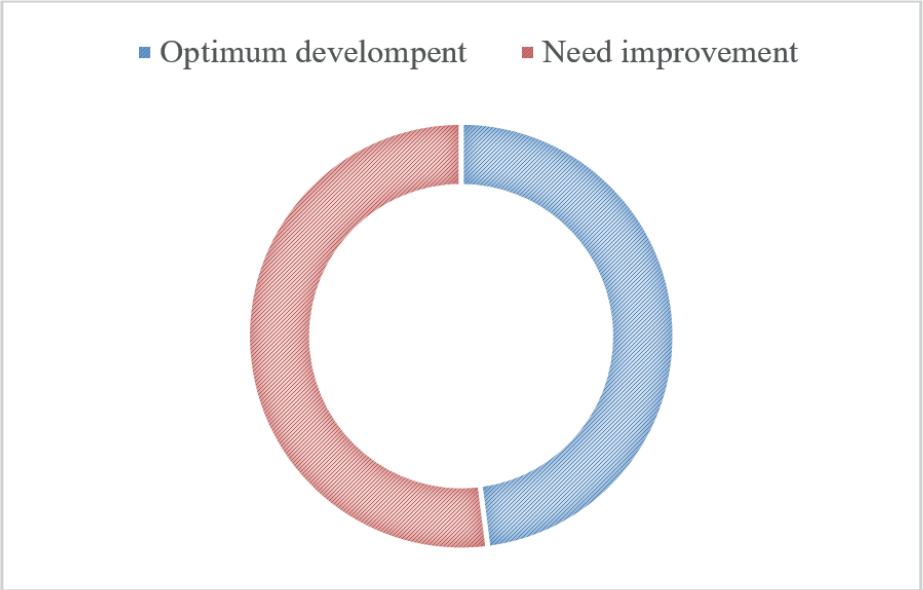

Figure 1: Summary of the result from DDST II.

Based on the four identified aspects, children will be classified into two general conclusions, namely optimum development and need for improvement. Children will be granted optimal developmental conclusions when they achieve normal results in all components of the DDST II. Nevertheless, if a cautionary or untestable conclusion is obtained in at least one aspect, the child will receive a conclusion that indicates a need for improvement. This indicates that children still struggle with or reject certain developmental activities in one or more DDST II domains. In general, 48% of children were assigned the optimum development conclusion, while the remaining 52% were assigned the need for improvement conclusion. This demonstrates that over half of the study participants still lack the skills to complete age-appropriate developmental activities.

TABLE 2: Comparison study based on gender.

Domain	P-value
General	0,267
Personal Social	0,115
Fine motor adaptive	0,019*
Language	0,499
Gross motor	0.715

Note. (*) indicates that fine motor adaptive development is found to be significantly different between males and females

According to Table 2, there are no disparities in overall developmental accomplishments between males and females. This indicates that gender does not exert an influence on developmental accomplishments among research participants. There were substantial disparities between the male and female populations in terms of adaptive fine motor skills. These disparities were not observed in other domains, including personal social skills, language, and gross motor skills. The detailed differences in fine motor adaptive can be seen in Table 3.

TABLE 3: Fine Motor Adaptive Comparison male and female.

		JK				Total
		Male	%	Female	%	
Fine motor adaptive	Normal	37	55	67	76	104
	Caution	22	33	17	19	39
	Untestable	8	12	4	5	12
Total		67	100	88	100	155

Table three indicates that the number of females exhibiting optimal growth surpasses that of boys in the fine motor adaptive domain. In other words, the fine motor adaptive abilities of females are more advanced than those of boys. In contrast, a greater number of boys have not yet developed the fine motor skills that are appropriate for their age or are unwilling to engage in activities that necessitate eye-hand coordination.

4. Discussion

The data collection results revealed that over 50% of the participants exhibited developmental delays in one or more areas of development. Several individuals failed to complete the developmental tasks due to a lack of age-appropriate abilities, while others declined to engage in activities or reply throughout the testing procedure. Despite the participant's refusal to engage in activities, if the developmental tasks assigned were expected to have been completed earlier, the participant would be classified as having not achieved the developmental tasks. According to the World Health Organisation (WHO), Indonesia is the third country in the Southeast Asia Region with the highest prevalence of developmental delay among preschoolers, with a prevalence of 28.7% (20) The results of this study are consistent with the Indonesian Paediatrician Association's data, which indicates that approximately 1-3% of children under the age of

five experience developmental delays (IDAI, 2013). During the 2020-2021 timeframe, the Ministry of Health documented 5,530 incidents of developmental abnormalities in children. The rise in delays is not exclusive to Indonesia; it is a global phenomenon that persists annually (21). Numerous factors can contribute to this, such as changed diagnostic criteria, increased awareness and identification of developments, and increased access to health service providers (21,22).

External and internal factors are among the numerous risk factors that can affect the prevalence of developmental delays. All factors from the environment and parents are considered external factors. Prior research has demonstrated that developmental delays are significantly influenced by parental education and low socioeconomic status (23). Parenting styles were also discovered to be one of the major variables driving developmental delays in children. Specific characteristics of parenting include stimulation, response to the kid, rejection, and emotional warmth. Parents and the environment both play important roles in ensuring a safe and healthy environment for children (24).

Internal variables contributing to the likelihood of developmental delays encompass biological elements and child behavior. Numerous biological causes linked to developmental delays in infants include preterm delivery, low birth weight, stunting, and genetic influences. Behavioral variables associated with developmental delays include excessive gadget usage. (24,25). Developmental delays are more probable when a child has many risk factors that are not counterbalanced by protective factors.

The study results showed that the highest indications of developmental delays appeared concerning language skills. A basic health study indicates that around 0.42% of children aged 2 to 5 years have linguistic difficulties. These findings align with data from the RSCM Medical Rehabilitation Department. Out of 1125 pediatric patient visits, 10.13% of children were identified with language development problems. Additionally, in a sub-district of Central Jakarta, the frequency of language delays was observed to be 9.3% among 214 children under the age of 3 (26). Numerous factors contribute to delays in speech, with the most prevalent being a low intelligence quotient, which hinders children's ability to acquire language skills comparable to their peers with average intelligence. Additionally, a lack of motivation arises as children recognize they can communicate sufficiently through their parents' prompted speech, leading them to persist in using "baby talk," which they perceive as endearing. Furthermore, restricted opportunities for verbal practice due to stringent limitations on their speaking time at home, continuous interaction with twin siblings who comprehend their unique

expressions, and the use of foreign languages within the household impede the acquisition of their native language (27).

Except for the fine motor adaptive aspect, there are no substantial disparities between girls and boys in any development aspect. The findings of this study are consistent with other studies that showed girls outperformed boys in activities requiring fine motor abilities. Girls tend to have higher fine motor scores compared to boys (28–30). One of the main reasons for this finding is due to gender roles and the frequency of their labor. Males have historically exhibited a higher prevalence in gross motor performance than women in fine motor performance (31). Additionally, the social environment influences the development of several aspects in both males and girls. Parents of males frequently promote participation in activities that enhance large motor abilities, whereas parents of girls typically advocate for engagement in activities that develop fine motor skills (29). This may be associated with the stereotyped activities or gender role models that females engage in, which are those that enhance their fine motor skills, such as writing or practicing hand-eye activities and excellent coordination. Some authors have proposed this connection (30).

In addition to the results obtained, this research has significant drawbacks. One aspect pertains to the age distribution of the subjects. This study revealed a predominance of respondents within a certain age range. The predominant age range of the patients was 3 to 5 years. The study mostly describes generic indicators of developmental delays but has not determined the causes influencing this condition. Future research is expected to explore parallel studies in alignment with the provided suggestions.

5. CONCLUSION

The research findings indicated that 52% of individuals had developmental discrepancies according to chronological age. Language has the highest number of developmental delays among the four aspects of development that DDST II can identify. The fine motor adaptive aspect follows in second place. Gender disparities were identified as being associated with adaptive fine motor development. Girls exhibited superior growth relative to boys in the fine motor adaptive domain.

6. Implication

The current research's limitations provide an opportunity for future research to conduct a comparable study by considering the age distribution of the research subjects. Subsequent studies may concentrate on determinants that affect developmental delays during early life. This research aims to enable parents, educators, and the government to develop tailored preventive and promotion programs that meet their specific requirements. Policymakers prioritize prevention initiatives focused on enhancing linguistic abilities and adaptable fine motor skills.

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Authors' contributions

This research was authored by APS, a sole individual who managed all aspects of the research process, including study conception and design, data collection, analysis, and manuscript preparation.

Competing Interest

There is no conflict of interest during the research process.

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