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# THE RELATIONSHIP BETWEEN SMARTPHONE USE INTENSITY AND THE DEVELOPMENT OF CHILDREN AGED 4-6 YEARS IN KINDERGARTEN

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***Abstract***

***Background:*** *The use of smartphones among preschool children has increased along with the development of digital technology. Children aged 4–6 years are in a golden period of development, which includes gross motor skills, fine motor skills, speech and language, socialization, and independence. This study aimed to determine the relationship between the intensity of smartphone use and the development of children aged 4–6 years at TK Negeri Pembina 2 Kota Jambi.* ***Methods:*** *This study employed a cross-sectional design. The sampling technique used was total sampling, with 88 children who met the inclusion criteria as respondents. Data on the intensity of smartphone use were obtained through a questionnaire completed by parents, while child development was assessed using the Developmental Pre-Screening Questionnaire (KPSP).* ***Results:*** *Most children had a moderate level of smartphone use intensity (40.9%), and child development was predominantly in the appropriate category (53.4%). The Spearman Rank correlation test showed a correlation coefficient of $r = -0.794$ with a significance value of $p < 0.001$, indicating that H1 was accepted and H0 was rejected. These results demonstrate a strong relationship between the intensity of smartphone use and child development.* ***Conclusion:*** *Higher intensity of smartphone use may lead to a decrease in child development. Therefore, it is expected that schools can collaborate with parents to provide education regarding the wise use of smartphones for preschool children.*
***Keywords:*** *Preschool children, Intensity, Child development, Smartphone*

**Abstrak**

**Latar Belakang:** Penggunaan ponsel pintar pada anak usia prasekolah semakin meningkat seiring perkembangan teknologi digital. Anak usia 4-6 tahun berada pada masa emas perkembangan yang meliputi aspek motorik kasar, motorik halus, bicara dan bahasa, sosialisasi dan kemandirian. Penelitian ini bertujuan untuk mengetahui hubungan antara intensitas penggunaan ponsel pintar dengan perkembangan anak usia 4-6 tahun di TK Negeri Pembina 2 Kota Jambi. **Metode:** Penelitian ini menggunakan rancangan *cross sectional*, teknik pengambilan sampel menggunakan *total sampling* dengan 88 anak memenuhi kriteria inklusi sebagai responden. Data intensitas penggunaan ponsel pintar diperoleh melalui kuesioner yang diisi oleh orang tua, sedangkan perkembangan anak dinilai menggunakan Kuesioner Pra Skrining Perkembangan (KPSP). **Hasil:** Sebagian besar anak memiliki intensitas penggunaan ponsel pintar kategori sedang (40,9%) dan perkembangan anak berada

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pada kategori sesuai (53,4%). Hasil uji *Spearman Rank* diperoleh nilai korelasi r = -0,794 dengan nilai signifikansi p <0,001 maka $H_1$ diterima dan $H_0$ ditolak, hal ini menunjukkan bahwa terdapat hubungan yang kuat antara intensitas penggunaan ponsel pintar dengan perkembangan anak. **Kesimpulan:** Semakin tinggi intensitas penggunaan ponsel pintar maka dapat menyebabkan kemungkinan penurunan pada perkembangan anak. Diharapkan pihak sekolah dapat bekerja sama dengan orang tua dalam memberikan edukasi mengenai penggunaan ponsel pintar yang bijak pada anak usia prasekolah.
**Kata Kunci:** Anak prasekolah, Intensitas, Perkembangan anak, Ponsel pintar

## I. INTRODUCTION

A smartphone is a handheld communication device that combines telephone capabilities with computing functions, such as internet access, educational applications, a camera, and interactive games, all in one portable device (Agung, 2023). Children aged 4-6 years are considered preschoolers, a crucial stage of human development, where growth and development occur at a rapid and fundamental rate during the early years of life. Therefore, the quality of a child's future development is greatly influenced by the stimulation they receive from preschool age. Child development during this period encompasses various aspects of gross motor skills, fine motor skills, speech and language skills, socialization, and independence (Nardina & et al., 2021).

Previous research has shown that excessive smartphone use negatively impacts the development of preschool children. Children who use smartphones for a long time tend to experience decreased development of gross motor skills, fine motor skills, speech and language skills, as well as socialization and independence. This condition is caused by reduced physical activity, minimal social interaction, and a decrease in developmental stimulation that should be obtained through play and direct communication (Widiana, Rudsiyani, & Kusumawardani, 2022).

Smartphone use has also increased dramatically. Globally, the number of smartphones continues to increase, which has contributed to increased screen time among preschool-aged children. In Indonesia, data from the Central Statistics Agency shows that some preschool-aged children are already able to use smartphones and access the internet. This situation indicates that exposure to digital technology in early childhood is increasingly unavoidable (Central Statistics Agency, 2024).

According to a 2023 World Health Organization (WHO) report, approximately 52.9 million children under the age of 5 worldwide experience developmental delays (World

Health Organization, 2023). Meanwhile, a 2023 United Nations Children's Fund (UNICEF) report estimates that the prevalence of developmental delays in children globally remains quite high. This situation indicates that developmental delays in preschool-aged children remain a global health issue that requires serious attention (United Nations Children's Fund, 2023).

In Indonesia, the rate of developmental delays in preschool-aged children remains relatively high. Data from the Indonesian Ministry of Health in 2021 indicated that 5-25% of preschool-aged children experience developmental disorders. One factor that can affect child development is smartphone use. Therefore, it is recommended that children limit smartphone use to prevent negative impacts on development. (United Nations Children's Fund, 2023).

The urgency of this research arises from the increasing use of smartphones among preschool-aged children and the inconsistency of research findings regarding the relationship between smartphone use intensity and child development. Some studies show a significant relationship, while others show statistically insignificant results. These discrepancies in findings highlight the need for further studies that comprehensively assess child development (Kadek Ryas Prasetyani Veronika, 2024).

Based on the results of a preliminary study at Pembina 2 State Kindergarten in Jambi City, it was found that most preschool-aged children are accustomed to using smartphones in their daily lives, both for learning and entertainment purposes. From initial observations of six children and their parents interviewed, all children have used smartphones. Four children aged 4-6 years used smartphones to play games and sometimes watch videos on YouTube, parents said these children did not appear to have reached the developmental stage appropriate for their age.

The first child showed delays in fine motor development, such as not being able to hold a pencil properly and having difficulty performing activities requiring hand coordination. The second child experienced delays in speech and language, characterized by limited speaking skills and difficulty understanding simple instructions. The third child appeared to have difficulties with socialization, with the child being less able to interact with peers and preferring to play alone with a smartphone. Meanwhile, the fourth child showed delays in independence, such as still relying on parental assistance to dress.

The other two children used smartphones for learning. Their parents stated that their children had reached age-appropriate developmental milestones: in gross motor development, they were able to run, jump, and sit upright on a chair; in fine motor development, they were able to hold a pencil correctly, write some letters, and draw; in speech and language development, they were able to communicate clearly; and in socialization and independence, the children were able to interact with peers and demonstrate independence through dressing, eating independently, and following kindergarten routines. Based on these phenomena, the research problem was formulated to determine the relationship between smartphone use intensity and child development. Considering the importance of child development, this study aims to analyze the relationship between the intensity of smartphone use and the development of children aged 4-6 years at Pembina 2 State Kindergarten, Jambi City.

## II. THEORETICAL STUDIES

Preschool age is a developmental period that lasts from approximately 4 to 6 years of age. During this stage, there is rapid growth in gross motor skills, fine motor skills, speech and language skills, socialization, and independence. This period is often referred to as the "wonder years," a period during which children's curiosity, imagination, and emotional dynamics develop intensely (Arif, 2016). Preschoolers are in a phase of significant and continuous growth and development, and children at this age already possess stable physical activity capabilities. In addition, children at this age can experience the phase of initiative versus guilt. Children will have a very high sense of curiosity and have a power of imagination that will continue to develop. Characteristics of preschool children are that they will ask many questions about various things around them, where they will feel there is much they do not know. (Sitanggang and Anggraini, 2021)

The theory of gross motor development was first proposed by David L. Gallahue in 1982, and then further developed by John C. Ozmun and Jacqueline D. Goodway in their book *Understanding Motor Development: Infants, Children, Adolescents, Adults* (latest edition 2019). This theory introduces a framework called the Triangulated Hourglass Model. This model explains that gross motor development is the result of the interaction of three main aspects:

1) Biological maturity (includes the central nervous system and large muscles);

2) Motor experiences and a supportive environment (active movement practice, physical stimulation, and play spaces);
3) Affective aspects (Motivation, perception, and self-confidence in motor abilities).

Meanwhile, Esther Thelen's (1989) theory views fine motor development through the following core principles: Self-organization, Multicausal and non-linearity, Child's tasks, and Exploration and selection. Then there's Lev Vygotsky's (1978) theory of speech and language development, namely the Zone of Proximal Development (ZPD) and the Scaffolding concept. Erikson (1963) proposed a theory of socialization and independence development, encompassing several stages involving psychosocial developmental tasks that must be completed to support the formation of a healthy personality.

Smartphones are small, portable devices that combine the functions of a traditional cell phone with the computing capabilities of a minicomputer, and are enriched with internet access, applications, multitasking, and advanced sensors such as cameras, GPS, and accelerometers. Since the advent of operating systems like Android and iOS, smartphones have evolved into multifunctional devices capable of supporting a variety of daily activities, including communication, entertainment, education, and productivity, such as sending emails, playing video games, watching videos, taking photos/videos, and running learning applications simultaneously (Erliza, 2022).

Smartphone use among preschool-aged children has increased rapidly in recent years. These devices serve not only as communication tools but also as entertainment and learning tools. Children tend to use smartphones for playing games, watching videos, and accessing social media, often without direct parental supervision. This leads to the risk of addiction, impaired social interactions, and decreased focus on learning. High smartphone use intensity among children aged 4-6 has been shown to negatively impact social interaction skills and potentially develop antisocial behavior when used continuously for long periods (Yandi, 2021).

According to the Big Indonesian Dictionary, intensity is defined as a condition that describes the level or measure of the intensity of use. This definition suggests that intensity reflects the extent to which a phenomenon occurs. The intensity of smartphone use can be defined as the frequency and duration of an individual's interaction with the device in daily life. For preschoolers, this intensity includes the duration and frequency of smartphone use.

According to the Indonesian Ministry of Health, the recommended smartphone usage for children aged 4-6 years is no more than 1 hour per day, with usage limited to specific times, such as after completing learning activities, active play, or social activities. Parental supervision is also recommended to ensure that the content accessed is appropriate for the child's age and learning goals.

## III. RESEARCH METHODS

This study employed a quantitative correlational approach and a cross-sectional design. Data collection was conducted over a specific time period as needed. Furthermore, there was no follow-up or further observation in subsequent periods. The researcher employed a total sampling technique, a sampling method in which all members are sampled. Thus, 88 respondents met the inclusion criteria. The smartphone usage intensity instrument was a questionnaire adopted from Sandra Dwi Puspita Sari's (2019) research and modified by Ihyahul Ikhsan's (2022) research. Furthermore, the questionnaire was tested for validity and piloted on respondents who met the inclusion and exclusion criteria to ensure its reliability. The questionnaire's reliability test showed a Cronbach's Alpha value of 0.9312. Thus, the questionnaire can be categorized as a reliable instrument. The smartphone usage intensity questionnaire consisted of 10 questions: 7 questions regarding basic smartphone usage data, 2 questions regarding frequency of smartphone use, and 1 question regarding duration of smartphone use. The child development research instrument used the Developmental Pre-Screening Questionnaire (KPSP) to screen children's development, which covers four main sectors: gross motor skills, fine motor skills, speech and language, socialization, and independence. KPSP is a revised version of the early detection book for child growth and development issued by the Ministry of Health of the Republic of Indonesia in 2005. The analysis was conducted using the Spearman's Rank Correlation Coefficient test programmed into a computer. The alternative hypothesis (H1) is accepted if the P-value is <0.05, indicating a significant relationship between smartphone use and the development of preschool children aged 4 to 6 years. Data were collected through editing, coding, scoring, tabulation, and cleaning. The analysis was conducted using a univariate approach to describe the frequency distribution of each variable and bivariate using the Spearman Rank Correlation test programmed into a computer. This study also complies with research ethics

through informed consent, respondent signatures, and maintaining the confidentiality of all collected data.

## IV. RESEARCH RESULTS

**Table 1. Distribution of Respondents' Demographic Characteristics**

| Characteristics | Frequency (n) | Persentase (%) |
|---|---|---|
| **Usia** | | |
| 4 years | 3 | 3,4 |
| 4,5 years | 6 | 6,8 |
| 5 years | 36 | 40,9 |
| 5,5 years | 26 | 29,5 |
| 6 years | 17 | 19,3 |
| **Total** | **88** | **100** |
| **Gender** | | |
| Man | 30 | 34,1 |
| Woman | 58 | 65,9 |
| **Total** | **88** | **100** |
| **Parental Education** | | |
| Elementary School | 5 | 5,7 |
| Middle School | 12 | 13,6 |
| High School | 39 | 44,3 |
| Higher Education | 32 | 36,4 |
| **Total** | **88** | **100** |
| **Pekerjaan Orang Tua** | | |
| Housewife | 66 | 75,0 |
| Private Employee | 8 | 9,1 |
| Self-employed | 3 | 3,4 |
| Teacher | 1 | 1,1 |
| Indonesian National Armed Forces | 1 | 1,1 |
| Lain-lain | 9 | 10,2 |
| **Total** | **88** | **100** |

Based on Table 1, the largest number of respondents was 36 children (40.9%) aged 5 years, while the smallest number was 3 children (3.4%) aged 4 years. The majority of respondents were female (58 children (65.9%), while 30 were male (34.1%). Furthermore, 39 parents (44.3%) had a high school education, while the smallest number of parents (5.7%) had an elementary school education. The most common occupation was housewife (66

parents (75.0%), while the smallest number were teacher (1.1%) and Indonesian National Armed Forces (TNI) (1.1%).

**Table 2. Distribution of Respondents by Smartphone Use Intensity**

| Smartphone Usage Intensity | Frequency (n) | Persentase (%) |
|---|---|---|
| High | 33 | 37,5 |
| Medium | 36 | 40,9 |
| Low | 19 | 21,6 |
| **Total** | **88** | **100** |

Based on Table 2, the majority of respondents at Pembina 2 State Kindergarten in Jambi City (36 children, 40.9%) have moderate smartphone usage.

**Table 3. Distribution of Respondents by Frequency and Duration of Smartphone Use**

| Criteria | Frequency (n) | Persentase (%) |
|---|---|---|
| **Frequency/Week** | | |
| 1-3 days | 32 | 36,4 |
| 4-6 days | 28 | 31,8 |
| 7 days | 28 | 31,8 |
| **Total** | **88** | **100** |
| **Frequency/Day** | | |
| 1-2 times | 34 | 38,6 |
| 3-4 times | 37 | 42,0 |
| >4 times | 17 | 19,3 |
| **Total** | **88** | **100** |
| **Duration** | | |
| 1-30 minutes | 37 | 42,0 |
| 30-60 minutes | 33 | 37,5 |
| >60 minutes | 18 | 20,5 |
| **Total** | **88** | **100** |

Based on Table 3, the frequency per week shows that most respondents use their smartphones 1-3 times a day, namely 32 children (36.4%). Regarding the frequency per day, most respondents use their smartphones 3-4 times a day, namely 37 children (42.0%). Meanwhile, the duration of use is 1-30 minutes, namely 37 children (42.0%).

**Table 4. Distribution of respondents based on child development**

| Child Development | Frequency (n) | Persentase (%) |
|---|---|---|
| Appropriate Development | 47 | 53,4 |
| Doubtful Developments | 23 | 26,1 |
| There may be deviations | 19 | 20,5 |
| **Total** | **88** | **100** |

Based on Table 4, the majority of respondents at Pembina 2 State Kindergarten in Jambi City experienced appropriate development, with 47 children (53.4%).

**Table 5. Crosstabulation between smartphone usage intensity and child development.**

| Intensity | Child Development | | | | | | | | r | *p-value* |
|---|---|---|---|---|---|---|---|---|---|---|
| | Appropriate | | Doubtful | | Possible Deviations | | Total | | | |
| | *n* | % | *n* | % | *n* | % | *n* | % | | |
| **High** | 1 | 3,10 | 16 | 48,5 | 16 | 48,5 | 33 | 100 | | |
| **Medium** | 28 | 77,8 | 7 | 19,4 | 1 | 2,8 | 36 | 100 | **-0,794** | **< 0,001** |
| **Low** | 18 | 94,7 | 0 | 0,0 | 1 | 5,3 | 19 | 100 | | |
| **Total** | 47 | 53,4 | 23 | 26,1 | 18 | 20,5 | **88** | **100** | | |

Table 5 shows that of the 33 children with high smartphone use intensity, only 1 (3.1%) had appropriate development. Furthermore, of the 36 children with moderate smartphone use intensity, 28 (77.8%) had appropriate development. Furthermore, of the 19 respondents with low smartphone use intensity, 18 (94.7%) had appropriate development.

The Spearman Rank correlation test yielded a correlation value of r = -0.794 with a significance value of p <0.001. Therefore, H1 was accepted and H0 was rejected. This indicates a strong relationship between smartphone use intensity and the development of children aged 4-6 years at Pembina 2 State Kindergarten in Jambi City. The negative r value indicates that higher smartphone use intensity can lead to a decline in child development.

These results align with previous research by Kartika et al. (2023), which found that smartphone use intensity was significantly related to preschool children's development (p <0.005), demonstrating a strong correlation. These findings confirm that increasingly intense smartphone use can impact aspects of child development, including gross motor skills, fine motor skills, socialization and independence, and speech and language. However, this study is not always consistent with previous research on the relationship between smartphone use intensity and child development. For example, a study conducted by Nadya Putri Purwanto et al. (2021) on 65 preschool-aged children at St. Theresia Kindergarten found no significant relationship between smartphone use intensity and child development (p = 0.818).

This study showed that some respondents had high smartphone use intensity, but screening results using the KPSP (Student Activity Assessment) showed that their development was in line with expectations. To optimize smartphones as a tool to support

children's development, parents must not only accompany their children but also actively engage them. Furthermore, parents must selectively choose educational apps and manage the appropriate usage time. This way, the potential negative impacts of smartphone use can be minimized. Conversely, positive impacts that support children's development can be achieved.

## V. CONCLUSION

Based on the research results and discussion outlined previously regarding the relationship between smartphone usage intensity and the development of children aged 4-6 years at Pembina 2 State Kindergarten in Jambi City, the following conclusions can be drawn:

1. The intensity of smartphone usage among children aged 4-6 years at Pembina 2 State Kindergarten in Jambi City is mostly in the moderate category (40.9%), with some in the high (37.5%) and low (21.6%) categories, as assessed by the duration and frequency of smartphone use in daily life.
2. The development of children aged 4-6 years at Pembina 2 State Kindergarten in Jambi City is mostly in the appropriate category (53.4%), covering gross motor skills, fine motor skills, speech and language, and socialization and independence. Although some children still have questionable development (26.1%) and possible deviations (20.5%).
3. The Spearman Rank correlation test yielded a correlation value of $r = -0.794$ with a significance value of $p < 0.001$. This shows that there is a strong and significant relationship and a negative direction between the intensity of smartphone use and the development of children aged 4-6 years at Pembina 2 State Kindergarten, Jambi City, which shows that the higher the intensity of smartphone use, the more likely it is to cause a decline in children's development.

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