

ORIGINAL ARTICLE

GADGET PLAYING INTENSITY AND SUSPECTED ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) IN CHILDREN

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ABSTRACT

BACKGROUND

In these modern times, gadgets are not only owned by adults, but teenagers and children have also used them. Childhood is a golden period which is a period of conducive growth and development of children. Many parents have given and let their children play with gadgets. Gadgets can have negative effects that interfere with a child's development level. Attention Deficit Hyperactivity Disorder (ADHD) is a behavioural and neurocognitive disorder characterized by age-inappropriate developmental level, hyperactivity, inability to focus and impulsive behaviour. ADHD appears from childhood and can persist into adolescence and adulthood. Excessive gadget exposure is thought to be one of the triggers of ADHD. The purpose of the research is to determine the relationship between the intensity of playing gadgets with and suspected ADHD.

METHODS

The study was conducted on 92 kindergarten and elementary school students in West Jakarta in September-November 2019. The method was cross-sectional. The instruments used were a questionnaire about the identity and intensity of playing gadgets and a Skala Penilaian Perilaku Anak Hiperaktif Indonesia (SPPAHI) questionnaire for early detection of ADHD in children. Data analysis using the chi-square test with a significance level of $p < 0.05$.

RESULTS

Chi-square test showed no significant relationship between age with suspected ADHD $p = 0.625$, there was a significant relationship between sex with suspected ADHD ($p = 0.000$), and there was a significant relationship between the intensity of playing gadgets with a suspected ADHD ($p = 0.000$).

CONCLUSION

There is a significant relationship between gender and intensity of playing with gadgets with suspected ADHD in children.

KEYWORDS: Gadget intensity, ADHD, Children.

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ABSTRAK

Intensitas Bermain Gadget dengan Suspek Gangguan Pemusatan Pikiran dan Hiperaktivitas pada Anak

LATAR BELAKANG

Pada zaman modern gadget tidak hanya dimiliki oleh orang dewasa saja, namun remaja dan anak-anak pun sudah menggunakannya. Masa kanak-kanak adalah masa keemasan yang merupakan periode kondusif tumbuh kembang. Banyak orang tua yang sudah memberikan dan membiarkan anak bermain gadget. Gadget dapat memberikan dampak negatif yang mengganggu tingkat perkembangan anak. Gangguan Pemusatan Pikiran dan Hiperaktivitas (GPPH) merupakan keadaan tingkah laku dan neurokognitif yang ditandai oleh tingkat perkembangan yang tidak sesuai usia, hiperaktivitas, ketidakmampuan dalam memusatkan perhatian dan impulsif. GPPH muncul mulai masa kanak-kanak dan dapat menetap hingga remaja maupun dewasa. Paparan gadget yang berlebihan diduga menjadi salah satu faktor pencetus GPPH. Tujuan penelitian ini adalah untuk mengetahui hubungan intensitas bermain gadget dengan kejadian suspek GPPH.

METODE

Penelitian dilakukan pada 92 murid TK dan SD di Jakarta Barat pada bulan September-November 2019, dengan metode potong-lintang. Instrumen yang digunakan adalah kuesioner identitas dan intensitas bermain gadget dan kuesioner Skala Penilaian Perilaku Anak Hiperaktif Indonesia (SPPAHI) untuk deteksi dini GPPH pada anak. Analisis data menggunakan uji Chi-square dengan tingkat kemaknaan $p < 0.05$.

HASIL

Uji *Chi-square* menunjukkan tidak terdapat hubungan yang bermakna antara usia dengan suspek GPPH dengan $p=0.625$, terdapat hubungan yang bermakna antara jenis kelamin dengan suspek GPPH ($p=0.000$), serta terdapat hubungan yang bermakna antara intensitas bermain gadget dengan suspek GPPH ($p=0.000$).

KESIMPULAN

Terdapat hubungan yang bermakna antara jenis kelamin dan intensitas bermain gadget dengan suspek GPPH pada anak.

KATA KUNCI: Intensitas gadget, GPPH, Anak.

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD), according to the American Psychiatric Association (APA), is a behavioural and neurocognitive disorder characterized by an age-appropriate developmental level, decreased attention or inability to focus attention, hyperactivity and impulsivity. Which is permanent or persistent.⁽¹⁾ ADHD generally occurs in childhood and is found in approximately 5% of school-age children. Attention problems are characterized by an inability to focus or maintain focus. Children's attention does not focus on one thing, often requires help, and takes a long time to do tasks even though the task is simple. Impulsivity can be characterized by behaviour; among others, children find it challenging to wait for their turn when waiting in line, and children like to interrupt and are impatient. Hyperactivity can be seen in gross motor movements, for example, often running around the room, climbing on a chair, while fine motor movements such as writhing hands, restlessness and restlessness, or playing with small objects continuously.⁽²⁾

In general, ADHD symptoms appear in children before the age of 7. After childhood, ADHD can last into adolescence or adulthood, or it can go away on its own. The American Psychiatric Association (APA) suggests that the incidence of ADHD in children is 5%, with a ratio between boys and girls epidemiologically 3:1 and clinically 9:1.⁽³⁾ A survey conducted by the National Survey of Children's Health (NSCH) in the United States in 2016 stated that in children aged 2-17 years there were 9.4% (approximately 6.1 million) were diagnosed with ADHD, of which 388,000 were aged 2-5 years, 2.4 million aged 6-11 years and 3.3 million aged 12-17 years.⁽⁴⁾

Sulemba et al. in 2016 in Manado showed that 611 children out of 5752 respondents experienced ADHD.⁽¹⁾ Research by Saputro in 2009 on elementary school children in Jakarta using the Hyperactive Child Behavior Assessment Scale (SPPAHI) obtained a GPPH of 26.2%.⁽⁵⁾

Attention and hyperactivity disorder is a multifactorial disorder in the form of genetic factors and environmental factors. One of the environmental factors is the use of gadgets.

Research in China shows that children with ADHD use gadgets more often than children without ADHD.⁽⁶⁾

The gadget is a term from English, a small electronic device in this modern era with various features. Gadgets can function to download the latest information using modern technology and features, making it easier and more practical for users. Gadgets can be computers or laptops, tablet PCs, video games and cell phones or smartphones.^(7,8)

Nowadays, gadgets are not only owned by adults. Teenagers and children also use it. Childhood is a golden period which is a conducive period in the growth and development of various abilities, intelligence, talent, cognitive, language, socio-emotional and spiritual, which significantly determines the character of a child's attitude, behaviour, and personality in the future front. Many parents do not understand the importance of early stimulation in the development of preschool children. Many parents deliberately give and let children play with gadgets so that children are calm.⁽⁹⁾

Research by Dhea Novita in 2019 in Bandar Lampung on the onset of gadget use and the duration and assistance of parents when children use gadgets shows no relationship between the onset of gadget use and suspected ADHD. Still, there is a relationship between duration and parental supervision when using gadgets with suspected ADHD.⁽¹⁰⁾ Research by Setianingsih et al. in 2018 in Bareng Lor showed an association between gadget use and the risk of ADHD in preschool-aged children.⁽⁹⁾ Research by Mayenti et al. in 2018 in Pekanbaru on early childhood showed that there was no relationship between gadget use and child development.⁽¹¹⁾

Because there are still pros and cons regarding the use of gadgets with ADHD, we want to do further research on this, especially in early childhood and elementary school age and the intensity of gadget use.

METHODS

The study design was cross-sectional. The study was conducted in West Jakarta Kindergarten and Elementary School in August - November 2019 with a total sample of 92 children. The inclusion

criteria are having a gadget and having parents/guardians who can read and write. Exclusion criteria were students with a history of low birth weight (LBW), history of premature birth, history of head trauma, history of seizures, family with neurological or psychological disorders and suspected ADHD, and mothers who smoked and/or drank alcohol during pregnancy.

Data were collected using a questionnaire and the Indonesian Hyperactive Child Behavior Scale (SPPAHI) for early detection of ADHD. The questionnaire to assess the intensity of playing with gadgets contains the duration and frequency of children playing with gadgets in one day. The intensity of the gadgets is grouped into three categories, namely the high category of playing duration of 75-120 minutes/time with a frequency of >3 times/day, the medium category playing 40-60 minutes/time with a frequency of 2-3 times/day and the light category of 5-30 minutes/times with a frequency of 1-2 times/day).⁽¹²⁾

The SPPAHI questionnaire consists of 35 questions with answers: 1 for never at all, 2 for sometimes, 3 for often, and 4 for very often. SPPAHI's assessment is by giving a score of 0-3 for the answers to each question item. A value of 1 if the answer in the column is sometimes, a value of 2 if the answer in the column is often and a value of 3 if the answer in the column is always or very often. The total score ranged from 0 – 105. Parents filled out this questionnaire as respondents. The SPPAHI questionnaire interpretation is said to be positive for ADHD if the score is 30 and not suffering from ADHD if the score is 30.5. Data analysis used the *Chi-square* statistical test with a significance level of $p < 0.05$.

The research has passed the ethical clearance number 76/KER-FK/VII/2019 from the Medical Faculty of Universitas Trisakti.

RESULTS

In this study, the majority of children aged 6-9 years with more boys than girls. The intensity of playing with gadgets is the most moderate category with 47.8%, and as many as 56.5% of subjects do not experience ADHD, as shown in Table 1.

Table 2 shows that 6-9 years have more suspected ADHD than 3-5 years old, $p = 0.625$ ($p > 0.05$), which means that there is no significant

Table 1. Characteristics of research subjects

Variable	Frequency (n= 92 children)	Percentage (%)
Age (year)		
3-5	12	13
6-9	80	87
Gender		
Boy	50	54.3
Girl	42	45.7
The intensity of playing gadgets		
High	34	37
Medium	44	47.8
Light	14	15.2
Attention Deficit Hyperactivity Disorder (ADHD)		
Yes	40	43.5
No	52	56.5

relationship between age and ADHD. In addition, boys respondents were more suspected of having ADHD than girls; it was found that $p = 0.000$ ($p < 0.05$) means that there is a significant relationship between gender and ADHD. Finally, the high intensity of playing gadgets caused the most suspected ADHD; it was found that $p = 0.000$ ($p < 0.05$), which means that there is a significant relationship between the intensity of playing gadgets with ADHD.

DISCUSSION

In this study, the number of boys was more dominant than girls. This is in accordance with the profile data of Indonesian children, which says that the Indonesian population aged 0-17 years in 2018 found that the male population was more than the female population for each age range.⁽¹³⁾ Gender is one of the factors that affect ADHD. Research conducted by Novriana et al. said that boys had a higher incidence than girls, which was 2:1. This

may be due to a genetic mechanism related to sex. Boys tend to show more aggressiveness than girls, who tend to show more cognitive weakness, so that the symptoms will be more evident in boys.⁽¹⁴⁾ The prevalence of ADHD in Indonesia is not known for sure. Research in Jakarta reported the prevalence of ADHD was 4.2%, primarily found in school-age children and boys.⁽¹⁵⁾

Playing gadgets at the age of 6-9 years is more dominant. This is in line with the research of Novita et al., which said that 37.1% of children started using gadgets at the age of < 6 years, and 62.9% of children began using gadgets at the age of 6 years.¹⁰ This is also in accordance with the statement of Asian Parent Insights, which stated that as many as 98% of parents with children aged 3-9 years in Southeast Asia allow their children to access technology in the form of gadgets (computers, smartphones and tablets).⁽¹⁶⁾ Children aged 6-9 years use gadgets a lot because parents allow and in children 6-9 years old can

Table 2. The relationship between age, gender, and intensity of playing with gadgets with ADHD suspects

Variable	Suspect of Attention Deficit Hyperactivity Disorder (ADHD)				p-value
	Yes		No		
	n= 40	%	n= 52	%	
Age					
3-5 years	6	50.0	6	50.0	0.625*
6-9 years	34	42.5	46	57.5	
Gender					
Boy	30	60.0	20	40.0	0.000
Girl	10	23.8	32	76.2	
Intensity of playing gadgets					
High	27	79.4	7	20.6	0.000
Medium	10	22.7	34	77.3	
Light	3	21.4	11	78.6	

Chi-square test

* $p < 0.05$, Statistically significant

set and search for the desired type of game in the gadget features. Along with the development of information technology, today's children are also more "technology aware" compared to children of the previous generation. These children easily access various applications; it doesn't take long to master the features of these gadgets. In the current situation, the price of gadgets is easily affordable and is not an elite thing. This situation triggers children to have gadgets, which is widespread when children have gadgets so that children become active consumers. This causes children to become the target market for gadget products.⁽¹⁷⁾

The dominant intensity of playing gadgets is in the medium and high categories. This shows that most useful gadgets for more than 1 hour in one day. This study follows Zaini and Soenarto's research which states that the duration of children playing on smartphones and tablets is an average of 62 minutes per day.⁽¹⁸⁾ This is not in accordance with the American Academy of Pediatrics (AAP) recommendations, where the duration of gadget use in children is not more than 1 to 12 hours per day.⁽²⁾ The intensity of playing with gadgets in children is influenced by several factors, including parenting, family economic status, children's needs in accessing information, communication and recreation.⁽¹⁹⁾ The high intensity of playing with gadgets is caused by the assumption that is giving gadgets to children other than so that children can be quiet/not fussy as well so that children can play games that may be able to practice problem-solving in children. However, problem-solving in children should be done through language, touch and parental attitudes that are instilled in children repeatedly so that children get used to dealing with problems that come from outside.⁽¹⁷⁾ The liberating parenting style children in playing gadgets so that children are not fussy, the higher level of the family's economy makes gadget ownership increase, the convenience and sophistication of gadgets such as easy to obtain information and the many game applications make gadgets favoured by children.^(20,21)

The exact cause of ADHD is still unclear. Still, it is thought to be multifactorial, with biological and neuroanatomical factors obtained during the prenatal and perinatal periods and influenced by environmental factors. Affect the production, use and regulation of other neurotransmitters that

make it difficult for a person to regulate internal and external stimuli. For example, norepinephrine will amplify the desired stimulus, while dopamine will decrease the disturbing stimulation received.^(22,23) In this study, only the visible symptoms of ADHD were assessed.

Several factors may play a role in the occurrence of ADHD, such as genetic factors, brain injury, neurochemical factors, anatomical structures and psychosocial factors. In genetic factors, there may be mutations in the genes encoding neurotransmitters and dopamine receptors (D2 and D4) on chromosome 11p that play a role in the occurrence of ADHD. Minimal brain injury to the central nervous system was found in children with ADHD. Neurochemical factors are stimulants that affect dopamine or norepinephrine. In the anatomical structure, when a brain imaging examination is performed on a child with ADHD, a significant reduction in brain volume will be seen in the dorsolateral prefrontal cortex, caudate, pallidum, corpus callosum and cerebellum, as reported by Rapport et al. from the National Institute of Mental Health using Magnetic Resonance Imaging (MRI) to look at the brains of children with ADHD. There was a reduction in the right prefrontal lobe, right caudate nucleus, right globus pallidus, and vermis compared to children without ADHD. On psychosocial factors due to the long-term emotional relationships.⁽²²⁾

Research conducted on children with ADHD found a decrease in brain volume by 4% compared to children who did not have ADHD. Examination of brain volume found a decrease in volume in the frontal cortex, basal ganglia and cerebellum in children with ADHD, where this part of the brain plays a role in regulating activity, attention and good emotions.⁽²³⁾ There are several risk factors associated with decreased brain volume that can increase the incidence of ADHD, including substances consumed by the mother during pregnancy, history of premature birth, and history of low birth weight.

In this study, there was no relationship between age and ADHD. This is in accordance with the research of Setianingsih et al., who stated that there was no effect between age and ADHD in kindergarten and elementary school-age children. This is because ADHD can occur at any age.⁽⁹⁾ This study is different from the study by Byun et

al., who said that age affects the appearance of ADHD symptoms. Children who already have gadgets at the age of fewer than six years will have more visible ADHD symptoms compared to children who have gadgets at the age of more than six years. Lower than that of elementary school-aged children.⁽²⁴⁾ Symptoms of ADHD can appear as early as 3 or 6 years of age and can continue into adolescence and adulthood. However, the symptoms shown vary by age group. In children, the symptoms of hyperactivity-impulsivity are the most dominant.⁽²⁵⁾ In this study, the population studied was only children.

Gender and ADHD have a significant relationship. This is supported by the American Psychiatric Association (APA) statement that the incidence of ADHD in children is 5%, with a ratio of boys and girls epidemiologically 3:1 while clinically 9:1.⁽³⁾ This is also the same as the study by Saputro D on children. In elementary schools in Jakarta, boys experience ADHD more than girls with a ratio of 2:1 to 6:1.⁽⁵⁾ Boys are more likely to experience ADHD because boys tend to show external symptoms such as running and impulsive behaviour. Girls with ADHD tend to show internal symptoms, including inattention and low self-esteem. Boys tend to be more physically aggressive, while girls are more verbally aggressive. Girls with ADHD display fewer behavioural problems, so the symptoms are less noticeable. School-age boys are generally more hyperactive and defiant than girls. Girls with ADHD and without ADHD tend to have more internal and fewer external symptoms; this causes boys to be referred more often for further ADHD testing than girls. Girls are referred if they show severe symptoms of ADHD.^(9,21,26) Several studies have also shown that gender is a risk factor for ADHD. Based on research in Semarang in 2016-2019 in children aged 4-5 years, the prevalence of ADHD was 45.9%, with 37.8% for boys and 7.2% for girls.⁽²⁷⁾

There is a significant relationship between the intensity of playing with gadgets and ADHD. This is in accordance with research by Novita et al., which stated that the duration of gadget use would affect a person affected by ADHD.⁽¹⁰⁾ The same thing was stated by Setianingsih et al., who noted that the intensity of using gadgets would be at risk for the occurrence of ADHD.⁽⁹⁾ Based on

the Journal of the American Medical Association (JAMA), gadget addiction will increase the prevalence of attention deficit disorders and affect the excessive release of the hormone dopamine, causing a decrease in the maturity of the Pre Frontal Cortex (PFC), which is one of the causes of ADHD; where the Pre Frontal Cortex affects the function of attention, emotion, and impulse control.⁽²⁸⁾ The results of Wahyuni et al.'s research show that there is a relationship between the duration of playing with gadgets and the frequency of using gadgets with the emotional mentality of elementary school students; it is also found that the use of gadgets is more than 1-3 days a week. However, mental and emotional disorders are found in the use of gadgets 6-7 days a week and the duration of using gadgets < 5 hours a week.⁽⁸⁾ The frequency of children using gadgets will affect their mental and emotional development. A study conducted by the University of Western Australia on 2600 schoolchildren regarding the length of time staring at a gadget screen found that 45% of 8-year-olds and 80% of 16-year-olds spent more than 2 hours a day playing with gadgets. The use of gadgets for a long time can affect the level of aggressiveness of children; children also become insensitive to the environment around them. Mental and emotional elementary school children also have a significant relationship with the frequency of using gadgets in a week. Therefore, parents and teachers at schools should be able to limit the use of gadgets in children, namely, the duration of playing with gadgets should be less than 40 minutes per day, and the frequency should be less than three times per day or 1-3 days a week.⁽⁸⁾

Children who often play with gadgets will also have a higher risk of developing developmental disorders. The impact of these risks can be seen in the short and long term. Research conducted by Mubashiro in 2013, as quoted by Alfiah, said that using gadgets that are too early and without parental supervision will have a negative impact on children's psychosocial development. The intensity of using too frequent gadgets will also affect the child's personality so that children become more individualistic and do not pay attention to the people around them.⁽²⁹⁾ The intensity of using gadgets that are too frequent and long can cause children not to concentrate on learning and reduce the quality of children in

socialisation because the use of gadgets can affect individual communication behaviour.⁽³⁰⁾

This research is expected to increase knowledge about the relationship between gadget use and the incidence of ADHD in children so that the intensity of gadget use can be considered for parents in giving time for children to use gadgets. In addition, although this study has not investigated the types of gadgets that can affect the incidence of ADHD, it is hoped that further research will examine this to assist parents in choosing the type of gadget suitable for children.

CONCLUSION

There is a significant relationship between gender and the intensity of playing with gadgets with ADHD, and there is no relationship between age and ADHD.

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AUTHORS CONTRIBUTION

Study conception and design: (P & Alv). data collection: (P); analysis and interpretation of results: (P & Alv). draft manuscript preparation: (P & Alv). All authors reviewed the results and approved the final version of the manuscript.

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CONFLICT OF INTEREST

There is no conflict of interest between the authors.

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