

## Electronic Game Intensity and Gross Motor Development in Children Aged 5–6 Years: A Case Study at RA Nurul Huda Gegurun

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| Article Info                                                                                                                                                                                                                               | ABSTRACT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <b>Article history</b><br>Received : 06-07- 2026<br>Revised: 09-08- 2026<br>Accepted : 18-09-2026<br>Published : 21-09-2026                                                                                                                | <p><i>This study examines how electronic games affect the development of gross motor skills among children aged 5-6 years at RA Nurul Huda Gegurun, Lombok Timur,, Indonesia. The central question addressed is whether the intensity and duration of daily electronic game use are associated with variations in children's gross motor achievement, including balance, coordination, and locomotor skills. The researcher positioned this study within a descriptive qualitative case-study design, combining participatory observation, semi-structured interviews with teachers and parents, and documentation of children's daily electronic-game intensity to answer this question. Data on daily electronic-game intensity were cross-referenced with a gross motor development checklist adapted from early childhood assessment indicators. The findings show that children with high daily electronic-game intensity (more than 60 minutes) tend to achieve lower gross motor scores than peers who engage more often in physical and outdoor play, particularly on balance and body-coordination indicators, while children with low electronic-game exposure show more optimal gross motor development. These results imply that early childhood educators and parents at RA Nurul Huda Gegurun should design structured active-play interventions and limit daily screen-based electronic games to support optimal gross motor development.</i></p> |
| <b>Keywords</b><br>electronic games; gross motor skills; early childhood; RA Nurul Huda Gegurun                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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## INTRODUCTION

Digital technology has significantly transformed patterns of daily life, social interaction, and play among young children. Digital devices such as smartphones, tablets, computers, and game consoles are increasingly accessible to children through both family and educational environments. Electronic games are one form of digital activity that attracts children because they provide interactive visual and auditory stimulation and can be used conveniently in a variety of situations. On the one hand, digital technology can serve as a medium for entertainment and learning when used purposefully. On the other hand, excessive use may increase sedentary behaviour and reduce the time children would otherwise spend engaging in physical activity, active play, and direct interaction with their environment. The World Health Organization (WHO) identifies physical activity, sedentary behaviour, and screen-based media use as important components of children's daily activity patterns because the balance among these behaviours is associated with motor development, health, and well-being (World Health Organization, 2019, 2020).

The period between 5 and 6 years of age is an important stage in the development of gross motor skills. At this stage, children experience advances in body coordination that enable them to perform fundamental movements such as walking, running, jumping, throwing, catching, kicking, maintaining balance, and combining movements with increasing coordination. These abilities do not develop automatically; rather, they require stimulation through opportunities for movement and repeated motor experiences in a supportive environment. Play activities involving direct bodily movement constitute an important context for developing these skills. The WHO emphasises that physical activity during childhood plays an important role in supporting motor development and that reducing sedentary behaviour should occur alongside increasing opportunities for physical activity and active play (WHO, 2019).

In the context of early childhood education in Indonesia, physical-motor development is one of the developmental domains that requires systematic stimulation. For children aged 5–6 years, learning activities should ideally provide opportunities to develop movement skills through play that is appropriate to their developmental characteristics. Therefore, the issue of electronic-game use is not merely related to the presence of digital devices, but also to how the intensity of their use interacts with children's opportunities to engage in physical activity. Accordingly, attention to the duration and patterns of electronic play is relevant when examining children's everyday motor experiences.

Several empirical studies have demonstrated an association between screen-based media use and children's motor development, although the strength of this association may vary according to age, device type, duration of use, activity characteristics, and children's environments. Webster et al. (2019), for example, examined the relationships among fundamental motor skills, screen time, physical activity, and sedentary behaviour in preschool children. Their study used objective measures of motor skills and physical activity, illustrating that the relationship between screen exposure and motor development needs to be understood within the broader pattern of children's daily activities.

More specific findings were reported by Yuan et al. (2024) in a study of 817 children aged 3–6 years in China. Using the Test of Gross Motor Development, Third Edition (TGMD-3), together with measures of screen time, the researchers found a negative correlation between screen-time duration and gross motor movement. The magnitude of the correlation ranged from low to moderate, while regression analysis indicated that screen time was one predictor of gross motor movement. These findings suggest that greater allocation of time to screen-based activities may reduce opportunities for children to obtain the movement experiences needed to develop motor skills. However, because the study employed a cross-sectional design, the observed relationship should be interpreted as an empirical association rather than as evidence of causality.

Chaibal and Chaikyul (2022) likewise demonstrated the importance of considering the duration of digital-device use in early childhood. In their study of 85 children with a mean age of approximately four years, smartphone and tablet use averaged about 83 minutes per day. The study found a significant association between device-use duration and gross motor development. Children classified as having gross motor delays had a higher average duration of device use than children whose motor development was age-appropriate. These findings reinforce the importance of examining digital-device intensity in relation to motor development while also considering family characteristics and caregiving environments.

Longitudinal evidence further indicates that the relationship between screen media use and motor development is complex. Suggate and Martzog (2021), in a two-year longitudinal study of 117 preschool children, found that screen-media use was associated with several aspects of sensorimotor development, particularly fine motor and haptic skills. Their findings indicate that children's experiences with screen media may be associated differently with different components of sensorimotor development. Thus, research on electronic games should not simply ask whether children use digital devices, but should consider intensity, patterns of use, types of activities, and opportunities for physical activity outside screen use.

A more recent systematic review further highlights the importance of this issue. Bakht et al. (2025) reviewed 24 studies examining the relationship between screen time and motor development among children aged 0–7 years. Most of the reviewed studies reported a negative association between screen use and motor development, although some found no significant association and others produced mixed findings. Such variation indicates that the relationship between screen time and motor development is neither simple nor uniform, but may be influenced by media type, exposure duration, usage context, and children's environments. Consequently, contextual research within specific educational settings remains necessary to obtain a more precise understanding of the phenomenon.

The use of electronic games was also observed during preliminary observations at RA Nurul Huda Gegurun. Based on initial observations and communication with classroom teachers, some children aged 5–6 years tended to choose electronic games on their parents' smartphones at home rather than active outdoor play. Teachers also reported that several children appeared less active or became tired quickly when participating in physical activities such as exercise, skipping, and movement-based games. These initial observations cannot be used to conclude that electronic games cause lower gross motor development. However, they

indicate an empirical phenomenon that warrants systematic investigation by considering children's play experiences, electronic-game intensity, and gross motor development.

Although research on screen time and children's motor development has expanded, a research gap remains in the context of early childhood education institutions based on RA (Raudhatul Athfal), particularly in local settings in Bima City. Previous studies have predominantly employed quantitative designs, surveys, or standardised motor-development instruments, whereas studies specifically describing patterns of electronic-game use and gross motor development in everyday life within RA settings remain relatively limited. This gap is important because children's experiences are shaped not only by duration of device use but also by parental supervision, types of games, available physical activities, and the social environment in which children grow.

Based on this gap, the present study was designed to obtain a contextual description of electronic-game intensity and gross motor development among children aged 5–6 years at RA Nurul Huda Gegurun. Information from observations and interviews with teachers and parents was used to identify patterns of electronic-game use and relate them to children's gross motor development based on developmental indicators. This approach is expected to provide a more comprehensive understanding of the phenomenon at the educational-unit level without overgeneralising the findings.

Accordingly, this study, entitled "Electronic Game Intensity and Gross Motor Development in Children Aged 5–6 Years: A Case Study at RA Nurul Huda Gegurun," aims to describe the intensity of electronic-game use, describe the gross motor development of children aged 5–6 years, and analyse the relationship between the two within the context of children's everyday lives. The findings are expected to provide empirical information for teachers and parents in creating a balance between the use of digital technology and the provision of active-play experiences that support children's gross motor development.

## **METHODS**

This study employed a qualitative approach with a single-case study design to obtain an in-depth description of electronic-game intensity and gross motor development among children aged 5–6 years within their real-life context. A case-study design was selected because it enables a phenomenon to be examined holistically while considering the school and family environments as integral components of the research context (Creswell & Poth, 2018; Yin, 2018).

The study was conducted at RA Nurul Huda Gegurun, Bima City, West Nusa Tenggara, over eight weeks during the second semester of the academic year. The participants comprised 16 Group B children aged 5–6 years, while supporting informants included two classroom teachers and ten parents/guardians selected purposively. Informants were selected based on their direct involvement in children's learning activities and home-based supervision.

Data were collected through observation, semi-structured interviews, daily records, and documentation. Observation was used to identify children's gross motor abilities, including running, jumping, kicking, throwing and catching a ball, balance, and movement coordination. Interviews with teachers and parents explored electronic-play habits, including device type,

game type, frequency, duration, and context of use. Parents also recorded children's electronic-game activities for 14 days. Documentation was used to complement the observation and interview data. The instruments were reviewed by an early childhood education expert to ensure that the indicators were appropriate to the research objectives.

Data analysis followed the model proposed by Miles et al. (2014), comprising data condensation, data display, and conclusion drawing and verification. The data were first coded and grouped according to patterns of electronic-game use and gross motor indicators. The data were then presented in matrices and narratives to identify patterns across findings. Conclusions were repeatedly verified by comparing data from multiple sources.

Data credibility was ensured through source triangulation, technique triangulation, and member checking. Source triangulation involved comparing information from children, teachers, and parents, whereas technique triangulation involved comparing observation, interview, daily-record, and documentation data. Member checking was conducted by confirming preliminary findings with teachers and relevant informants to ensure that the researchers' interpretations corresponded with field conditions (Yin, 2018).

The study adhered to ethical principles for research involving children, including obtaining consent from parents/guardians, protecting participants' identities, maintaining data confidentiality, and using documentation only in accordance with the permissions granted. The data were used solely for research and academic reporting purposes.

## RESULTS AND DISCUSSION

### 1. Intensity of Electronic-Game Use among Children Aged 5–6 Years

Observations, interviews with teachers and parents, and daily activity records collected over two weeks revealed variation in electronic-game intensity among the 16 Group B children at RA Nurul Huda Gegurun. Five children (31%) were classified as having high-intensity use, with more than 60 minutes of use per day; six children (38%) were classified as having moderate intensity, with 30–60 minutes per day; four children (25%) were classified as having low intensity, with less than 30 minutes per day; and one child (6%) did not have a routine electronic-game habit and used electronic games only incidentally.

These findings indicate that most children in the study interacted with digital devices, particularly smartphones owned by their parents. The most frequent activities were watching short videos and playing simulation games. Use generally occurred in the afternoon or evening after children had completed school activities. This pattern indicates that digital devices had become part of children's recreational activities within the family environment.

Although the categorisation in this study was based on daily duration, interpretation of intensity should also consider content type, usage context, parental supervision, timing of use, and the activities displaced by screen use. Recent literature indicates that the relationship between screen use and child development is not determined solely by the amount of time spent on devices, but also by characteristics of use and the environment in which digital devices are used.

A recent systematic review of 24 studies involving children aged 0–7 years found that most studies reported a negative association between high screen time and motor development,

although some found no significant association or produced mixed findings. Therefore, the high duration of electronic-game use observed among some children in the present study should be understood as one characteristic of sedentary behaviour that may reduce opportunities for physical activity. The World Health Organization emphasises the importance of reducing screen-based sedentary time and providing sufficient opportunities for active play during early childhood because physical activity and active play contribute to motor development.

## **2. Gross Motor Development Outcomes**

The gross motor development checklist showed that no children were classified as Not Yet Developing (BB). Three children (19%) were classified as Beginning to Develop (MB), six children (38%) as Developing as Expected (BSH), and seven children (43%) as Developing Very Well (BSB).

Overall, these findings indicate that most children had reached the BSH and BSB categories of gross motor development. However, achievement was not uniform across all indicators. Relatively lower performance was observed in maintaining balance while walking along a straight line and in coordination when catching a ball. In contrast, running and jumping abilities were relatively stronger among most children.

Differences across indicators can be understood because gross motor skills constitute a multidimensional construct involving locomotor ability, object control, balance, coordination, and body control. Activities such as running and jumping may occur spontaneously during everyday play, whereas catching a ball and maintaining balance require more structured and repeated practice.

These findings are consistent with empirical evidence indicating that children's motor skills are closely associated with engagement in physical activity. Webster et al. (2019), for example, found that fundamental motor skills in preschool children were associated with more intensive physical activity, while screen time was negatively associated with several aspects of motor skills.

More recent cross-national evidence also supports the importance of managing sedentary behaviour. An analysis of 1,394 children aged 3–4 years in the SUNRISE study found that each additional hour of screen time per day was associated with lower gross motor skill scores after accounting for several child and family characteristics. Children who met recommended screen-time guidelines also showed better developmental indicators.

## **3. Relationship between Electronic-Game Intensity and Gross Motor Development**

Descriptive comparison of electronic-game intensity and gross motor outcomes revealed a consistent pattern. Children who played electronic games for more than 60 minutes per day tended to demonstrate less optimal motor performance, particularly in balance and body coordination. In contrast, children with low-intensity use or no routine electronic-game use tended to demonstrate relatively better performance across several indicators, including running, jumping, and kicking a ball.

Table 1. Relationship between Electronic-Game Intensity and Gross Motor Outcomes

| Electronic-game intensity | Duration per day | Gross motor development pattern                                     |
|---------------------------|------------------|---------------------------------------------------------------------|
| High                      | >60 minutes      | Tended to be less optimal, particularly in balance and coordination |
| Moderate                  | 30–60 minutes    | Relatively adequate                                                 |
| Low                       | <30 minutes      | Relatively optimal across most indicators                           |
| No routine/incidental     | Not routine      | Relatively very optimal across the observed indicators              |

This pattern indicates a tendency toward a negative relationship between electronic-game intensity and gross motor development. As electronic-game intensity increased, a tendency toward lower achievement became more apparent in several gross motor aspects. Conversely, children with lower levels of electronic-device use tended to demonstrate better motor outcomes.

Yuan et al. (2024), in a study conducted in China, provide relatively strong support for this pattern. Among children aged 3–6 years, screen time showed a low-to-moderate negative correlation with gross motor movement, with correlation coefficients ranging from  $r = -0.133$  to  $-0.354$ . Regression analysis also indicated that screen time was a predictor of gross motor movement.

A study in Indonesia by Maria and Puteh (2025) is also relevant to the present context. Among 120 children aged 4–6 years in eight kindergartens in Yogyakarta, children with high screen time obtained lower scores in locomotor skills and object control. The study also found that an additional 30 minutes of active play was associated with higher fundamental motor-skill scores.

Theoretically, this pattern can be explained through the displacement hypothesis, whereby time spent in sedentary screen-based activities replaces time that could otherwise be used for physical activity. Children who spend longer periods with electronic devices have fewer opportunities to run, jump, throw, catch, maintain balance, and engage in other physical play. Gross motor skills, however, develop through repeated, varied movement experiences that are appropriate to children's developmental stages.

A systematic review by Kwofie et al. indicated that most studies examining the relationship between sedentary behaviour and motor competence among children aged 3–4 years reported a generally negative direction of association, although the quality and designs of the available studies varied. This finding is important because it suggests that the relationship between screen time and motor competence is complex rather than a single effect determined solely by the number of minutes spent using a device.

In the context of RA Nurul Huda Gegurun, this potential mechanism appears particularly relevant to balance and coordination. These skills require movement practice involving postural control, hand–eye coordination, body orientation, and responses to objects

and the surrounding environment. Electronic play conducted in a seated position does not provide movement stimulation equivalent to activities such as walking along a line, playing with a ball, jumping, running, or traditional games involving whole-body movement.

Nevertheless, the findings of this study cannot be interpreted as evidence that electronic games directly cause gross motor delays. The relatively small sample (16 children), case-study design, and use of observations, interviews, and daily records limit the ability to draw causal conclusions. Other factors, such as physical activity at home, parental involvement, sleep patterns, nutritional status, play environment, opportunities to participate in sports, and characteristics of electronic games, may also influence children's motor development.

These limitations are consistent with a recent systematic review indicating that evidence concerning the relationship between screen time and motor development remains heterogeneous. Of the 24 studies reviewed, most reported negative associations, but some found no significant association and others produced mixed results. Therefore, screen-time duration is one factor that warrants attention but is not the sole determinant of children's motor development.

#### **4. Implications for Early Childhood Learning**

The findings suggest that the management of electronic-game use should be undertaken proportionally rather than simply through prohibiting digital devices. Teachers and parents need to establish a balance between digital activities and physical activity. In RA settings, gross motor stimulation can be provided through activities involving running, jumping, throwing, catching, balance exercises, gymnastics, ball games, traditional games, and outdoor activities.

This approach is consistent with WHO guidance emphasising the importance of physical activity and reducing sedentary behaviour in early childhood. WHO also identifies active play as an important component of children's physical activity and recommends that early childhood education and care environments provide sufficient opportunities for movement and active play.

Within the family context, parents can establish consistent rules for device use, accompany children when they use devices, and provide attractive alternative activities. Activities such as playing ball, cycling, walking, dancing, traditional games, or outdoor play can provide greater opportunities for developing gross motor skills.

Thus, the principal contribution of this study is not to argue that electronic games should be eliminated from children's lives, but to highlight the importance of maintaining a balance between screen-based activities and real-world movement experiences. Controlled technology use can remain part of children's lives, but it should not replace opportunities for children to gain motor experiences through active play.

#### **5. Synthesis of Findings**

Overall, the study identified three main findings. First, electronic-game use among Group B children at RA Nurul Huda Gegurun varied in intensity, with 31% of children spending more than 60 minutes per day on electronic games. Second, most children had reached the BSH and BSB categories of gross motor development, although balance and ball-catching coordination were relatively weaker aspects. Third, children with higher electronic-game

intensity tended to demonstrate relatively lower gross motor outcomes than children with lower levels of use.

These local findings are broadly consistent with recent international and national studies indicating a tendency toward a negative association between high screen time and motor abilities in early childhood. Nevertheless, this relationship should be interpreted cautiously because motor development results from the interaction of multiple factors, including physical activity, play environments, parental stimulation, child characteristics, and the context in which technology is used.

Accordingly, the findings of this study are best interpreted as showing that high electronic-game intensity is associated with relatively less optimal gross motor development among children aged 5–6 years at RA Nurul Huda Gegurun, particularly in balance and coordination. This conclusion is consistent with the case-study nature of the research and is not intended to constitute a causal or generalisable claim.

## CONCLUSION

This study demonstrates an association between electronic-game intensity and gross motor development among children aged 5–6 years at RA Nurul Huda Gegurun. Children with higher electronic-game intensity tended to demonstrate less optimal gross motor performance, particularly in balance and body coordination, than children with lower levels of electronic-game use who were more frequently engaged in physical activities. These findings indicate that sedentary screen-based play patterns may represent one factor that should be considered when supporting gross motor stimulation in early childhood.

The practical implication is that children's developmental stimulation should emphasise a balance between electronic-game use and active play involving bodily movement. Teachers and parents can strengthen the provision of varied, structured, and developmentally appropriate physical activities while supervising children's use of electronic games proportionally. Future research is recommended to employ longitudinal or experimental designs with larger samples to examine the relationship and potential effects of electronic-game intensity on gross motor development more robustly.

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