

Gadget Use and Learning Motivation in Early Childhood: Evidence from a Rural District in Malaysia

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ABSTRACT This study was conducted to examine the relationship between gadget usage and learning motivation among preschool children in the Kota Marudu district, Sabah. The rapid development of digital technology has made gadgets an integral part of children’s daily lives; however, excessive gadget use poses a risk of negatively affecting children’s motivation toward learning. This study employed a quantitative approach using a survey research design. Data collection was carried out through an online questionnaire distributed to 100 parents with children aged 4–6 years. Data analysis in this study involved descriptive analysis to identify the level of gadget usage and the level of learning motivation among preschool children, while Pearson correlation analysis was used to examine the relationship between gadget usage and learning motivation. The findings revealed that the level of gadget usage among preschool children was at a moderate level ($M = 2.80$, $SD = 0.442$), whereas the level of learning motivation was at a high level ($M = 3.86$, $SD = 0.501$). Furthermore, there was no significant relationship between gadget usage and learning motivation ($r = -0.145$, $p = 0.151$). The findings indicate that although gadget usage was not significantly associated with learning motivation, its use should still be monitored due to concerns reported in previous study. Parental and educators’ supervision of gadget usage should be strengthened to ensure its educational benefits.

Keywords: gadget use, learning motivation, early childhood.

Introduction

The rapid development of digital technology has transformed how people interact and live their daily lives. Gadgets have become widely integrated into everyday routines and are increasingly used not only by adults but also by preschool children from an early age (Ali & Mokhtar, 2026; Ponti, 2023). Their use covers communication, entertainment, and learning. In early childhood education, gadgets can function as interactive tools that enhance engagement and support children’s interest and motivation to learn. Research indicates that digital devices can support early learning and cognitive development

when used appropriately (Ali & Mokhtar, 2026; Asmayawati et al., 2024). However, growing concerns remain, as excessive or uncontrolled use has been associated with negative effects on children’s cognitive, emotional, and behavioural development (Ali & Mokhtar, 2026; Asmayawati et al., 2024; Yelizarova et al., 2025). Therefore, this study examines gadget use and its relationship with learning motivation among preschool children to better understand the role of technology in early education. The advancement of digital technology in today’s world has made gadgets an important part of daily life, including among preschool children. Gadgets are not only used for entertainment

but are also increasingly utilised as interactive learning tools that can make learning more engaging. However, the rise in gadget use has also raised concerns, as excessive exposure may negatively affect children's language, cognitive, emotional, and learning motivation development (Ali & Mokhtar, 2026; Aldhilar, 2026).

This situation highlights that the use of gadgets has two contrasting sides. On one hand, digital devices can support learning when used in a controlled and guided manner. On the other hand, it has the potential to hinder children's development if used without proper monitoring and guidance. Excessive or unsupervised use may hinder children's development, particularly in cognitive, social, and behavioural domains (OECD, 2025; Murillo Herrera & Roca Piloso, 2025).

The use of gadgets among preschool children is increasing due to their wide range of functions, but this trend also raises concerns. Studies have shown that excessive use may contribute to sleep disturbances, visual strain, delays in physical development, and poorer learning-related outcomes (Ali & Mokhtar, 2026; Yelizarova et al., 2025). However, existing research has largely focused on the general effects of digital technology use on children's development and well-being, with less attention given to its relationship with learning motivation in early childhood contexts. In addition, studies in rural settings remain limited, particularly in areas where access to technology and educational resources differs significantly from urban environments (Harverson et al., 2025; Fauzee et al., 2026; Yelizarova et al., 2025). Therefore, this study is conducted to provide a clearer understanding of this issue and to help parents and educators take appropriate preventive measures and interventions.

This study is grounded in Self-Determination Theory (SDT), developed by Deci and Ryan (1985), which explains motivation in terms of intrinsic and extrinsic forms. Intrinsic motivation refers to engaging in activities out of interest and enjoyment, while extrinsic motivation is driven by external rewards or pressures (Ryan & Deci, 2020). In early childhood, gadgets can

support intrinsic motivation through interactive applications that promote exploration, engagement, and active participation. At the same time, many digital platforms incorporate external reward systems such as points, badges, and leaderboards, which may reinforce extrinsic motivation (Luo, 2024; Sari et al., 2026). However, excessive or unregulated use may undermine intrinsic motivation over time, as children become more focused on entertainment or reward-based engagement (Ali & Mokhtar, 2026; Ryan & Deci, 2020; Papadakis, 2021; Kucirkova, 2023). Therefore, SDT provides a useful framework for understanding how gadget use can both support and hinder learning motivation among preschool children.

Previous studies suggest that children's digital experiences may differ across geographical and socioeconomic contexts. In rural communities, factors such as internet connectivity, access to appropriate digital devices, parental digital competencies, and the availability of educational resources may influence how technology is used for learning. Evidence from communities in Sabah further indicates that inequalities in digital access, skills, motivation, and patterns of technology use remain relevant within the local context (Fang et al., 2022). Children's digital experiences are also shaped not only by the duration of device use, but by the purpose, quality, and context of that use (Organisation for Economic Co-operation and Development [OECD], 2025). Therefore, findings from urban or technologically well-connected populations may not fully reflect the experiences of preschool children in rural communities such as Kota Marudu.

This study offers several contributions to different groups. For parents, the findings can help them better understand their children's level of gadget use and its effects on learning motivation, allowing for more effective monitoring and guidance. For educators, the results may serve as a reference in designing teaching strategies that integrate gadgets in a thoughtful and balanced way, making learning more engaging and meaningful. From an academic perspective, this study contributes to the existing literature on

the relationship between gadget use and learning motivation among preschool children, particularly in under-researched rural areas of Sabah such as Kota Marudu. Overall, the study is expected to support relevant stakeholders in ensuring that gadgets are used in ways that support the quality of early childhood learning. This study is conducted with the following objectives:

1. To identify the level of gadget use among preschool children in the Kota Marudu area.
2. To determine the level of learning motivation among preschool children in the Kota Marudu area.
3. To examine the relationship between gadget use and learning motivation among preschool children in the Kota Marudu area.

Literature Review

The increased number of digital technology usage has transformed children's learning environments, particularly through the widespread use of smartphones and tablets in early childhood (Ali & Mokhtar, 2026). Recent studies indicate that young children are exposed to gadgets at increasingly earlier ages, making the role of parents and educators pivotal in guiding appropriate technology use (Ali & Mokhtar, 2026; Burhan Nudin et al., 2024; Chaudron et al., 2020). Although digital devices can support early learning by providing interactive and engaging content (Gkantia & Dinas, 2024; Suyansah et al., 2026), concerns have emerged regarding the potential negative effects of excessive or unsupervised gadget usage on children's cognitive, behavioral, and motivational development (Kucirkova, 2023; Taisin et al., 2025).

Learning motivation in early childhood is widely recognized as a key predictor of academic engagement and long-term learning success. According to Ryan and Deci (2020), motivation can be broadly categorized into intrinsic motivation, which involves engaging in activities for enjoyment and personal satisfaction, and extrinsic motivation, which is driven by external rewards or expectations

(Ali & Mokhtar, 2026). In digital learning environments, both forms of motivation can be influenced by the design and use of technology. For example, educational applications that encourage exploration, creativity, and problem-solving may enhance intrinsic motivation, while reward-based features such as points, badges, and leaderboards can strengthen extrinsic motivation (Luo, 2024). These features may increase children's engagement in the short term but may also shift attention toward rewards rather than meaningful learning experiences if used excessively.

Empirical studies have shown mixed findings regarding the relationship between gadget usage and learning motivation among young children. Some researchers report that moderate and purposeful use of digital tools can improve engagement and participation in learning activities, particularly when integrated into structured educational settings (Li et al., 2024). In contrast, other studies suggest that prolonged screen exposure without appropriate supervision may reduce attention span, limit social interaction, and negatively influence children's interest in learning (World Health Organization [WHO], 2020). These inconsistent findings highlight the need to examine contextual factors such as parental involvement, teaching practices, and the learning environment when investigating the effects of technology on children's motivation.

Despite the growing body of research on digital technology and child development, limited attention has been given to the specific relationship between gadget usage and learning motivation in early childhood contexts, particularly within rural or semi-rural communities. Access to digital devices, internet connectivity, and educational resources may vary significantly between urban and rural settings, potentially influencing how children use technology and how it affects their learning experiences (United Nations Children's Fund [UNICEF], 2021). Consequently, localized studies are necessary to provide contextually relevant evidence that reflects the realities of specific communities.

Kota Marudu was selected as the research setting because it provides a relevant context for examining gadget use and learning motivation

among preschool children in Sabah. The district consists of geographically dispersed communities, where access to digital infrastructure, educational resources, and technology-supported learning opportunities may vary across locations. Evidence from Sabah indicates that differences in digital access, skills, motivation, and patterns of technology use remain relevant among local communities (Fang et al., 2022). These contextual characteristics make Kota Marudu an appropriate setting for investigating how preschool children use gadgets and whether such use is associated with their learning motivation. Furthermore, empirical research focusing specifically on gadget use and learning motivation among preschool children in Kota Marudu remains limited.

Guided by Self-Determination Theory (SDT), this study examines how gadget usage may support or hinder children's motivation to learn. SDT provides a useful framework for understanding the balance between intrinsic and extrinsic motivation in technology-mediated learning environments. By focusing on preschool children in the Kota Marudu district, this study aims to address existing gaps in the literature and contribute empirical evidence on the relationship between gadget use and learning motivation within a rural Malaysian context.

Methodology

This study adopted a quantitative research approach using a survey design. Data were collected through structured questionnaires distributed to 100 parents of preschool children aged between 4 and 6 years in the Kota Marudu district. The questionnaire consisted of several structured items organized into three main sections: demographic information, survey questions measuring the level of gadget usage, and survey questions measuring the level of learning motivation among preschool children. The gadget-use section included items related to the types of devices used, the usual time of use, and the estimated daily duration of gadget use. For example, parents were asked to indicate the type of gadget used by their children, the usual time of gadget use, and the estimated duration of use per day. The learning motivation section included items assessing children's interest in learning activities, persistence in completing tasks, participation in classroom activities, and responsiveness to teacher instructions. Sample items included "I believe that preschool children under my care can complete tasks given by

the teacher," "I believe that preschool children under my care consistently study to improve their performance," and "I believe that preschool children under my care are motivated to learn when using engaging teaching materials at home." These survey items were developed based on constructs commonly used in early childhood education research to ensure content relevance and clarity. Responses were measured using a Likert scale.

Descriptive statistics were used to determine the mean and standard deviation of gadget usage and learning motivation. Pearson correlation analysis was conducted to examine the relationship between the two variables. Statistical analysis was performed using standard social science research procedures to ensure reliability and validity.

Findings

Level of Gadget Use among Preschool Children

Based on a descriptive analysis of 100 respondents, gadget use was examined in terms of the types of devices used, the usual time of use, and the daily duration of use. Overall, the level of gadget use among preschool children was found to be at a moderate level, with a mean score of 2.80 ($M = 2.80$, $SD = 0.442$). Table 1 presents the classification of mean scores used to determine the level of gadget use.

Table 1 Level of Gadget Use among Preschool Children

Mean Score Range	Level
1.00 - 2.33	Low
2.34 - 3.66	Moderate
3.67 - 5.00	High

Source: (Jumain et al., 2022)

Types of Gadgets Used

Based on Table 2, the findings show that the overall level of gadget use among preschool children is at a moderate level, with a mean score of 3.08 ($M = 3.08$, $SD = 0.614$). The most frequently used gadget is television, with a moderate mean score ($M = 3.65$, $SD = 0.957$). In contrast, computers/laptops recorded the lowest mean score, although still within the moderate level ($M = 2.65$, $SD = 1.242$).

Table 2 Level of Gadget Use among Preschool Children by Type of Device

Item	N	Mean	SD	Level
1.1 Television	100	3.65	0.957	Moderate
1.2 Smartphone	100	3.05	1.209	Moderate
1.3 Tablet/iPad	100	2.97	1.234	Moderate
1.4 Computer/Laptop	100	2.65	1.242	Moderate
Overall	100	3.08	0.614	Moderate

Time of Gadget Use

Table 3 shows that the level of gadget use among preschool children based on time of use is at a moderate level, with a mean score of 2.54 ($M = 2.54$, $SD = 0.649$). Afternoon usage recorded the highest mean score at a moderate level ($M = 3.02$, $SD = 1.255$), while morning usage recorded the lowest mean score at a low level ($M = 1.75$, $SD = 0.903$).

Table 3 Level of Gadget Use among Preschool Children by Time of Use

Item	N	Mean	SD	Level
2.1 Morning	100	1.75	0.903	Low
2.2 Midday	100	2.81	1.308	Moderate
2.3 Afternoon	100	3.02	1.255	Moderate
2.4 Night	100	2.59	1.172	Moderate
Overall	100	2.54	0.649	Moderate

Daily Duration of Gadget Use

Table 4 shows that the overall daily duration of gadget use among preschool children is at a moderate level, with a mean score of 2.68 ($M = 2.68$, $SD = 0.519$). Usage of less

than 1 hour per day recorded the highest mean score at a moderate level ($M = 3.16$, $SD = 1.308$), whereas usage of more than 2 hours per day recorded the lowest mean score at a low level ($M = 2.18$, $SD = 1.266$).

Table 4 Level of Gadget Use among Preschool Children by Daily Duration

Item	N	Mean	SD	Level
3.1 Less than 1 hour	100	3.16	1.308	Moderate
3.2 1 hour	100	2.98	1.18	Moderate
3.3 2 hours	100	2.4	1.154	Moderate
3.4 More than 2 hours	100	2.18	1.266	Low
Overall	100	2.68	0.519	Moderate

Learning Motivation among Preschool Children

Based on a descriptive analysis of 100 respondents, the overall level of learning motivation among preschool children was found to be at a high level, with a mean score of 3.86 ($M = 3.86$, $SD = 0.501$) as shown in Table 5.

Table 5 Level of Learning Motivation among Preschool Children

Mean Score Range	Level
1.00 - 2.33	Low
2.34 - 3.66	Moderate
3.67 - 5.00	High

The item with the highest mean score indicates that children are more motivated to learn when engaging teaching materials are used ($M = 4.28$, $SD = 0.636$), which falls under the high level. In contrast, the lowest mean score was recorded for learning with the aim of competing with peers ($M = 2.89$, $SD = 1.162$), which falls under the moderate level.

Table 6 Level of Learning Motivation among Preschool Children Based on 10 Motivation Items

Item	N	Mean	SD	Level
1. I believe that preschool children under my care make early preparations at home before attending lessons	100	3.94	0.776	High
2. I believe that preschool children under my care use their free time at home to revise lessons	100	3.74	0.883	High
3. I believe that preschool children under my care revise lessons that have been learned at school	100	3.86	0.864	High
4. I believe that preschool children under my care complete tasks given by the teacher	100	4.27	0.664	High
5. I believe that preschool children under my care study to obtain high marks	100	3.57	0.945	Moderate
6. I believe that preschool children under my care study to compete with peers in class	100	2.89	1.162	Moderate
7. I believe that preschool children under my care consistently study to improve their performance	100	3.96	0.839	High
8. I believe that preschool children under my care complete tasks on time	100	3.99	0.745	High
9. I believe that preschool children under my care choose a comfortable place to study for better focus	100	4.15	0.641	High
10. I believe that preschool children under my care are motivated to learn when using engaging teaching materials at home	100	4.28	0.636	High
Overall	100	3.86	0.501	High

Relationship between Gadget Use and Learning Motivation among Preschool Children

Correlation analysis showed a Pearson correlation coefficient of $r = -0.145$ with a significance value of $p = 0.151$, which exceeds the 0.05 level. This indicates that there is no significant relationship between the level of gadget use and learning motivation among preschool children.

The relationship observed is negative and very weak, suggesting that an increase in gadget use does not directly influence learning motivation. Therefore, the alternative hypothesis of this study, which proposes that there is a significant relationship between gadget use and learning motivation among preschool children in the Kota Marudu area, is not supported.

Table 7 Relationship between Gadget Use and Learning Motivation among Preschool Children

Correlation			
Variable		Gadget Use	Learning Motivation
Gadget Use	Pearson Correlation	1	-0.145
	Sig. (2-tailed)		0.151
	N	100	100
Learning Motivation	Pearson Correlation	-0.145	1
	Sig. (2-tailed)	0.151	
	N	100	100

Discussions

Level of Gadget Usage among Preschool Children

The findings of this study revealed that the level of gadget usage among preschool children was at a moderate level ($M = 2.80$, $SD = 0.442$), suggesting that although gadgets have become integrated into children's daily lives, their use remains relatively controlled and not yet alarming. However, this finding should be interpreted critically rather than viewed as inherently positive. A moderate level of usage does not necessarily indicate healthy digital engagement, as the developmental impact of gadgets depends largely on factors such as duration of use, type of content accessed, and the presence of adult mediation. Although with the findings of Samsuddin and Yusof (2020) have identified smartphones as commonly used devices among preschool children, the present study found that television recorded the highest mean score, remain the most frequently used devices among preschool children, largely because of their accessibility and multifunctionality. Nevertheless, the notion that gadget usage is "under control" may mask underlying concerns, particularly when parents perceive educational applications and entertainment content as equally beneficial. Existing evidence suggests that while educational gadgets can support language development, problem-solving skills, and digital literacy, excessive or unsupervised exposure may impair attention span, sleep quality, and

social interaction, thereby affecting children's holistic development (Madigan et al., 2020; World Health Organization [WHO], 2019).

Furthermore, the moderate level of gadget use identified in this study may also be influenced by contextual and geographical factors, particularly the rural setting of Kota Marudu, Sabah. Limited internet accessibility and digital infrastructure in rural communities may restrict the intensity and frequency of children's gadget use compared to urban populations (Hadi Omar, 2021). However, such structural limitations should not be assumed to fully protect children from the potential negative consequences of digital exposure. The increasing affordability of smartphones and mobile internet services has narrowed aspects of the rural–urban digital divide, enabling greater access to online entertainment and educational platforms. Critically, disparities in parental digital literacy may create unequal patterns of gadget supervision, whereby some children benefit from guided educational experiences while others are exposed primarily to passive screen consumption. This implies that socioeconomic and contextual factors are important mediators in understanding the developmental outcomes of gadget use among preschool children (Livingstone & Blum-Ross, 2020).

From the perspective of Self-Determination Theory, controlled gadget use may foster intrinsic motivation by enhancing children's sense of autonomy, competence, and engagement through interactive educational

applications (Deci & Ryan, 1985). Yet, this theoretical benefit depends heavily on purposeful and supervised usage. Without proper monitoring, gadget dependency may encourage passive consumption and instant gratification, ultimately weakening children's natural curiosity and reducing participation in social, play-based, and experiential learning activities that are fundamental during early childhood (Hair & Ernawati, 2022). Therefore, the present findings suggest that the issue is not merely the quantity of gadget use, but the quality of engagement and the extent of parental involvement in shaping meaningful digital experiences.

Level of Learning Motivation among Preschool Children

The findings of this study indicate that preschool children demonstrated a high level of learning motivation, suggesting that they possess a strong willingness and readiness to participate in educational activities. At face value, this finding reflects a positive developmental outcome, particularly in early childhood education, where motivation is a critical determinant of learning engagement and academic readiness. However, a more critical interpretation suggests that high motivation should not be assumed to occur naturally or remain stable over time. Preschool children's motivation is highly dynamic and context-dependent, shaped by the quality of learning experiences, emotional support, and environmental stimulation. According to Self-Determination Theory, children are more likely to demonstrate intrinsic motivation when they experience autonomy, competence, and meaningful social connection during learning (Deci & Ryan, 1985). Therefore, the high motivation observed in this study may reflect an environment where children perceive learning activities as enjoyable, relevant, and emotionally rewarding. Nevertheless, without sustained stimulation and supportive interactions, such motivation may gradually decline, especially if learning becomes overly structured or repetitive.

The present finding also highlights the significant role of parental and teacher support in fostering preschool children's learning motivation. In the context of Kota Marudu, family

involvement may serve as an important protective factor, particularly where formal educational resources are relatively limited compared to urban areas. Existing evidence suggests that children's motivation is strengthened when parents actively engage in home-based learning, provide encouragement, and create emotionally supportive environments that nurture confidence and curiosity (Fan & Chen, 2020). Similarly, interactive and creative teaching materials have been found to stimulate children's exploratory behaviours and sustain attention, thereby increasing enthusiasm for learning. However, this finding should also be critically evaluated, as excessive parental control or performance-oriented expectations may undermine intrinsic motivation by shifting children's focus from enjoyment to external rewards or approval. In this regard, motivation should not be understood merely as compliance with learning activities but as a genuine interest and willingness to learn.

Furthermore, the high level of learning motivation may indicate that preschool children are particularly responsive to developmentally appropriate and stimulating educational experiences. Research has shown that young children are naturally curious and tend to engage more actively when learning environments incorporate play, creativity, and interactive materials that support exploration (Zosh et al., 2022). Nevertheless, maintaining high motivation requires consistency in educational support from both home and school environments. In rural communities such as Kota Marudu, disparities in access to educational resources may challenge efforts to sustain motivation over time. Therefore, while the findings are encouraging, stakeholders should prioritise strengthening family-school partnerships and ensuring access to engaging learning materials to preserve children's intrinsic interest in learning and support long-term educational development.

Relationship between Gadget Usage and Learning Motivation among Preschool Children

The findings of this study revealed no significant relationship between gadget usage and preschool children's learning motivation, indicating that gadget exposure alone may not be a determining

factor influencing children's willingness to learn. These findings challenge common assumptions that increased gadget use automatically leads to reduced motivation among young children. Critically, the absence of a significant relationship suggests that learning motivation in early childhood is a multidimensional construct shaped by broader psychosocial and educational influences rather than a single technological factor. Factors such as parental support, quality of teaching, emotional security, and stimulating learning environments may exert greater influence on children's motivation than the mere frequency of gadget usage (Abu Bakar et al., 2021). Therefore, interpreting gadget use as inherently beneficial or harmful may oversimplify the complex interactions that shape children's educational engagement.

From the perspective of Self-Determination Theory, the finding may be explained by the nature of intrinsic motivation, which is influenced by autonomy, competence, and relatedness rather than external tools alone (Deci & Ryan, 1985). Preschool children may maintain high learning motivation despite moderate or high gadget use if digital content supports exploration, curiosity, and meaningful engagement. For example, interactive educational applications may encourage children to feel competent and autonomous during learning experiences. However, this positive effect is highly dependent on the relevance and quality of content. When gadgets are primarily used for passive entertainment, children may gradually become accustomed to instant gratification and reduced attention spans, potentially weakening intrinsic motivation over time. Importantly, such developmental consequences may not be immediately observable, particularly in short-term studies involving preschool-aged children.

The lack of a significant relationship also aligns with previous empirical evidence suggesting that gadget usage does not necessarily undermine children's motivation when supported by effective parental mediation. Earlier studies found that parental involvement and educator guidance are more influential than gadget exposure itself in shaping children's attitudes toward learning (Hair & Ernawati, 2022). This suggests that the issue may lie less in whether

children use gadgets and more in how gadgets are integrated into daily routines. Parents who regulate screen time, co-engage with children, and encourage educational content are more likely to minimise negative effects while maximising developmental benefits. Consequently, gadget usage should be conceptualised as part of a broader learning ecology rather than an isolated predictor of educational motivation.

Nonetheless, the absence of a statistically significant relationship should not be interpreted as evidence that unrestricted gadget use is harmless. Contemporary research has consistently highlighted potential risks associated with excessive screen exposure, including behavioural dysregulation, reduced physical activity, emotional difficulties, and weaker social interactions among young children (Madigan et al., 2020; World Health Organization [WHO], 2019). These consequences may indirectly influence learning motivation over time, particularly if children become overly dependent on screen-based stimulation. Thus, the non-significant finding in the present study may reflect a short-term or context-specific outcome rather than a definitive absence of developmental influence.

Overall, this finding underscores the importance of adopting a balanced and critical perspective on gadget usage in early childhood. Rather than focusing solely on limiting screen exposure, stakeholders should prioritise enhancing the quality of children's learning experiences, strengthening parental involvement, and ensuring purposeful digital engagement. Future studies should examine moderating variables such as parental mediation, screen content, and duration of use to better understand the nuanced relationship between gadget usage and learning motivation among preschool children.

Conclusion

This study indicates that the use of gadgets in early childhood education has the potential to become an effective learning tool when used in a controlled manner and focused on educational content. However, without proper monitoring, gadget usage may negatively affect children's

attention, social interaction, and emotional well-being, consequently reducing their motivation to learn. Therefore, maintaining a balance between the utilization of technology and a holistic approach is crucial to ensure children's optimal development in line with the demands of 21st-century education. The active involvement of parents and teachers in guiding gadget usage is a key factor in achieving this goal.

Ethics Statement

This study was conducted following ethical guidelines. Informed consent was obtained from all participants. Participation was voluntary, and confidentiality was ensured.

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