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The Correlation between Parental Digital Literacy, Gadget Addiction, and Emotional Stability in Children with Neurodevelopmental Disorders

Afrina Afrina[1], Dwi Harianti[2], Lili Nurlaili[3]
[1,2,3]Universitas Pamulang
*Corresponding author, e-mail: afrina260217@gmail.com

Abstract
Technology use impacts children's behaviour significantly. Gadget reliance in Neurodevelopmental Disorders (NDDs) children's causes more complex psychological issues than in other youngsters. This study examines the association between parental digital literacy, gadget addiction, and children with NDDs's mental stability. The study collected data by questionnaire. Purposive sampling was utilised to select 185 verified Greater Jakarta residents with children with neurodevelopmental problems. Data was analysed using SEM-PLS. Research shows that parental digital literacy and gadget addiction explain 53.9% of NDDs children's mental stability. This study introduces novelty by simultaneously evaluating parental digital literacy and gadget addiction within the specific context of neurodivergent children. The research shows that gadget addiction correlated negatively and significantly with children's emotional stability (β = -0.704; $p < 0.001$). Meanwhile, parental digital literacy did not show a significant correlation (β = -0.089; $p = 0.072$).

Keywords: Children with Special Needs; Digital Literacy; Emotional Stability; Gadget Addiction.

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Introduction

Digital devices have integrated into children and youth lives from the simple use for entertainment, to a parenting challenge, especially regarding caregivers of Children with Neurodevelopmental Disorders (NDDs). After gadget addiction has gained prevalence, children show cognitive fixation and withdrawal symptoms for limited screen time availability (Albayrak et al., 2026; Cemiloglu et al., 2022). This pattern of dependence can elicit significant emotional fragility, characterized by recurrent aggressive outbursts and dysregulated self-control in the daily context among NDDS (Chinchay et al., 2024; Lal et al., 2023). Parental digital literacy skills are an essential competence here — given the complexities involved in special needs education. More importantly, this skill prevents children from adverse outcomes linked to technology and has a protective factor for their emotional development.

As a preventive, parental digital literacy goes beyond simple technical supervision for the interaction of children with digital environments. A child's behaviors problems can be highly reduced through the role of awareness and the competences as a parent (Purnama et al., 2022; Supriyadi & Maesyaroh, 2023). Due to excessive exposure and vulnerability of neurodiverse children in developing emotional disorders, an accurate guidance by parents can reduce the urge for addiction and improve affective regulation (Syifa & Kusumaningrum, 2025; Firmansyah & Putri, 2024). Consistent daily parental use of digital literacy, as an integral part of interventions with children who have special needs, has a great impact on their emotional health because the limited time that parents are allowing their children to feel safe in empathy and sensitivity.

Children with Neurodevelopmental Disorders who develop gadget dependence are more likely to experience a wider range of psychological issues compared to their typically developing peers. Even with children with neurodevelopmental disorders, the abundant unsupervised screen time increases social interaction deficits (Alenazi et al., 2024; Shorna et al., 2025). Children with digital devices acting as the main providers of comfort experience greater detachment from their environment and a reduction in mental well-

being (Masri-Zada et al., 2025). This reliance is less of an adaptive mechanism than it is a hindrance to their ability to read emotional cues and react with frustration, disrupting the building blocks of their psychosocial lives (Celebi, 2023). In the end it is this emotional dysregulation from an inability to manage your feeling and expression of emotions that has been preceded by disruption in device usage.

While concern has been voiced at the wider technology problem in child development (Alpuğan, 2024), the reactions of parents about this & its influence on their children (Abdelmoneium et al., 2023; Al-Harahsheh et al., 2024), and theory studies are far more numerous yet there is a widespread gap in any specific investigations about special education. Current literature often neglects the role of parents as mediators for mental health in neurodiverse populations (Vidani et al., 2024). As a result, this gap leads to an insufficient knowledge of the psychological dynamics influencing this group of people highly susceptible to damaging psychosocial influence. The present study intended to measure the association of emotional stability in Children with Neurodevelopmental Disorders with device addiction severity based on parents' digital literacy levels. These results offer a novel empirical foundation to highlight how these interconnected variable matters.

Previous studies often isolate these variables. They rarely test them simultaneously in populations with NDDs. This gap limits our understanding of digital parenting outcomes. The present study offers novelty. It evaluates parental digital literacy and gadget addiction simultaneously as predictors of emotional stability in children with NDDs. This study proposes two hypotheses. Hypothesis 1: Parental digital literacy correlates with emotional stability in children with NDDs. Hypothesis 2: Gadget addiction correlates negatively with emotional stability in children with NDDs.

Method

The research method used in this research is quantitative with a correlational design, which aims to examine and measure the significance of the relationship between parental digital literacy, severity of gadget addiction and Emotional Stability in Children with Neurodevelopmental Disorders (NDDs) We relied on data collected by means of a structured questionnaire so that they could be measured with the adoption of a five-point Likert scale consisting of both positively and negatively poised items to minimize the tendency for respondents to provide automatic, biased agreement. Researchers adapted items from previously validated scales. A pilot study ensured content validity. The data processing reversed the scores for negatively phrased items. The survey was delivered over the internet to optimize reach while following precautionary health procedures. Ethical Considerations ethical concerns unique to research in special education were strictly followed during every stage of data collection. The development of the research instrument based on previous studies can be seen in Table 1.

Table 1. Research Instrument

Research Variables	Measurement Indicators	Item in Questionnaire	Reference
X1: Parental Digital Literacy	1. Proactivity & Content Filtering (PCF)	1, 9	(Alpuğan, 2024; Asmahasanah et al., 2025; Khald et al., 2025)
	2. Active Mediation & Mentoring (AMM)	3, 4, 10	(Firmansyah & Putri, 2024; Guo et al., 2024; Yulianti et al., 2023)
	3. Screen Time Regulation (STR)	5, 6	(Al-Harahsheh et al., 2024; Purnama et al., 2022)
	4. Technical Control (TC)	2, 7, 8	(Muchtarom et al., 2025; Supriyadi & Maesyaroh, 2023)
X2: Gadget Addiction in Children with NDDs	1. Withdrawal Symptoms (WS)	11, 19	(Abdelmoneium et al., 2023; Chinchay et al., 2024)
	2. Social and Physical Neglect (SPN)	12, 13, 20	(Alamri et al., 2023; Alenazi et al., 2024; Alshaban et al., 2017; Theopilus et al., 2024)
	3. Cognitive Preoccupation and Tolerance (CPT)	14, 15, 16	(Albayrak et al., 2026; Cemiloglu et al., 2022; Shorna et al., 2025)
	4. Disruption of Daily Routines (DDR)	17, 18	(Gammoh et al., 2024; Kent et al., 2021)

Y1: Emotional Stability of Children with NDDs	1. Self-Regulatory Capacity (SRC)	21, 27	(Firmansyah & Putri, 2024; Syifa & Kusumaningrum, 2025)
	2. Mood Fluctuations (MS)	22, 26, 29	(Bao et al., 2024; Celebi, 2023; Masri-Zada et al., 2025)
	3. Manifestations of Aggressive Behavior (MAB)	23	(Purnama et al., 2022)
	4. Isolation Anxiety and Sensitivity (IAS)	24, 25, 28, 30	(Kushwah & Dave, 2025; Lal et al., 2023; Ntalindwa et al., 2021; Vidani et al., 2024)

Research Instrument (Afrina & Harianti. 2026).

The population was parents of children with disabilities who lived in Jakarta, Bogor, Depok, Tangerang and Bekasi (Jabodetabek). A purposive sampling strategy was implemented with selection of parents of children diagnosed with neurodevelopmental disability (NDD) including the disorders like Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), Down Syndrome (DS) and speech delay. Confirmation from the school and medical records verify the NDD diagnosis. This verification step controls for clinical heterogeneity. This aligns with research reporting that this population exhibits an increased susceptibility to the negative impacts of excessive screen exposure. Data were collected from May 4 to 29, 2026, using the Google Form platform.

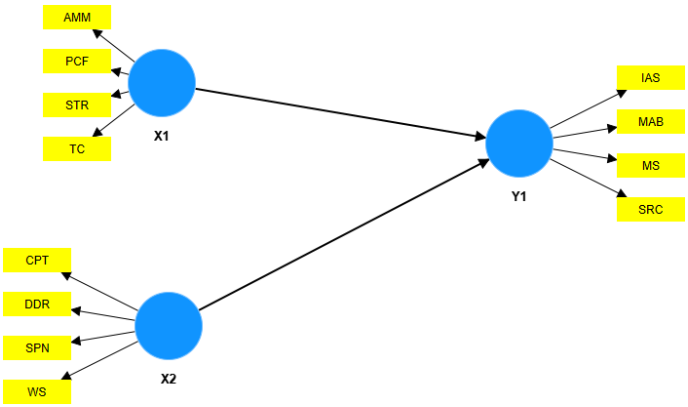

Figure 1. Research Framework

The research framework, as described in Table 1 along with the suggested relationships among variables is arc (Fig. 1). The data preprocessing was implemented through SmartPLS 4.0.9.9 (Ringle et al., 2022). Descriptive statistics were integrated and Structural Equation Modeling — Partial Least Squares (SEM-PLS) was employed to evaluate the relationships among variables. SEM-PLS (Partial Least Squares Structural Equation Modelling) was selected because it allows for prediction purposes. The model utilized first-order reflective constructs. The study applied the Yeo-Johnson transformation. SEM-PLS does not strictly require normal distribution. However, this transformation optimizes data distribution and improves the robustness of the parameter estimates (Yusoff et al., 2025). The Yeo-Johnson transformation is defined as:

$$y = \begin{cases} \frac{(x+1)^{\lambda}-1}{\lambda}, & \text{if } \lambda \neq 0, x \geq 0 \\ \log(x+1), & \text{if } \lambda = 0, x \geq 0 \\ -\frac{(-x+1)^{2-\lambda}-1}{2-\lambda}, & \text{if } \lambda \neq 2, x < 0 \\ -\log(-x+1), & \text{if } \lambda = 2, x < 0 \end{cases}$$

where y is the value we want to obtain, x are the data that We want to transform and λ is the parameter that must be estimated in order for the transformed data come as close as possible to being normal distributed.

In the context of SEM-PLS, latent variable is a linear combination of all its indicators. The weight estimate accounts for the inner and outer model latent variable score components. R^2 criterion is for evaluating the structural model, which represents the proportion of variance explained in the endogenous

latent variables, while the path coefficient indicates the strength of relationships among constructs within a model.

The measurement model is evaluated using four criteria: indicator reliability, internal consistency, convergent validity, and discriminant validity. The external loading values determine the indicator reliability or in other words, how much of the variance of an indicator is explained by a latent variable. We must remove indicators that have outer loadings of less than 0.7 from the model (Hair & Alamer, 2022). Composite reliability ($\hat{\rho}$) is used to estimate internal consistency (also known as construct reliability); following common practice in the area, we consider values exceeding 0.6 acceptable. The average variance extracted (AVE) is used to evaluate convergent validity, while it is suggested that an acceptable level of 0.5 or higher indicates adequate convergence (Hair & Alamer, 2022). The second is discriminant validity that measures the square root of the AVE versus constructs correlations or, alternatively by checking if HTMT (Heterotrait–Monotrait Ratio) is lower than 0.85. Researchers confirmed that indicator removal maintained theoretical content validity. The structural evaluation included bootstrapping with 5,000 subsamples. The study also assessed the Variance Inflation Factor (VIF) for collinearity, f^2 for effect sizes, and Q^2 for predictive relevance. The last step of data analysing is the statistical hypotheses testing, which done through the T-statistics and P-values of analysed data. A T-statistic value that is simply less than or equal to -1.96, and greater than or equal to 1.96; and a P-value of below 0.05 indicates statistical significance (Koirala & Baptiste, 2026).

Result and Discussion

From among a total of 202 respondents who answered the questionnaire, 17 did not meet the inclusion criteria and therefore there were only 185 valid responses (data collection results). The demographic distribution of the respondents were, 69 men and 116 women. Based on Figure 2, most of the respondents (39%) living in Jakarta, 46% had children who go to primary school and 22% have children who were diagnosed with ASD / Autism. Also, most of them were in D4/S1. These demographic characteristics added to the objectivity in gaining an understanding of the phenomenon.

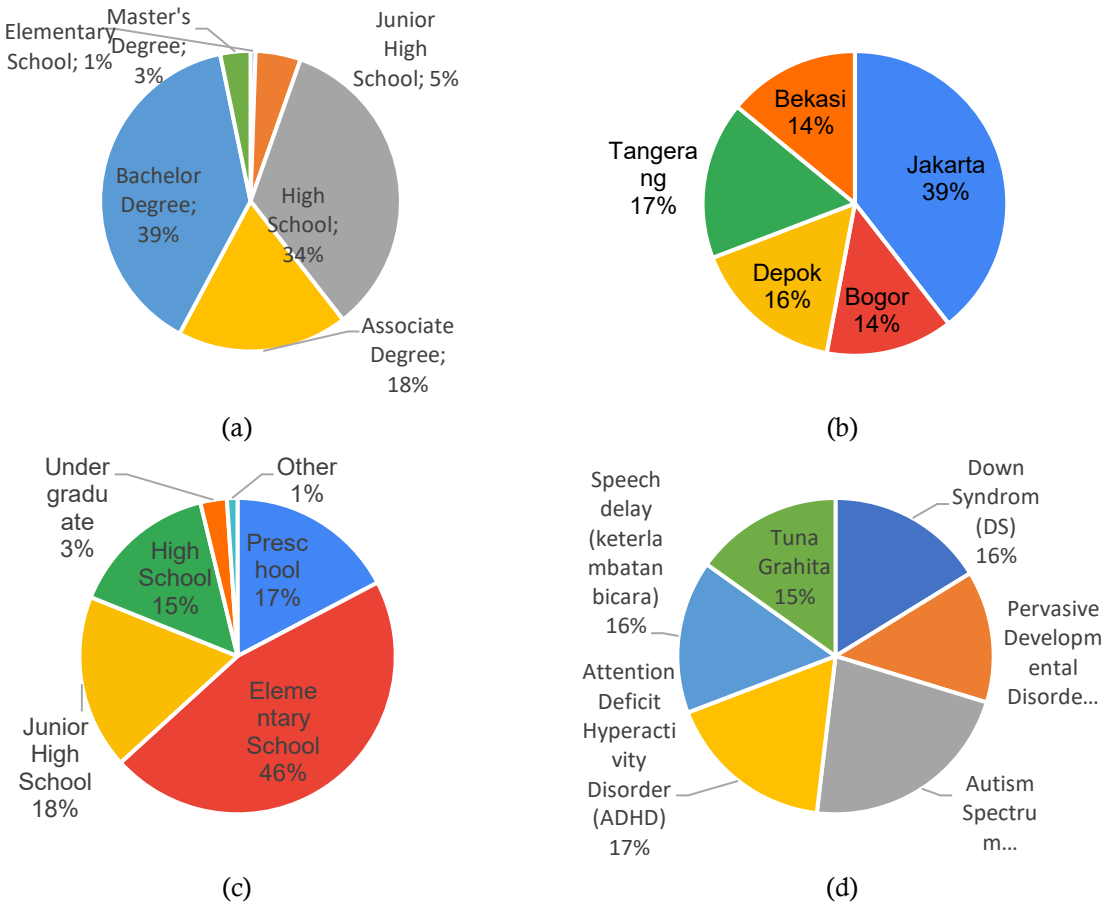

Figure 2. Respondent Demographics: (a) Respondent's educational background; (b) Respondent's domicile; (c) Child's educational background; (d) Child's disability

Table 2: shows the descriptive statistical analysis of the latent constructs for the study The family digital literacy latent variable have a relatively high mean between 4.043 until 4.164 There was moderate variability in this construct (SD<1.0 across all timepoints). The latent construct related to gadget addiction among the children with NDDs was moderately standardized with a standard deviation from 1.105-1.258 and more variance against gadgets. The construct relating to emotional stability among children with special needs demonstrated the lowest mean values ranging from 2.542-3.719 indicating a comparatively lesser level of emotional stability in these group of children. However, according to indications from the three aspects of skewness (each was between -2 and 2), it can be seen that all latent construct distributions are acceptable. Distributions were primarily missing data, which was negatively skewed with a left tail, indicating the mean is less than both the median and mode. Kurtosis values, however, showed a substantial kurtosis range beyond the conventional -3 to 3 resources limit for three constructs: technical control (TC), active mediation & mentoring (AMM) and proactivity & content filtering (PCF) (Kamath et al., 2025). These three constructs were all leptokurtic in nature (i.e., had a higher, more pronounced peak).

Table 2. Descriptive Statistics of the Data

Variable	Const	Initial Data					Normalized				
		Mean	Med.	Std. Dev.	Kurt.	Skew.	Mean	Med.	Std. Dev.	Kurt.	Skew.
X1: Parental Digital Literacy	PCF	4.159	4.000	0.752	4.273	-1.634	-0.000	-0.440	1.003	-0.139	-0.480
	AMM	4.164	4.333	0.758	4.031	-1.774	-0.000	0.041	1.003	-0.273	-0.618
	STR	4.043	4.500	0.814	2.443	-1.503	-0.000	0.540	1.003	-0.265	-0.575
	TC	4.097	4.333	0.703	5.283	-1.971	-0.000	0.224	1.003	-0.153	-0.077
X2: Gadget Addiction in Children with NDDs	WS	3.646	4.000	1.180	-0.520	-0.792	0.000	0.166	1.003	-0.345	-1.154
	SPN	3.472	4.000	1.105	-0.763	-0.662	-0.000	0.399	1.003	-0.294	-1.161
	CPT	3.497	4.000	1.223	-0.791	-0.787	0.000	0.293	1.003	-0.434	-1.303
	DDR	3.432	4.000	1.258	-1.015	-0.539	0.000	0.383	1.003	-0.291	-1.291
Y1: Emotional Stability of Children with NDDs	SRC	3.719	4.000	0.967	-0.169	-0.740	-0.000	0.177	1.003	-0.216	-0.988
	MS	2.542	2.000	1.018	-0.531	0.736	0.000	-0.405	1.003	0.043	-0.711
	MAB	2.595	2.000	1.408	-1.299	0.327	-0.000	-0.255	1.003	-0.004	-1.469
	IAS	2.555	2.000	1.157	-0.812	0.768	-0.000	-0.269	1.003	0.155	-1.250

Descriptive Statistics (Afrina & Harianti. 2026).

However, after Yeo-Johnson transformation of the metrics, all independent variables reported skewness and kurtosis values reflecting the normal distribution range. The self-regulatory capacity (SRC) indicator was one of two with a loading smaller than 0.7, which failed the outer loadings threshold in the first run; it had an outer loading value of −0.637. As a result, this indicator was removed from the model. Figure 3(a) shows the results of the second round For this iteration, all noncentral loading criteria were true.

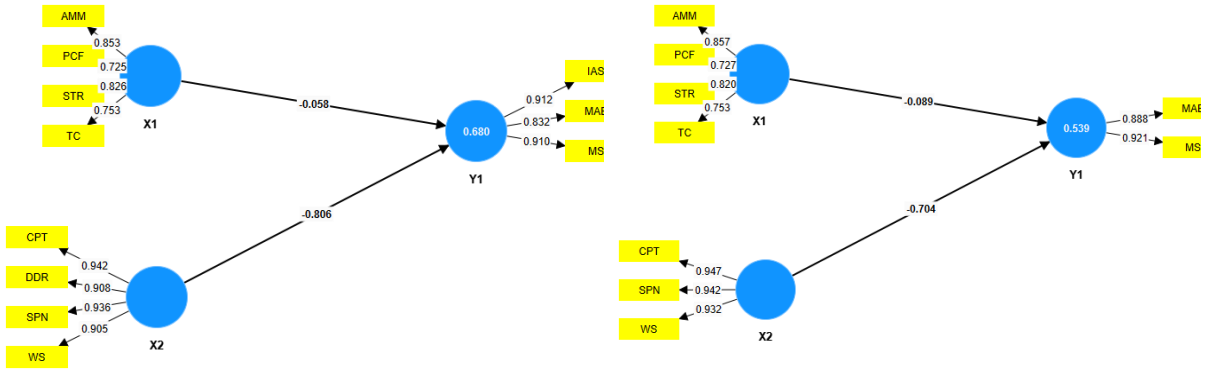

Figure 3. Loading Factor Results: (a) Second Iteration; (b) Third Iteration

Data processing continued with an evaluation of the internal consistency, namely construct reliability. The composite reliability value ($\hat{\rho}$) of the construct was better than 0.6 (Hair & Alamer, 2022). SmartPLS provides composite reliability results which are summarized in Table 3. Indeed, SmartPLS output (Table 8) shows that the composite reliability (rho_A and rho_C) values for all constructs exceeded 0.60; These results reflect that each construct was successfully in good form for testing depending on an acceptable level.

Table 3. Results of Composite Reliability, AVE, and Square Root of AVE

	Iterasi Kedua			Iterasi Ketiga		
	Composite reliability (rho_A and rho_C)	**AVE**	**Square Root of AVE**	**Composite reliability (rho_A and rho_C)**	**AVE**	**Square Root of AVE**
X1: Parental Digital Literacy	0,849	0,626	0,791	0.853	0.625	0.791
X2: Gadget Addiction in Children with NDDs	0,944	0,852	0,923	0.936	0.884	0.940
Y1: Emotional Stability of Children with NDDs	0,875	0,784	0,885	0.795	0.818	0.905

Composite Reliability, AVE, and Square Root of AVE (Afrina & Harianti. 2026).

The process of evaluation continued with convergent validity, using the average variance extracted (AVE) as the metric. An AVE value greater than 0.5 is conventionally considered an appropriate score for establishing adequate convergent validity (Hair & Alamer, 2022). The composite reliability values presented in Table 3 from the SmartPLS output for all constructs were above the minimum threshold of 0.50. The last step of measuring the measurement model (outer model) is to test the discriminant validity. The HTMT correlation between Y1 and X2 was 0.905, indicating that the HTMT criteria for discriminant validity could not be established. The study indicated that these variables do not have sufficient discrimination by the indicators. In order to deal with this, the constructs related to variables X2 and Y1 were redefined. In this specific case, two constructs—disruption of daily routines (DDR) and isolation anxiety and sensitivity (IAS)—were excluded. The removal of these indicators relied on statistical thresholds and theoretical validity. These specific items showed conceptual overlap. Their removal preserved the core theoretical meaning of the emotional stability construct. HTMT values in the 2nd and 3rd iteration are compared in Table4. After these constructs were removed, the correlation of Y1 to X2 in the third round was cut down to 0.848, passing below their required value.

Table 4. Heterotrait-monotrait ratio (HTMT) values

	Second Iteration	**Third Iteration**
X2 <-> X1	0.323	0.302
Y1 <-> X1	0.339	0.339
Y1 <-> X2	0.905	0.848

HTMT Values (Afrina & Harianti. 2026).

The structural model, or inner model, must be assessed prior to testing the hypothesis. Running R-square over three iterations in the model gave us 53.9%. This means that parental digital literacy (X1) and gadget addiction in NDDs (X2) simultaneously can explain 53.9% of the variance of emotional stability of NDDs (Y1), while the remaining 46.1% is explained by other factors not examined in this study. The results of the path coefficients are showed in Table 5. Based on the analysis results using SmartPLS, the influence of parental digital literacy (X1) towards emotional stability in NDDs (Y1) produces a T-Statistics value of 1.802 and p value of 0.072. Since the T-Statistics value is less than 1.96 from the threshold this relationship is not significant. The data do not therefore lend themselves to an effect of parental digital literacy on emotional well-being in children with NDDs. Conversely, gadget addiction in NDDs (X2) have negative impact towards emotional stability (Y1) by T-Statistics value of 15.839 and p-value of 0,000. The T-Statistics value is greater than 1.96, which means a significant relationship exists. Thus, data support a negative association between gadget addiction and emotional stability in children with NDDs.

The path coefficient indicates that a one-standard-deviation increase in gadget addiction correlates with a 0.704 standard-deviation decrease in emotional stability. The non-significant result for parental digital literacy does not imply that digital parenting is ineffective. It simply demonstrates no direct cross-sectional correlation in this specific model. Furthermore, the model did not test moderation or mediation effects. Therefore, the study cannot conclude whether digital literacy mitigates the impact of gadget addiction.

Table 5. Path Coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1 -> Y1	-0.089	-0.098	0.050	1.802	0.072
X2 -> Y1	-0.704	-0.701	0.044	15.839	0.000

Path Coefficients (Afrina & Harianti. 2026).

Discussions

The results of SmartPLS calculations indicated that parental digital literacy and gadget addiction jointly explained 53.9% of the variance in the emotional stability of Children with Neurodevelopmental Disorders. This discovery emphasizes how important both variables are in behavioral research. Patterns of technology use in the home environment are an important predictor of psychological wellbeing among neurodiverse children, the study concludes. These findings are consistent with Lal et al. (2023) identified the challenges facing families of special needs regarding managing everyday exposure to technology. Mothers frequently allow extended screen time, not because they have any great digital literacy but because, in their estimation, it keeps their NDDs children emotionally stable..

Research approach This research uses qualitative approach and the empirical findings of this research found that parental digital literacy is not significantly correlated with emotional stability of Children with Neurodevelopmental Disorders. The p-value is 0.072, just above the usual cutoff of 0.05. This begs the question, because prohibitive measures—like checking content ratings or activating parental controls—will not work in alleviating Children with Neurodevelopmental Disorders from their chronic cycling of emotions. The intricate nature of such reactions cannot be merely dealt with via parental expertise and proactive use of technology. These findings are in contrast to those of Khald et al. (2025) who argued that more than two-thirds of mothers were not aware that their children were using digital media. In the same line, these results contradict with Supriyadi & Maesyaroh (2023) findings that explained children's emotional stability can be influenced by digital literacy. But in the study of Supriyadi & Maesyaroh (2023) we observe that good parenting is not less important to create digital literacy. These differences may be reconciled by the bidirectional framework proposed by Guo et al. (2024). For children with special needs that experience such wide variances in emotional state to implement consistent digital literacy across the home can be quite challenging.

The analysis also showed, for example, that a one-standard-deviation increase in gadget addiction correlates with a 0.704 standard-deviation decrease in emotional stability. An assessment of that correlation coefficient of 0.704 demonstrates substantial statistical (and practical) significance, and warrants further discussion. Especially when a child might have neurodevelopmental disorders, the negative effects of gadget addiction can lead to extreme emotional instability and temper outbursts. These results are in line with those of Alenazi et al. (2024) and Shorna et al. (2025). Shorna et al. (2025) This explains the massive body of work done showing kids who are neurodevelopmental disorder (and especially ASD or ADHD) cases tend to be telephone addicted. Equally, the study of Alenazi et al. (2024) found a robust relationship between screen

time and the emergence of ASD in children.. Additionally, Masri-Zada et al. (2025) warn that the high use of digital media may lead to mental health disorders, which supports these findings.

An outer model evaluation was conducted to identify the key constructs which best exemplified gadget addiction for children with NDDs. Socialized and/or physical neglect parents: Children show withdrawal from parent-child interactions, it becomes all about themselves. If they have cognitive preoccupation and tolerance, Psychologically children get distress while taking away the gadgets or making them limit to use gadgets which will result into tantrums and aggression. This trend is in line with results from Celebi (2023), Firmansyah & Putri (2024), and Gammoh et al. (2024). Firmansyah & Putri (2024) emphasizes emotional disturbances as well as, in particular, disturbed and affected by limited access to gadgets. Gammoh et al. (2024) connected device addiction was a causal risk factor of psychiatric instability among children. In this regard, Celebi (2023) offered more context for these depressive symptoms and described them as externalizations of unmet psychological needs.

The non-significant correlation for digital literacy requires careful interpretation. Common method bias might influence self-reported parenting measures. Furthermore, the NDD population is highly heterogeneous. Different disorders may exhibit distinct behavioral responses to screen time. Researchers must distinguish between statistical significance and practical significance. A lack of statistical significance in this model does not negate the practical reality of parenting challenges.

Theoretically, the study within special education adds to how gadget addiction affects emotional stability among children with NDDs. The results of the model show that gadget addiction is the strongest predictor of emotional instability and parental digital literacy has not been able to reduce emotional instability due to gadget addiction. The present finding limits traditional theories of digital parenting and raises questions as to whether they are applicable and/or effective for children with NDDs in the absence of specific interventions. The results of this study are consistent with those reported by Albayrak et al. (2026) emphasized the significance of clinical cluster analysis for mapping pathology in digital use. Adaptive ICT interventions are suggested for children with neurodevelopmental disorders in future studies (Chinchay et al., 2024). These strategies are likely to be more effective than a traditional approach which simply restricts their use of technology, inherently increasing the risk that the emotional instability seen in these children worsens.

Conclusion

Technological development patterns have led to a change in the role technology plays in the home. Data analysis using SmartPLS returned that digital literacy and gadget addiction (simultaneously) from parent results in an explanation of 53.9% variation on emotional stability children with NDDs. The results show that the digital competence of parents does not hold a statistically significant relationship with children´s well-being (T-statistic 1.802; P-value 0.072). It suggests that understanding technology or controlling the use of tech is not sustainable at sustaining emotional stability in children with NDDs. One of the key results in this research is very strong inverse association and P-value 0.000 which indicates that children's emotional stability account and gadget addiction (T-statistic 15.839). The path coefficient indicates that a one-standard-deviation increase in gadget addiction correlates with a 0.704 standard-deviation decrease in emotional stability.

In the realm of special education, gadget addiction severity has become the main predictor of emotion dysregulation in Children with Neurodevelopmental Disorders. Furthermore, it should be noted that people can acquire digital literacy but cannot eliminate the influence of technological addiction. Although this research finds psychological behavioral phenomena, it is limited to cross-sectional associations examined through a SEM-PLS structural model in Jakarta and surrounding areas. The findings confirm associations between the variables but do not draw firm conclusions regarding to causation, clinical diagnosis, or psychoeducational application. The model also suggests that 46.1% of the variance in emotional stability can be accounted for by variables other than those examined here. With a view of expanding this understanding, the authors encourage new studies to focus on mediator variables in relation with ecosystem components surrounding children with NDDs. Such an exploration could also include a spectrum of parenting methods and adaptation to information and communication technologies.

Author Declaration

Authro Contribution

All authors contributed to the preparation of the article, including conceptualization, data collection and analysis, manuscript drafting, and revision and refinement of the article. All authors have read and approved the final version of the manuscript.

Conflict of Interest

The authors declare that there are no conflicts of interest that could influence the research process or the publication of this article.

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Penggunaan *Artificial Intelligence*

In the preparation of this article, the author may use Artificial Intelligence (AI)-based tools to a limited extent to assist with language editing, grammar checking, and/or refining the writing structure. The author retains full responsibility for the content, analysis, interpretation, and scholarly integrity of the article.

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