



## Mobile Media Exposure and Use in Children with and without Neurodevelopmental Disorder: A Comparative Analysis

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### Abstract

**Objective:** It was aimed in the study to evaluate and compare the purpose, frequency, and scope of mobile media use in children with neurodevelopmental disorder and those without neurodevelopmental disorder.

**Methods:** This study planned with a comparative design was conducted with the participation of the mothers of 111 children with neurodevelopmental disorder and 237 children without neurodevelopmental disorder. The data were collected through a self-report questionnaire.

**Results:** Most of the children had their own personal mobile media devices (with neurodevelopmental disorder=96.4%, without neurodevelopmental disorder=90.7%), and the majority used their mobile media devices to watch videos (with neurodevelopmental disorder=100.0%, without neurodevelopmental disorder=77.6%). Children with neurodevelopmental disorder used mobile media devices at an earlier age, and their duration of use in the day was longer ( $p<0.05$ ).

**Conclusion:** Education programs for mothers should be prepared in line with expert opinions which aim at reducing use of mobile media devices and screen exposure. Nurses should play a role in the development and evaluation of intervention programmes to prevent the negative consequences of mobile media use and screen exposure, especially in primary health care centres.

**Keywords:** Neurodevelopmental Disorder, Exposure, Media, Children

## 1. Introduction

In recent years, the use of mobile media has increased significantly due to the advancement of mechanical technology and the ease of access to new innovations. The use of touchscreen devices and online applications that offer intuitive content may lead to an increase in children's media use (1,2). Despite the apparent increase in mobile media use among children (2-5), the recommendations of the American Academy of Pediatrics (AAP) have significantly limited mobile media use among children. The AAP recommends that children aged 18-24 months should not use screens except for video calls. For children aged over 24 months, daily screen time should be limited to one hour or less (6). It recommends that parents limit screen time with their children between 2 and 5 years of age to 1 hour of screen time with high-quality programs, and that parents of children aged six years and older set consistent limits on the amount of time spent using media types (1). It also emphasizes making sure that children do not replace adequate physical activity, sleep, or other healthy behaviours (2-5).

An increase in the use of mobile media among children has the potential to impede their cognitive development (1,2). Furthermore, prolonged exposure to various media devices has the potential to negatively impact cognitive, social, and linguistic development, both in the immediate and long-term (1,2,7,8). The literature contains numerous studies that have demonstrated the adverse effects of excessive use of digital media among children. These include behavioural issues (5), obesity (3,9), sleep disturbances (10), and delayed cognitive development (11). Children with neurodevelopmental disorders may be at higher risk (1,2). Prolonged exposure to and use of mobile media can have a

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potentially detrimental impact, given that children with neurodevelopmental disorders are at significant risk for their developmental competencies (1). Consequently, an analysis of the introduction of media in these groups and an investigation of their behaviours that differ from those of children with typical development will provide crucial information for future research (12).

The use of versatile media by children with neurodevelopmental disorders carries a risk because it can replace formatively advantageous intelligence and contains numerous tangible benefits (13,14). The premature introduction of screen-based media to children with neurodevelopmental disorders may result in impaired communication, delayed language development, and impaired social interaction (11,12). A significant proportion of children diagnosed with attention deficit hyperactivity disorder are reported to use mobile media for between two and four hours per day (15). The mobile media devices that children with neurodevelopmental disorders habitually utilize are computers and smartphones. The mean daily duration of mobile media use among children with neurodevelopmental disorders is longer than two hours (16).

Currently, inquiries within this population are limited and findings are inconclusive. Most research on the use of mobile media and screen time has focused on children with obsessive-compulsive disorder and attention deficit hyperactivity disorder. However, it is important to note that these findings may not be generalizable to other age groups (10,12,17–19). A study of children with extreme introvertedness range clutter and obsessive-compulsive clutter revealed that they exhibited higher levels of web and video entertainment use and experienced greater difficulty disengaging from screen time compared to typically developing children (5). As the writing provides only a limited comparison of the use of mobile media between children who are developing normally and those who have extreme introvertedness range clutter and obsessive-compulsive clutter, it is essential to address this issue within the field. A comparison of the use of mobile media between children with typical development and those with neurodevelopmental disorders will yield more precise information. In this context, the aim of the present study was to evaluate and compare the purpose, frequency, and scope of mobile media use in children with neurodevelopmental disorder and children without neurodevelopmental disorders. The study's research questions are as follows, in line with its purpose:

- 1) What is the frequency of mobile media use in children aged between 0-8 years with neurodevelopmental disorders and those without neurodevelopmental disorders?
- 2) What is the purpose of mobile media use in children aged between 0-8 years with neurodevelopmental disorders and those without neurodevelopmental disorders?

## **2. Methods**

### **2.1. Design and participants**

A cross-sectional comparative plan was employed in the analysis. This strategy was selected to identify differences in the use of mobile media between children with neurodevelopmental disorders and typically developing children, and to conduct research in this area. Data were collected from mothers of children aged between 0 and 8 years who were hospitalized in the pediatric department of an obstetrics and pediatrics hospital in Bartın province in the Western Black Sea Region of Türkiye. The following inclusion criteria were established for the child: (1) age between 0-8 years, (2) diagnosis of neurodevelopmental disorder in accordance with DSM 5, (3) not having any vision or hearing problems and (4) exposure to mobile media devices (e.g., TV, smartphone, computer, tablet, gaming console, etc.). The following criteria were established for the mother: (1) primary caregiver of the child between 0-8 years of age, and (2) the mother's age must be over 18, (3) the mother must own at least one TV, smartphone, computer, tablet, game console and (4) willingness to participate in the study. Over the course of the data collection period (October 2022-July 2023), a total of 125 children with neurodevelopmental disorders and 301 children without neurodevelopmental disorders were identified as eligible for inclusion in the study. A total of 111 mothers of children with neurodevelopmental disorders (cooperation rate: 88.8%) and 237 mothers of children without neurodevelopmental disorders (interest rate: 78.7%) participated in the study. A purposive sampling strategy, which is one of the non-probability sampling strategies, was employed to select the test population. A post hoc power analysis of the obtained data was conducted using a Chi-Square Goodness of Fit Test with a 95% confidence level ( $1-\alpha$ ) and a 95% test power ( $1-\beta$ ). This analysis yielded an effect size of  $d=0.489$ .

## 2.2. Measurement

The data were collected from mothers who agreed to participate in the study through a self-report-based 0-8 years mobile media information form prepared by the researchers in line with the literature (1,21,22). The shape was then divided into two distinct segments. The initial segment (questions 1-12) was employed to ascertain the participants' sociodemographic characteristics, including the child's age, the mother's and father's level of education, the mother's marital status, her employment status, her occupation, and her monthly income. The second segment, comprising questions 13-19, was employed to evaluate the child's access to media devices, frequency of use, and typical time spent on media devices, as well as mothers' activities while their child was exposed to media devices. In accordance with the objective of the study, various types of mobile media devices were classified into four categories: televisions, mobile devices (such as smartphones), computers, and video game consoles. Lastly, the mothers were queried about the type of content their children were exposed to and whether a paediatrician had informed them about the potential risks associated with the use of mobile media devices.

Eleven field specialists were counseled, including those engaged in child advancement, mental counseling and direction, paediatric nursing, and brain research nursing. The specialists were requested to evaluate the items on a four-point rating scale (1 = not pertinent, 2 = somewhat pertinent, 3 = quite significant, 4 = highly relevant). The Lawshe content validity index (CVI) was employed to assess the legitimacy of the 0-8 years mobile media information form (Lawshe, 1975). The item-level CVI values of the individual items ranged from 0.75 to 1.0, while the scale-level CVI value was 0.96. Based on these findings, the format of the 0-8 years mobile media information form was revised. The 0-8 years mobile media information form was pilot-tested with 20 mothers in a different institution than the study locations, and the resulting data were not included in the analysis.

## 2.3. Data collection

The researchers collected data from mothers who agreed to participate in the study at the relevant clinic during the specified observation period. The researchers and the mothers did not know each other and were not related in any way. Accordingly, it was emphasized that the assessment instruments be completed accurately and precisely. The purpose of the study was thoroughly explained to the participants. The entire questionnaire was completed in 10 to 15 minutes.

## 2.4. Data analysis

The data were analysed using the IBM SPSS Statistics 22.0 software package. A post hoc sample analysis was conducted using the G\*Power version 3.1.9.7 software. The data were presented in a clear and concise manner, with numerical values, rates, percentages, and standard deviations. The results of the comparative analysis were presented in cross-tables. All questions were answered. In all comparative examinations, the Chi-square test was utilized. In order to identify the factors that caused the contrast, Fisher's Exact test was utilized (20). The information was assessed with 95% certainty, and a measurable importance level was decided to be  $p < 0.05$ .

## 2.5. Ethics

The study was approved by the Social Sciences and Humanities Ethics Committee of a university (Protocol No. 2022-SBB-0408, Date: 19.09.2022, Decision No. 22). Subsequently, authorization from the provincial health directorate was obtained for the study to be conducted at the relevant hospital. Following the provision of information to the mothers regarding the purpose and plan of the study, written consent was obtained from each participant. The 0-8 years mobile media information form was conducted in accordance with the principles of anonymity and confidentiality. No identifying data were collected. All participants were informed that their data would be kept confidential. All data were stored exclusively on a password-protected computer, accessible only to members of the research team. All procedures were conducted in accordance with the ethical standards and principles set forth in the Helsinki Declaration.

### 3. Results

The mean age of the children included in the study was 3.13±2.04 (0-8) years, and 52.9% were male. 40.2% of the mothers of the children included in the study were high school graduates. 71.3% of the children's parents were employed, and 46% had an income equal to their expenses. 31.9% of the children were diagnosed with a neurodevelopmental disorder. Accordingly, 0.2% had autism spectrum disorder, 0.6% had Down syndrome, 10.9% had cerebral palsy, 14.1% had epilepsy, and 2.6% had ADHD (Table 1).

All children included in the study had mobile media devices at home. 93.7% of the children with neurodevelopmental disorder and 90.3% of the children without neurodevelopmental disorder had mobile media use experience. Most of the children had their own personal mobile media devices (with neurodevelopmental disorder =96.4, without neurodevelopmental disorder=90.7%), and most of them used their mobile media devices to watch videos (with neurodevelopmental disorder=100.0, without neurodevelopmental disorder=77.6%) and always needed assistance while using their mobile media devices (with neurodevelopmental disorder=68.5%, without neurodevelopmental disorder=57.8%) (Table 2).

**Table 1.** Demographic Characteristics of Children (N=348)

Characteristics	Mean±SD	Range
<b>Age (year)</b>	3.13±2.04	0-8
	<b>n</b>	<b>%</b>
<b>Gender</b>		
Girl	164	47.1
Boy	184	52.9
<b>Mother's educational status</b>		
Primary school	59	17.0
High school	140	40.2
Bachelor's degree	104	29.9
Master's degree	30	8.6
Doctorate degree	15	4.3
<b>Household employment status</b>		
1 parent employed	248	71.3
2 parents employed	97	27.9
Both parents unemployed	3	0.9
<b>Family income status</b>		
Income lower than expenses	128	36.8
Income equal to expenses	160	46.0
Income higher than expenses	60	17.2
<b>Presence of neurodevelopmental disorder diagnosis in the child</b>		
Yes	111	31.9
No	237	68.1
<b>Neurodevelopmental disorder</b>		
Autism Spectrum Disorder	7	2.0
Down Syndrome	2	0.6
Cerebral Palsy	38	10.9
Epilepsy	49	14.1
Attention Deficit/Hyperactivity Disorder	9	2.6

There were significant differences regarding the variety of mobile media devices at home according to the children's having a diagnosis of with neurodevelopmental disorder ( $\chi^2=14.937$ ,  $p=0.001$ ). The rate of having a laptop computer at home was significantly higher in without neurodevelopmental disorder children compared to with neurodevelopmental disorder children (with neurodevelopmental disorder=25.2%, without neurodevelopmental disorder=48.5%). The rate of having a tablet at home was significantly higher in neurodevelopmental disorder children compared to without neurodevelopmental disorder children (with neurodevelopmental disorder=53.2%, without neurodevelopmental disorder=32.1%). There were significant differences regarding having a personal mobile media device according to the children's having a diagnosis of with neurodevelopmental disorder or without neurodevelopmental disorder ( $\chi^2=11.937$ ,  $p<0.001$ ). The rate of having a personal

TV at home was significantly higher in without neurodevelopmental disorder children compared to with neurodevelopmental disorder children (with neurodevelopmental disorder=16.8%, without neurodevelopmental disorder=34.4%). The rate of having a personal desktop computer was significantly higher in with neurodevelopmental disorder children compared to without neurodevelopmental disorder children (with neurodevelopmental disorder=3.7%, without neurodevelopmental disorder=0.0%) (Table 2).

**Table 2.** Distribution of Mobile Media Devices of Children and Their Usage Behaviors According to The Presence of Children's Neurodevelopmental Disorder

Characteristics	With neurodevelopmental disorder (n=111)		Without neurodevelopmental disorder (n=237)		Difference
	n	%	n	%	
<b>Presence of mobile media devices at home</b>					
Yes	111	100.0	237	100.0	-
No	0	0.0	0	0.0	
<b>Mobile media devices at home</b>					
TV set	110	99.1	230	97.0	$\chi^2=14.937$ p=0.001
Desktop computer	12	10.8	43	18.1	
Laptop computer	28 <sup>a</sup>	25.2	115 <sup>a</sup>	48.5	
Internet access	95	85.6	190	80.2	
Smart phone	102	91.9	219	92.4	
Tablet	59 <sup>b</sup>	53.2	76 <sup>b</sup>	32.1	
E-book reader	8	7.2	7	3.0	
Game console (Xbox, PlayStation, Nintendo)	2	1.8	17	7.2	
<b>Child's purpose for using mobile media use *</b>					
Touching or swiping the screen to look at different pages	95	85.6	165	77.1	-
Watching videos	111	100.0	166	77.6	
Watching TV shows	39	35.1	56	26.2	
Playing Games	33	29.7	70	32.7	
Listening to music	42	37.8	65	30.4	
<b>Presence of child's personal mobile media device</b>					
Yes	103	96.4	193	90.7	-
No	4	3.6	22	9.3	
<b>Child's personal mobile media devices *</b>					
TV	18 <sup>c</sup>	16.8	74 <sup>c</sup>	34.4	$\chi^2=11.937$ p<0.001
Desktop computer	0	0.0	8	3.7	
Laptop computer	0 <sup>d</sup>	0.0	8 <sup>d</sup>	3.7	
Smart phone	75	70.1	74	34.4	
Video iPod and the like	10	9.3	7	3.3	
Tablet	4	3.7	24	11.2	
E-book reader	0	0.0	3	1.4	
Game console (Xbox, PlayStation, Nintendo)	0	0.0	1	0.5	
<b>Child's need for assistance while using mobile media device</b>					
Always	76	68.5	137	57.8	-
Sometimes	33	29.7	84	35.4	
Never	2	1.8	16	6.8	

$\chi^2$ =Chi-Square test, \*More than one choice was marked. <sup>a b c d</sup> These values comprise the significant difference.

Children with neurodevelopmental disorder started to watch TV programs at a younger age compared to the children without neurodevelopmental disorder (with neurodevelopmental disorder=2.44±1.39, without neurodevelopmental disorder=3.07±1.28,  $t=-3.944$ ,  $p<0.001$ ). Neurodevelopmental disorder children started to touch/swipe the screen of their tablets or smart phones in order to change and look at the pages at a younger age compared to without neurodevelopmental disorder children (with neurodevelopmental disorder=2.25±1.26, without neurodevelopmental disorder=3.52±1.22,  $t=-8.763$ ,  $p<0.001$ ). Children with neurodevelopmental disorder used applications on their mobile media devices in the last 24 hours for a longer duration compared to the children without neurodevelopmental disorder (with neurodevelopmental disorder=1.67±0.97, without neurodevelopmental disorder=1.25±0.65,  $t=3.289$ ,  $p=0.001$ ). Children with neurodevelopmental disorder watched TV programs on their mobile media devices in the last 24 hours for a longer time compared to the children without neurodevelopmental disorder (with neurodevelopmental disorder=1.22±0.45, without neurodevelopmental disorder=1.04±0.44,  $t=2.458$ ,  $p=0.015$ ) (Table 3).

**Table 3.** Distribution of Behaviours of The Children Related with The Activities They Do in Their Mobile Media Devices According to The Presence of Children's Neurodevelopmental Disorder

Children's behaviours regarding the activities they do in mobile media devices	With neurodevelopmental disorder (n=111)	Without neurodevelopmental disorder (n=237)	Difference
	Mean±SD	Mean±SD	
<b>The age of doing the following activities for the first time (year)*</b>			
Watching TV programs	2.44±1.39	3.07±1.28	$t=-3.944$ , $p<0.001$
Making a phone call	1.99±1.41	2.05±2.00	$t=-0.299$ , $p=0.765$
Touching/swiping in order to change the pages and to look at them in tablet or smart phone	2.25±1.26	3.52±1.22	$t=-8.763$ , $p<0.001$
Playing video games	2.76±1.74	3.09±2.06	$t=-1.365$ , $p=0.174$
Using mobile media applications	3.08±1.91	3.33±2.16	$t=-1.007$ , $p=0.315$
<b>Activity duration in mobile media device in the last 24 hours (hour)**</b>			
Listening to music	1.07±0.26	1.03±0.17	$t=1.104$ , $p=0.273$
Playing games on the video console	1.00±0.28	1.10±0.30	$t=-1.797$ , $p=0.083$
Using applications in the mobile media device	1.67±0.97	1.25±0.65	$t=3.289$ , $p=0.001$
Watching TV	1.34±0.74	1.34±0.93	$t=-0.067$ , $p=0.946$
Watching TV programs on a mobile media device	1.22±0.45	1.04±0.44	$t=2.458$ , $p=0.015$

\*Mean age (SD), \*\* Mean hour (SD)

Most of the mothers of the children had fewer than five applications in their mobile media devices (with neurodevelopmental disorder=90.6%, without neurodevelopmental disorder=60.6%), and most of these applications were related with children (with neurodevelopmental disorder=92.0%, without neurodevelopmental disorder=44.0%). There were significant differences in the mothers' behaviors related with the children's use of mobile media devices (the number of those whose applications in their mobile media devices were related with children / using them while keeping the child busy /sleeping the child in public spaces) according to the presence of neurodevelopmental disorders ( $p<0.05$ ). The number of the mothers of the children with neurodevelopmental disorder most of whose applications in their mobile devices were related with children was higher compared to the mothers of the children

without neurodevelopmental disorder (with neurodevelopmental disorder=92.0%, without neurodevelopmental disorder=44.0%). The number of the mothers of the children without neurodevelopmental disorder less than half of whose applications in their mobile devices were related with children was significantly higher compared to the mothers of the children with neurodevelopmental disorder (with neurodevelopmental disorder=0.0%, without neurodevelopmental disorder=8.6%). The number of the mothers of the children without neurodevelopmental disorder only a few of whose applications in their mobile devices were related with children was significantly higher compared to the mothers of the children with neurodevelopmental disorder (with neurodevelopmental disorder=2.3%, without neurodevelopmental disorder=42.2%). The number of the mothers of the children with neurodevelopmental disorder who did not receive expert opinion (such as a doctor) regarding mobile media use in children was significantly higher compared to the mothers of the children without neurodevelopmental disorder (with neurodevelopmental disorder=100.0%, without neurodevelopmental disorder=92.8%). The number of the mothers of the children with neurodevelopmental disorder who gave mobile media devices to their children to keep the child busy while doing the chores was significantly higher compared to the mothers of the children without neurodevelopmental disorder (with neurodevelopmental disorder=82.0%, without neurodevelopmental disorder=60.8%). The number of the mothers of the children with neurodevelopmental disorder who gave mobile media devices to their children in order to keep the child calm in public spaces was significantly higher compared to the mothers of the children without neurodevelopmental disorder (with neurodevelopmental disorder=91.1%, without neurodevelopmental disorder=54.4%). The number of the mothers of the children with neurodevelopmental disorder who gave mobile media devices to children in order to put the child to sleep was significantly higher compared to the mothers of the children without neurodevelopmental disorder (with neurodevelopmental disorder=94.7%, without neurodevelopmental disorder=40.5%) (Table 4).

**Table 4.** Mothers' Behaviours Regarding Their Children's Mobile Media Device Use According of The Presence of Neurodevelopmental Disorders

	With neurodevelopmental disorder (n=111)		Without neurodevelopmental disorder (n=237)		Difference
	n	%	n	%	
<b>The number of applications in the mobile media devices</b>					
Fewer than 5	77	90.6	77	60.6	
5-10	8	9.4	32	25.2	
11-20	0	0.0	9	7.1	-
21-30	0	0.0	8	6.3	
More than 30	0	0.0	1	0.8	
<b>Applications related to children in the mobile media devices</b>					
Most of them	80 <sup>a</sup>	92.0	51 <sup>a</sup>	44.0	$\chi^2=16.841$ p<0.001
Nearly half of them	5	5.7	6	5.2	
Less than half of them	0 <sup>b</sup>	0.0	10 <sup>b</sup>	8.6	
Only a few of them	2 <sup>c</sup>	2.3	49 <sup>c</sup>	42.2	
<b>Obtaining expert opinion about mobile media device use in children (such as a doctor)</b>					
Yes	0 <sup>d</sup>	0.0	17 <sup>d</sup>	7.2	$\chi^2=8.371$ p=0.004
Mo	111 <sup>e</sup>	100.0	220 <sup>e</sup>	92.8	
<b>Giving the child a mobile media device when outside in order to keep the child busy</b>					
Yes	63	56.8	108	45.5	-
No	48	43.2	129	54.5	

<b>Giving the child a mobile media device when doing chores in order to keep the child busy</b>					
Yes	91 <sup>f</sup>	82.0	144 <sup>f</sup>	60.8	$\chi^2=9.548$ $p<0.001$
No	20 <sup>g</sup>	18.0	93 <sup>g</sup>	39.2	
<b>Giving the child a mobile media device in public spaces in order to keep the child calm</b>					
Yes	90 <sup>h</sup>	91.1	106 <sup>h</sup>	54.4	$\chi^2=8.728$ $p<0.001$
No	21 <sup>i</sup>	18.9	101 <sup>i</sup>	42.6	
<b>Using a mobile media device in order to get the child to sleep</b>					
Yes	94 <sup>j</sup>	94.7	96 <sup>j</sup>	40.5	$\chi^2=8.182$ $p<0.001$
No	17 <sup>k</sup>	15.3	141 <sup>k</sup>	59.5	

$\chi^2$ =Chi-Square test, <sup>a b c d e f g h i j k</sup> These values comprise the significant difference.

#### 4. Discussion

The display compares the media exposure and utilization of children with and without neurodevelopmental disorder. It is acknowledged that such a comparison represents a significant contribution to the existing literature. The study revealed that children with neurodevelopmental disorder exhibited a longer duration of media exposure. In particular, the observation of television and mobile phone and tablet usage was found to be significantly higher in children with neurodevelopmental disorder. The proportion of mothers who had formed a definitive opinion on the use of mobile media was significantly lower than that of the general population, and no definitive opinions were formed by the mothers of children with neurodevelopmental disorder. The advent of mobile media due to the rapid advancement of technology and its pervasive and unregulated use in environments where children have access may pose challenges for children with neurodevelopmental disorder, as well as for all children. Children with neurodevelopmental disorder are particularly susceptible to the adverse effects of unregulated mobile media usage (1,12,17).

Most children with and without neurodevelopmental disorder had experience with a range of mobile media devices and owned their own personal devices. It has been documented that the prevalence of touchscreen devices, computers, online videos, smartphones, and tablets has been high in recent years among children aged 0-8 (14,23). It has been indicated that approximately three-quarters of children with ND utilize mobile media devices (1). In a further consideration, on average, seven screen devices were present in each domestic setting in developed countries (23).

In the context of the study, the prevalence of tablet usage in the home setting was higher among children with neurodevelopmental disorder compared to those without neurodevelopmental disorder. Children who experience a long-lasting infection and an inability can spend a significantly greater proportion of their leisure time using mobile media devices than their peers who demonstrate typical development (24). For children with neurodevelopmental disorder, the use of touchscreen devices (such as smartphones or tablets) requires less motor exertion, making it a more appealing activity (25). Furthermore, mothers of children with neurodevelopmental disorder may employ tablets to engage their children and soothe them while attending to essential care requirements (26).

Children with neurodevelopmental disorder have been observed to interact with mobile media devices at an increasingly early age. These devices include televisions, tablets, and smartphones, which they use to view content, navigate menus, and access information. In the present era, children are acquiring competencies such as touch screen utilization, device operation, and screen swiping at an exceedingly early age (27). In a study conducted by Coutinho et al.(1), 61% of children with neurodevelopmental disorder were reported to have started using a mobile media device before the age of two. In another study, 52% of children with neurodevelopmental disorder were found to begin using mobile media devices at an age of approximately 18 months (12). This suggests that the use of mobile media devices begins at younger ages in children with neurodevelopmental disorder.

Most mothers of children with neurodevelopmental disorder reported applications related to children on mobile media devices.. One method of preventing children from accessing inappropriate content is to use mobile media devices with children (co-viewing) and to monitor children's online activity (27,28). Given the neurocognitive limitations of children with neurodevelopmental disorder, there is a heightened need for parental monitoring to mitigate the adverse effects of excessive screen time (22).



A discrepancy was observed between the mothers of children without neurodevelopmental disorder and those with neurodevelopmental disorder. While 7.22% of the mothers of children without neurodevelopmental disorder received guidance on their children's use of mobile media gadgets, no such guidance was provided to the mothers of children with neurodevelopmental disorder. A study revealed that 13.4% of mothers of children with neurodevelopmental disorder received guidance from pediatricians regarding the use of mobile media devices (1). Wellbeing experts play a pivotal role in educating mothers about the introduction of mobile media in childhood and the benefits and risks associated with mobile media devices. Consequently, mothers can mitigate the adverse effects of screen time at an early age (29).

The mothers of children with neurodevelopmental disorder employed a range of media gadgets for various purposes, including engaging their children in activities while completing household tasks, soothing their children in open spaces, and helping them relax. A greater than one-third of the mothers of children with neurodevelopmental disorder employ mobile media devices to maintain their children's engagement (30). In a study conducted with mothers of children with neurodevelopmental disorder it was reported that mothers frequently used mobile media to distract their children while they were engaged in various activities (1). In the present era, mobile media devices, including televisions, smartphones, and tablets, are employed by mothers in a caregiving capacity to maintain their children's engagement and to provide them with a sense of calm (31). The mothers of children with neurodevelopmental disorder may provide their children with mobile media gadgets as a means of engaging, relaxing, and keeping them occupied (26). Furthermore, children with neurodevelopmental disorder may require more time and attention, which could result in exhaustion and stress for their mothers. As mobile media devices capture the attention of children with neurodevelopmental disorder, mothers may utilize these devices as a means of engaging and entertaining their children (1).

The children with neurodevelopmental disorder started to watch TV programs and use tablets or smart phones at a younger age compared to children without neurodevelopmental disorder. In a study conducted in Thailand, children with autism spectrum disorder were reported to be exposed to mobile media environment at a younger age compared to children without autism spectrum disorder diagnosis (6.44 vs. 12.41 months) and for a longer duration (32). In another study conducted in Spain, it was found that children with neurodevelopmental disorder started to watch TV at a younger age compared to those without neurodevelopmental disorder ( $p < 0.001$ ) (4). In a study conducted in the USA, use of mobile media before the age of two years was emphasized to be a significant risk factor for seeing symptoms like autism spectrum disorder. It is thought that screen exposure in children at a young age can be a significant factor for neurodevelopmental disorder in children (33). Another study showed that there was a significant relationship between the age of exposure to screen devices and autism spectrum disorders and that more than 81% of children started to be exposed to electronic screens at the age of  $\leq 2$  years (26).

The children with neurodevelopmental disorder were observed to utilize versatile media gadgets for longer periods of time than children without neurodevelopmental disorder. The results of the studies indicated that over 40% of children with neurodevelopmental disorder had a daily screen time exceeding four hours (34), while over 90% had a daily screen time exceeding one hour (12). Children with neurodevelopmental disorder spend approximately two times more time engaged with mobile media gadgets than those without neurodevelopmental disorder (35). It has been observed that the introduction of screens to children with neurodevelopmental disorder occurs at a later age compared to children without neurodevelopmental disorder. The reason for the longer screen introduction in these children may be attributed to their mothers' more frequent utilization of versatile media gadgets to keep them active while fulfilling their care needs and providing them with entertainment (26).

#### **4.1. Strengths and limitations**

One of its strengths is that it covers the period of 0-8 years when growth and development are quite rapid. A comparative introduction of the information pertaining to children with neurodevelopmental disorder and children without neurodevelopmental disorder may be a crucial aspect to consider. It should be noted that the consideration is subject to certain limitations. The relatively small number of children hospitalized at the clinic throughout the data collection period limited the scope for comparison within the study. It is recommended that larger-scale tests be incorporated into future studies. Furthermore, the test employed in this study reveals a discrepancy between individuals with and without neurodevelopmental disorders regarding sociodemographic characteristics, including age,

gender, education, family structure, and income. This imbalance may limit the generalizability of the data. Thirdly, the study employed a methodology that relied on mothers' perspectives on children's use of mobile media, which could be a limitation because it did not rely on self-report.

## **5. Conclusion**

Because of the aforementioned considerations, the children with neurodevelopmental disorder had been exposed to mobile media for an extended period and at an earlier age. The findings revealed that children with neurodevelopmental disorder frequently engaged with mobile media devices, namely TV, smartphones, and tablets. The proportion of mothers who had reached a definitive conclusion regarding the introduction of mobile media was significantly lower among the mothers of children with neurodevelopmental disorder compared to the mothers of children without neurodevelopmental disorder. The elevated prevalence of prolonged screen exposure in children with neurodevelopmental disorder further suggests that it may contribute to the progression of neurodevelopmental disorder symptoms. It is therefore recommended that education programmes for mothers on the use of mobile media devices and the reduction of screen time should be implemented in accordance with expert recommendations. It is also recommended that guidelines for parents' use of mobile media in children with neurodevelopmental disorders be developed and updated.

It is of the utmost importance that all adults in a child's life, including guardians, educators, and healthcare professionals, can assess the potential risks associated with neurodevelopmental disorders. It is important to increase awareness of early mobile media habits, frequent use and effects of mobile media use in children with neurodevelopmental disorders. Further research is required to examine the factors related to screen time through mobile media in children with neurodevelopmental disorders. The findings of this study indicate that pediatric medical caretakers and social workers should play an active role in the development of education programs for mothers on the use of mobile media devices and reducing screen time. It is imperative that they play a role in the development and assessment of intervention programs designed to prevent the adverse effects of excessive screen time, particularly in primary healthcare facilities. Furthermore, it is recommended that larger-scale tests be incorporated into future studies.

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