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Predicting preschool children's digital play addiction tendency during Covid-19 pandemic: Regarding the mother-child relationship, and child- and family-related factors

Tuğba Emiroğlu İlvan[1] · Remziye Ceylan[2]

Abstract

Previous research about children's digital play has predominantly focused on parental perspectives and parental mediation strategies. Although research on the effects of digital play on young children's development is plentiful, there is little evidence on young children's digital play addiction tendency. Herein, preschool children's digital play addiction tendency, and the mother-child relationship perceived by mothers, examining child- and family-related factors were explored. The present study also aimed to contribute to the current research pertaining to preschool-aged children's digital play addiction tendency through an examination of the mother-child relationship, and child- and family-related factors as potential predictors of children's digital play addiction tendency. A sample of 450 mothers of children between 4 and 6 years filled out two measures that identify the mother-child relationship and children's digital play addiction tendency. Correlational analyses revealed that in general, the mother-child relationship was significantly associated with children's digital play addiction tendency. Significant differences were evident in the relationship between numerous child- and family-related factors, and children's digital play addiction tendency, as well as the mother-child relationship. Hierarchical regression analyses indicated that a negative mother-child relationship, the children's digital play usage, and the mothers' digital device usage predicted the children's digital play addiction tendency.

✉ Tuğba Emiroğlu İlvan
   temiroglu@29mayis.edu.tr

   Remziye Ceylan
   rceylan@yildiz.edu.tr

[1] Early Childhood Education Department, Istanbul 29 Mayıs University, Istanbul, Turkey

[2] Early Childhood Education Department, Yıldız Technical University, Istanbul, Turkey

1 Introduction

Young children's digital technology usage has been an issue that has been researched since the advent and development of technology. In a comprehensive literature review on access to technology at an early period, it was clear that preschool children are exposed to technological devices all around the world. In Sweden, 70% of 3–4 years old preschool children use digital media (Findahl, 2012). Another research reported that many children use tablets or laptops and approximately one-third of children aged 0–5 who have access to tablets at home, have their tablets in the U.K. (Marsh et al., 2015). Greek parents of preschool children have also stated that all children in the household have access to at least one electronic device, and several of them have access to two or more different kinds of devices (Papadakis et al., 2022).

Furthermore, in addition to technology device usage, it's crucial to highlight young children's excessive and frequent use of technology. Another study conducted in the USA, researchers determined that children from birth to age 8 use digital screens for approximately two and a half hours in a day (Rideout & Robb, 2020). Moreover, another study indicated that about half of children aged 0–3 years use technological devices for an average of two to five hour for each day (Kulakci-Altintas, 2020). However, the American Academy of Pediatrics (AAP) advised children between the ages of 0 and 2 should not be introduced to any technology devices, and children aged 3 to 5 should be restricted to using technology for only one hour per day (AAP, 2016). Conversely, parents have difficulty controlling children's screen time (Danet, 2020; OfCom, 2021) and the use and content of digital devices (Danet, 2020)

Parents of preschool children are uncertain about the benefits and harms of digital technology for their kids. These parents seem to be confused and unable to make a clear determination on whether digital technology is advantageous or detrimental to their children (Papadakis et al., 2022). Thus, it should be noted that there is ample research which has shown that digital technologies may have negative outcomes. Technology-based activities reinforce an unhealthy lifestyle and pose a threat to many health problems (Dhakal & Dhakal, 2020). Researchers stated that preschool children can have difficulty differentiating between actual reality and virtual reality (Subrahmanyam et al., 2000). Additionally, digital technology use may influence children's physical health such as vision, poor posture, and obesity (Edwards et al., 2018).

Many studies have shown that primary reason for using technological device is playing games during the early years (Verenikina & Kervin, 2011; Oliemat et al., 2018). Another study which examines digital technology use in early childhood, parents of preschool children reported their children's computer activities. Most parents (60.9%) indicated that their children played games (Mikelić Preradović et al., 2016). Digital play can lead to potential problems and conflicts for some

parents and their children (Chai et al., 2011). Not only in family relationships but excessive use of video games is also interrelated with problems in peer relationships (Kovess-Mafety et al., 2016). Researchers have emphasized that digital play can lead children to violence (Anderson et al., 2004), cause children to display aggressive behavior (Lieberman et al., 2009) and isolation (Huh, 2017).

Another important potential problem is the overuse of digital play, which might lead to addiction. A rising global issue is the addiction to digital games, which is caused by the growing number of users and can have adverse impacts on both the physical health and social lives of individuals (Keya et al., 2020). In a study, Lemmens et al. (2009) defined game addiction as the persistent and uncontrollable use of computer or video games, resulting in negative social or emotional consequences. The affected individual is unable to regulate or limit their excessive gaming despite experiencing these problems. The American Society of Addiction Medicine (ASAM) defines addiction as a medical disease that is chronic and treatable. It results from a complex interplay between an individual's genetics, environment, and life experiences. Addictive people frequently engage in compulsive substance use or behaviors that persist despite negative consequences (ASAM, 2019). Some researchers have expressed that individuals who play problematic games cannot control their behavior even after they realize the problems that arise in their lives, they dream of playing games when they are not playing, and they experience symptoms such as being angry and restless at these times, and even if they stop playing games for a while, they start again later with similar intensity (Király et al., 2015). Researchers emphasized that digital game addiction reduces young individuals' desire to communicate with other people around them; thus, it may have negative effects on young people's social relationships (Kuss & Griffiths, 2012). On the other hand, there are many disagreements about whether digital technology should be considered an addiction (Kardefelt-Winther, 2017). In this study, instead of labeling preschool children as addicts, the digital play addiction tendencies of preschool children was investigated to intervene early against addiction that may occur in future life (Budak & Işıkoğlu, 2022).

1.1 Digital play and parent-child relationship

Digital play addiction may have adverse outcomes on the social development of preschool children. For instance, addiction to games can be a factor that can weaken their social competence (Zamani et al., 2010) because playing digital games changes the time spent with other people and other activities (Chai et al., 2011). Researchers have determined that parents play a crucial role in reducing the level of digital game addiction (Lee & Kim, 2017). In a study examining parent-child closeness and children's video game behaviours, it was shown that the degree of closeness between parent and child was related with a decrease in digital game addiction (Choo et al., 2015). It has been noticed that a positive correlation exists between the weak relationship the players have with their families and their game addictions (Kim et al., 2008). It was found that there are several individual factors predicting gaming addiction, one of which was emphasized as a low level of family closeness (Chang &

Kim, 2020). The study's results indicated that engaging in playing games was linked to lower quality relationships with both friends and parents. Similarly, 62.6% of French parents believed that digital devices could impact the relationships between parents and their children (Danet, 2020). According to Pianta (1997), "Child-adult relationships are a special social context for the development of certain social and academic outcomes in early childhood" (p. 22). To briefly explain, the parent-child relationship consists of two dimensions: positive parent-child relationships and negative parent-child relationships. Playing and laughing together, and showing care and affection for each other can be given as an example of a positive parent-child relationship. On the other hand, yelling, hitting, arguing with one another, and refusing to talk can be given as examples of a negative parent-child relationship (Wieber, 2002). A negative parenting behavior that influences the parent-child relationship may cause the development of antisocial behaviors in children (Popov & Ilesanmi, 2015).

1.2 Child- and family-related factors

Prior research on digital technology and digital play has focused on child-related factors, such as sex and age, and family-related factors, such as family income, family type, and the parents' educational level. For instance, considering the children's sex and age differences, boys spend more time engage in digital playing than girls (Nikken & Schols, 2015; Hu et al., 2018) whereas older children engage more frequently in digital media usage (Ahmadzadeh et al., 2020). In other study involving children aged 0–6, the older children's daily computer usage was higher than that of the younger children (Vandewater et al., 2007). Moreover, children who belong to families with lower incomes tend to spend more time on screen (Rideout & Robb, 2020; Seguin et al., 2021; Xie et al., 2020), and children who belong to families with a low level of education spend more time utilizing computers (Nikken & Schols, 2015). Additionally, Isikoglu Erdogan et al. (2019) showed parents' employment status is not correlated with their children's play types. Media usage by parents is also seen as a noteworthy determinant of their children's usage. Researchers have indicated that the child's media usage is consistent with their parent's usage (Nikken, 2017; Nevski & Siibak, 2016). Parents' time spend on screens has a direct correlation with children's time spend on screens, indicating a positive association; thus, a decrease in the parents' screen time, results in a decrease the children's screen time (Nikken & Schols, 2015; Hu et al., 2018). According to smartphone addiction, a parent's addiction significantly positively predicts their children's addiction (Gong et al., 2022). Considering the family type, being raised in a family with a single parent was considered a risk factor that increased children's level of addiction to games (Rehbein & Baier, 2013). In a study, preschool children of single-parent families had higher digital screen time (Xie et al., 2020). Some researchers have also stated a positive correlation between gaming time and game addiction (Rehbein & Baier, 2013; Park et al., 2007).

1.3 The context of COVID-19 pandemic

Prior research has shown that most preschool children use digital media (Findahl, 2012; Marsh et al., 2015; Rideout & Robb, 2020). Preschool children have been exposed to screen media since infancy (Susilowati et al., 2021), and their screen time exceeds the recommended limits set by the American Academy of Pediatrics (AAP, 2016). Despite the AAP's recommendation that pre-schoolers' spend no more than one hour/a day with technological devices, researchers have found that 64% of preschoolers used digital media for more than two hours in Canada during the pandemic (Fitzpatrick et al., 2022). This trend was confirmed by several studies, which indicated a significant increase in preschool children's screen time compared to pre-pandemic levels (Arı-Arat & Gülay-Ogelman, 2021; Arslan et al., 2021; Xie et al., 2020; Brzęk et al., 2021; Kracht et al., 2021; Aguilar-Farias et al., 2021) indicated that young children's recreational screen time increased. Meanwhile, physical activity levels among preschool children decreased during the pandemic (Brzęk et al., 2021; Aguilar-Farias et al., 2021), due to the stay-at-home policies and quarantines participation in online gaming increased (King et al., 2020). In line with prior research, another study that examines Turkish children's digital gaming habits before and during the COVID-19 pandemic found that children's digital game playing has increased during the COVID-19 pandemic. This study noted that most mothers reported that one of the reasons for increasing digital game playing of children during the pandemic was limited activities due to the pandemic lockdown. Mothers stated that they were unable to find suitable activities for their children (Oflu et al., 2021). Besides the digital gaming, with the decision taken by the Ministry of National Education of Turkey, face-to-face education was suspended in all formal education institutions affiliated to the Ministry of National Education, and on March 23, 2020, it started to carry out educational activities through distance education (MoNE, 2020). In this sense, researchers mentioned that because of the COVID-19 pandemic face-to-face teaching was disrupted and children were required to stay at home, which resulted in an increase communication and interaction through technological devices (Arslan et al., 2021). Therefore, the current state of the COVID-19 pandemic can be one reason why parents introduce children to digital media earlier (Susilowati et al., 2021).

According to several studies, there is evidence that digital play influences children's social relationships with their parents adversely (Choo et al., 2015; Kim et al., 2008). The state of COVID-19 pandemic can also disrupt family relationships. For instance, in a research examining how the COVID-19 pandemic process affected Korean families, it was found that while staying at home provided an opportunity for emotional bonding for some families, many families had difficulty adapting to this situation (Lee et al., 2020). Singaporean parents of children reported less closeness to their children during COVID-19 (Chung et al., 2020). Another study in the early of COVID-19 pandemic lockdown revealed that one in four parents has experienced more conflicts with their children since the pandemic process began (Lee & Ward, 2020). Researchers also mentioned that these rates may be increased over time as economic circumstances worsen and parents' stress levels rise. Similarly, in a study which examines the changes in family relationships during the pandemic, family

chaos during pandemic-related shutdowns was linked to a higher level of conflict between mothers and their children. Since the beginning of the pandemic, conflicts between children and parents have increased (Cassinat et al., 2021). According to another recent study, the majority of American mothers with preschool children stated an increase in children's screen time during the pandemic. The study also found that households with higher levels of screen time also tended to have higher levels of chaos (Kracht et al., 2021). These research display the substantial effects the pandemic had on family dynamics and relationships.

1.4 Theoretical background

Csikszentmihalyi's flow theory which bases game design process provides a valuable framework for understanding and addressing young children's digital play behaviour. According to this theory, motivation is the key factor that drives individuals to continue taking action, and this motivation is provided by the combination of flow and entertainment (Csikszentmihalyi, 2014). Flow is often experienced during physical activities; however, digital media usage time also relates to flow and addiction (Khang et al., 2013). According to researchers, the flow experiences have stronger effects on addiction (Chou & Ting, 2003; Kiatsakared & Chen, 2022) also explored the impact of flow experiences on online game addiction and found that the flow experience contributes to online game addiction during the COVID-19 pandemic. Other research performed in COVID-19 pandemic have also found that the flow was interrelated with gaming addiction (Al-Sharqi & Hasan, 2022; Barbon, 2021), with Barbon (2021) stating that the more people are occupied with video gaming they become addicted. Therefore, this theory ensures a useful framework for understanding why children become deeply engaged in digital play (Johnston, 2021).

On the other hand, parents' perspectives and expectations about digital media have an influence on their children's digital media interactions (Chaudron et al., 2015). Researchers reveal that parents with preschool children are concerned about the impact of technology. Most parents of preschoolers are worried because their children are constantly at the computer (Doliopoulou & Rizou, 2012). Parents with children aged 3–7 feel worried and hesitant to give permission for their children to use digital technologies (Mikelić Preradović et al., 2016). According to Cao et al. (2022), some parents are concerned about young children's digital addiction, feeling that their 3-6-year-olds are too young to use digital technologies in an appropriate way. In this respect, Livingstone and Helsper (2008) explained parental regulation of children's media engagement as parental mediation. On a basis, parental mediation theory classifies strategies into three dimensions: restrictive mediation, active mediation, and co-using. Restrictive mediation can be explained as restricting children's media usage and content, while active mediation makes references to watching and discussing on media content with children. Co-using is playing digital games together unless explaining and commenting on the content (Clark, 2011; Sobel et al., 2017). In the situation of COVID-19 pandemic, parental mediation was interrelated to children's spending time online, parents' worries and attitudes

in Ireland (Sciacca et al., 2022), and especially restrictive parental mediation was linked to risky digital media use by preschool children in Canada (Fitzpatrick et al., 2022). In short, parents' attitudes toward their children's digital play provide to comprehend young children's engagement in digital play.

1.5 The importance of the study and research questions

Prior research indicates the COVID-19 pandemic has significantly impacted the lives of children and families, especially caused a rise in screen time for children, disruptions in family relationships, limited leisure activities, and other impacts that have necessitated further research. Excessive screen time was a significant consequence of the lockdowns for both pre-school and school-aged children (López-Bueno et al., 2021). Studies have indicated that during the COVID-19 pandemic, there has been an increase in Turkish preschool children's tendencies of technological device using (Arslan et al., 2021) and out of 1245 Turkish preschoolers, 25% of them were observed to engage in playing video games (Yalçın et al., 2022). The primary purpose of screen use for gaming and entertainment among children aged 3–9 years was significantly associated with increased screen time (Türe & Velipaşaoğlu, 2021). During the COVID-19 pandemic, there was an increase in school-aged children's gaming disorder, which is a behavioral addiction (Çakıroğlu et al., 2021; Choi et al., 2021) reported an increase in smartphone addiction tendencies among children. Similarly, Ekinci et al. (2021) found that the level of game addiction among children also increased. According to another study conducted during the pandemic, the rise in preschool children's addiction to digital games has had an adverse effect on their social and emotional development (Şenol et al., 2023).

Given the ever-increasing presence of digital play, and the potential to affect the family and child context, it is important to conduct an examination of these relationships. The maternal factors were examined in previous research on preschool children's digital technology usage. For instance, research has demonstrated a connection between the well-being of mothers and their children's digital devices usage (Özyurt et al., 2018; Pempek & McDaniel 2016). Additionally, in a study, lower maternal education was associated with higher digital screen time of preschool children (Xie et al., 2020). Since the mother-child relationship is closely linked to children's outcomes (Solomon, 1996), maternal factors may also be related to young children's digital play behaviour, such as their use of digital technology. Therefore, we investigated preschool children's digital play behaviour by focusing on the mother-child relationship.

This study basically examines how children and mothers' factors affect children's digital play behaviour. There was no existing research that has investigated how the relationship between mother and child may affect preschool children's tendency to digital play addiction. This means that little is known about the predictive factors of preschool children's digital play addiction tendencies. The major contribution of this study is to identify the predictive factors of preschool children's digital play addiction tendency. For this reason, the goal of this study was to better understand the level of preschool children's digital play addiction tendency, and the mother-child

relationship, considering the child- and family-related factors. Despite the importance of these variables, these relations have not yet been tested. It is therefore expected that a negative mother-child relationship will predict preschool children's tendency level toward digital play addiction. The results of this study are anticipated to make remarkable contributions to the literature on the between children's digital play behaviour and relationship with their mothers.

The current study bridges these gaps in the literature by examining associations between preschool children's digital play addiction tendency, and the mother-child relationship. The aim of this study is to address the following research questions:

1) What is the relationship between demographic variables (children's gender, children's age, mothers' educational level, mothers' employment status, family income, and family type) and digital play addiction tendencies of preschool children?
2) What is the relationship between digital-related variables (children's digital play usage, children's digital play status, mothers' digital device usage) and digital play addiction tendencies of preschool children?
3) Is there a relationship between mother-child relationship and children's digital play addiction tendencies?
4) What are the predictors of digital play addiction tendencies among preschool-aged children?

Based on these considerations, the current study had three following aims: (a) to determine preschool children's digital play addiction tendencies and mother-child relationships as perceived by mothers during the COVID-19 pandemic, examining also child- and family-related factors in Istanbul, Turkey; (b) to examine the relationship between preschool children's digital play addiction tendency and the mother-child relationship; (c) to examine the role of mother-child relationship and child- and family-related factors on young children's tendency levels of digital play addiction.

2 Method

2.1 Research model

In this study, since the relationships between mother-child relationship and child- and family-related factors and children's digital play addiction tendencies were examined, a correlational survey model was used. The correlational study refers to research conducted to discover relationships between variables (Gall et al., 1996; Cresswell, 2012). Mother-child relationship and child- and family-related factors were the independent variables of the research while the dependent variable was comprised of children's digital play addiction tendencies.

2.2 Participants

Data in this study were collected in Istanbul, Turkey, in March and April 2021, during the COVID-19 pandemic. Participants consist of 450 mothers (age range = 24–52) with 48–72 months old children attending preschool education affiliated to Istanbul Directorate of National Education in the 2020–2021 academic year. This study gathered data from 13 different preschool education institutions that gave permission to participate in the study. To select the preschool education institutions convenience sampling was used. Questionnaires were sent to 47 preschool teachers in preschool institutions, who were in turn asked to give the questionnaires to their students' mothers. Table 1 shows further descriptive characteristics related to mothers' age, mothers' educational and employment status, children's sex, children's age, duration of children's attending preschool education, family income, and family type.

2.3 Measures

In this study, demographic information form, digital play addiction tendency scale, and mother-child relationship scale were used.

2.3.1 Demographic information questionnaire

Researchers prepared this questionnaire to gather the personal information of the mothers and their children and examine its relationship with the variables of the study. The demographic information questionnaire includes two sections: demographic variables and digital-related variables. In the first section, there are questions about sample characteristics such as the age of mothers and children, gender of the children, duration of children's attending preschool education, educational level and employment status of mothers, monthly family income, and family type. The second section includes questions about children's most preferred digital device in digital play, mothers' most used digital device, children's digital play usage, mothers' digital device usage, and children's digital play status. Researchers have asked mothers to report how many minutes their digital device usage and children's digital play in a day, to determine the children's digital play usage and mothers' digital device usage. Additionally, mothers reported how their children's digital play in two ways: alone and interactive by mothers. Interactive by mothers means that mothers have participated in their children's digital play and help sometimes.

2.3.2 Digital play addiction tendency scale (DPATS)

This scale was developed by Budak and Işıkoğlu (2022) to determine the digital play addiction tendencies of preschool children, in which consists of a total of 20 items under four subscales. The names of the subscales are Dissociation from Life, Conflict, Constant Play, and Reflection on Life. These subscales consist of seven,

Table 1 Sample characteristics

Measure		N (%)	M	SD
Mother's Age			35.21	4.90
Mothers' Educational Level	Associate and below	252 (56.0)		
	Bachelor and higher	198 (44.0)		
Mothers' Employment Status	Unemployed (currently)	245 (54.8)		
	Employed (currently)	202 (45.2)		
Children's Sex	Girl	225 (50.0)		
	Boy	225 (50.0)		
Children's Age	48–60 months	153 (34.0)		
	61–72 months	297 (66.0)		
Attending Preschool Education	First-year	208 (46.2)		
	Second-year	156 (34.7)		
	Third-year	86 (19.1)		
Family Income	Low (≤ 3500 TL/month)	60 (16.8)		
	Middle (3501–6500 TL/month)	131 (36.7)		
	High (≥ 6501 TL/month)	166 (46.5)		
Family Type	Nuclear family	364 (80.9)		
	Extended family	58 (12.9)		
	Single-parent family	17 (3.8)		
Total		450 (100.0)		

five, five, and three items in total, respectively. There is no reverse-coded item on the scale. The Cronbach Alpha reliability coefficients were respectively, 0.88, 0.90, 0.82, and 0.70. The internal consistency coefficient for the overall scale was 0.93. In this study, the Cronbach Alpha reliability coefficients were, respectively, 0.90, 0.93, 0.88, and 0.74. The internal consistency coefficient for the overall scale was 0.95. The scale has a maximum score of 100 and a minimum score of 20. Preschool children's addiction tendencies are classified as minimal, low, moderate, high and extremely high. A high score indicates that children have a high level of digital play addiction tendency, while a low score indicates that children have a low level of digital play addiction tendency.

2.3.3 Parent-child relationship scale (PCR)

The scale was developed by Robert C. Pianta (1992) to examine the parent-child relationship, and it was adapted into Turkish culture by Akgün and Yeşilyaprak (2010). The adaptation study was performed with only the mothers of 36–72-month-old children, so the adapted scale measured only the mother-child relationship. The adapted scale consists of 24 items and two factors. The first subscale of the adapted scale was named Conflict and consists of 14 items in total. The second subscale was named Positive Relationship and consists of 10 items in total. There are reverse-coded items on the scale. The Cronbach Alpha reliability coefficient for the first factor was 0.85, and the Cronbach Alpha reliability coefficient for the second factor was 0.74. The internal consistency coefficient for the overall scale was 0.73. In this study, the Cronbach Alpha reliability coefficient for the first factor was 0.80, and that for the second factor was 0.82. The internal consistency coefficient for the overall scale was 0.50. The scale has a maximum score of 120 and a minimum score of 24. A high score indicates a negative mother-child relationship, while a low score indicates a positive mother-child relationship.

2.4 Data collection process

This study was conducted in adherence to ethical principles. Before starting the data collection, written ethical approval from the Institutional Review Board for Research with Human Subjects at Yıldız Technical University, and permission from the Istanbul Provincial Directorate of National Education were obtained. Upon receiving permission, written participation consent forms and data collection forms were prepared. The data were collected from 13 different preschools. To select the preschool education institutions convenience sampling was used. Questionnaires were sent to 47 preschool teachers in preschool institutions, who were in turn asked to give the questionnaires to their students' mothers. A total of 450 mothers out of 635 mothers who gave their consent to participate by signing their names on the participant consent forms, completed the data collection forms. Due to the COVID-19 restrictions, preschool teachers gave back data collection tools to the researchers. Thus, the response rate was 75.12%.

2.5 Data analyses

As a preliminary data analysis, the data for normality was checked. The data did not display strong deviation from normality in the sample. Moreover, there were no missing data in the sample. Descriptive statistics were computed to explore the mother-child relationship, children's digital play addiction tendency, the child- and family-related factors. Independent sample t-tests were performed when conducting between-group analyses. Two-way ANOVA was performed to explore the the impact of children's sex and age on preschool children's digital play addiction tendency. One-way ANOVA was used to compare the mean values in different groups of children's digital play usage and the mothers' digital device usage. Pearson correlation analyses was conducted to assess the relationship between the children's digital play addiction tendencies and the mother-child relationship (Tabachnick & Fidell, 2013). Hierarchical linear regression analysis was used to assess the fourth research question by examining the combined contributions of the mother-child relationship, and child- and family-related factors on the children's digital play addiction tendency. The statistical analyses were conducted using IBM SPSS Statistics.

3 Results

3.1 Descriptive statistics and child-, and family-related differences

All preschool children in the current study had access to at least one digital device. The mothers reported that they mostly use smartphones and computers as digital devices (84.7% and 13.8%, respectively), and also their children mostly preferred smartphones and tablets for digital play (59.1% and 29.1%, respectively). Most children were alone while playing with digital devices. More than half of children had digital play for more than one hour in a day. (Table 2)

Table 3 shows the descriptive statistics for the DPATS total score and the subscales of the Mother-Child Relationship Scale, respectively. In this sample, the DPATS total scores of preschool-aged children ranged from 20 to 89 (M = 45.73, SD = 16.04). Their mean scores on the DPATS subscales were 15.04 for Dissociation from Life, 12.27 for Conflict, 10.89 for Constant Play, and 7.53 for Reflection on Life. The total of the Mother-Child Relationship Scale scores of the mothers ranged from 28 to 87 (M = 50.13, SD = 10.52), where the mean scores of its subscales were 30.41 for Conflict and 19.71 for Positive Relationship (Table 3). Children's digital play addiction tendencies were categorized as follows: 29.8% had minimal addiction, 36.9% had low addiction, 23.1% had moderate addiction, 8.9% had high addiction, and 1.3% had extremely high addiction. The findings showed that 33.2% of the children had a moderate or higher level of digital play addiction tendency.

Independent samples t-tests were performed to estimate the group differences based on the children's sex and age. Concerning the sex and age group of the children, the means, standard deviations, and t-test values for all of the variables are shown in Table 4. Table 4 showed that there are significant differences with regard to sex for the DPATS and its subscales, with the boys having higher mean scores than

Table 2 Distribution of children's and mothers' digital device usage

Measure	Groups	N (%)
Children's digital play usage	Less than 1 h/day	193 (43.5)
	1–2 h/day	140 (31.5)
	More than 2 h/day	111 (25.0)
Children's digital devices preferences	Smartphones	266 (59.1)
	Tablets	131 (29.1)
	Computer	18 (4.0)
	Game consoles	9 (2.0)
Children's digital play status	Alone	244 (68.0)
	Interactive by mother	115 (32.0)
Mothers' digital device usage	Less than 1 h/day	138 (31.0)
	1–2 h/day	138 (31.0)
	More than 2 h/day	169 (38.0)
Mothers' digital device preferences	Smartphones	381 (84.7)
	Tablets	4 (0.9)
	Computer	62 (13.8)
	Game consoles	0 (0.0)

girls. There were also significant differences with regard to age in only the Constant Play subscale, with older-age children having higher mean scores than younger-age children (Table 4).

According to the results of independent samples *t*-tests, in order to explore the potential impact of children's sex and age on preschool children's digital play addiction tendency the two-way ANOVA test was performed. Figure 1 presents the descriptive statistics of DPATS scores by children's sex and age (Fig. 1).

Based on the results of two-way ANOVA, the variables "Children's Sex x Children's Age" do not reach the level of significance, with an *F*-value of 1.075 ($p = 0.300$), indicating that the interaction among the two variables does not exhibit significant effects on the preschool children's digital play addiction tendency. In addition, children's sex reaches the level of significance in the main effect of DPATS

Table 3 Distribution of the DPATS total score and subscale scores of children, PCRS total score, and subscale score of the mothers ($n = 450$)

Scales	Means ± SD	Median (Min-Max)
DPATS total score	45.73 ± 16.04	43.0 (20.0–89.0)
Dissociation from life	15.04 ± 6.22	14.0 (7.0–35.0)
Conflict	12.27 ± 5.13	11.0 (5.0–25.0)
Constant play	10.89 ± 4.50	10.0 (5.0–24.0)
Reflection on life	7.53 ± 2.91	7.0 (3.0–15.0)
PCRS total score	50.13 ± 10.52	49.0 (28.0–87.0)
Conflict	30.41 ± 8.93	29.0 (14.0–62.0)
Positive relationship	19.71 ± 3.15	19.0 (10.0–34.0)

Table 4 Mean ($\bar{x}$) and standard deviation (SD) value of the variables based on the child's sex and age

Child's digital play addiction tendency	Sex				Age			
	Girls	Boys			48–60 mos.	61–72 mos.		
	$\bar{x}$ (SD)	$\bar{x}$ (SD)	t(df)	p	$\bar{x}$ (SD)	$=\bar{x}$ (SD)	t(df)	p
DPATS	42.11 (14.62)	49.35 (16.60)	−4.91 (448)	0.000*	44.12 (15.08)	46.56 (16.47)	−1.53 (448)	0.126
Dissociation from life	14.19 (6.01)	15.89 (6.32)	−2.94 (448)	0.003*	14.61 (5.80)	15.26 (6.42)	−1.04 (448)	0.298
Conflict	11.04 (4.44)	13.50 (5.47)	−5.24 (448)	0.000*	11.96 (4.91)	12.43 (5.24)	−0.92 (448)	0.358
Constant play	9.78 (3.92)	12.00 (4.77)	−5.40 (448)	0.000*	10.08 (4.30)	11.31 (4.55)	−2.76 (448)	0.006*
Reflection on life	7.11 (2.81)	7.96 (2.96)	−3.12 (448)	0.002*	7.46 (2.79)	7.57 (2.98)	−0.35 (448)	0.726

*p <0.05

Fig. 1 Children's sex and age on the DPATS scores
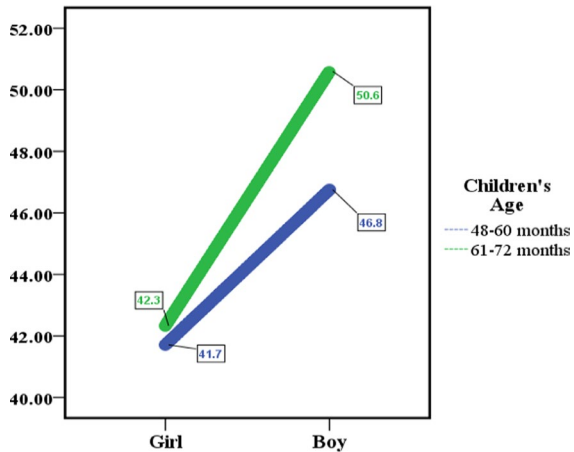
scores ($F = 18.293$; $p = 0.00$), indicating that preschool children's digital play addiction tendencies of boys and girls differ significantly. Concerning another variable in this study, children who played with digital alone (M: 47.91, SD: 16.62) showed a higher digital play addiction tendency ($t_{(357)} = 3.61$, $p < 0.05$) (M: 41.64, SD: 12.12). Regarding the usage of the child's digital play, the mean, standard deviation, and ANOVA F values are shown in Table 5.

The results demonstrated that at least two or three groups differed significantly with regard to the mean scores of the DPATS and its subscales. The post hoc comparisons, using the Bonferroni test, indicated that children whose daily usage of

Table 5 Mean ($\bar{x}$), standard deviation (SD), and one-way ANOVA F value differences based on the child's digital play usage and mother's digital device usage for DOBE and its subscales among the children and mothers

	<1 h $\bar{x}$ (SD)	1–2 h $\bar{x}$ (SD)	≥2 h $\bar{x}$ (SD)	F(df)	p	Post-Hoc
Child's digital play usage						
DPATS	38.99 (14.02)	44.76 (13.28)	58.64 (14.69)	70.25 (441)	.000*	1–2,3; 2–3
Dissociation from life	13.71 (5.83)	14.33 (5.58)	18.24 (6.46)	22.10 (441)	0.000*	1–3; 2–3
Conflict	10.40 (4.67)	12.01 (4.35)	15.88 (5.01)	49.01 (441)	0.000*	1–2,3; 2–3
Constant play	8.19 (3.08)	10.95 (3.28)	15.45 (4.08)	159.33 (441)	0.000*	1–2,3; 2–3
Reflection on life	6.68 (2.85)	7.46 (2.67)	9.06 (2.64)	26.58 (441)	0.000*	1–2,3; 2–3
Mother's digital device usage						
DPATS	41.86 (15.37)	44.79 (14.43)	49.75 (17.02)	9.93 (442)	0.000*	1–3; 2–3
Dissociation from life	14.80 (6.42)	14.36 (5.90)	15.80 (6.28)	2.22 (442)	0.110	
Conflict	11.10 (5.06)	11.93 (4.46)	13.51 (5.48)	9.08 (442)	0.000*	1–3; 2–3
Constant play	8.90 (3.45)	10.95 (3.77)	12.52 (5.13)	27.58 (442)	0.000*	1–2,3; 2–3
Reflection on life	7.05 (2.87)	7.55 (2.87)	7.92 (2.95)	3.39 (442)	0.035*	1–3

*$p < 0.05$

digital play was less than 1 h had a significantly lower mean value on the DPATS and its subscales than children whose daily usage of digital play was more than 2 h. Similarly, children whose daily usage of digital play was 1–2 h had a significantly lower mean value on the DPATS and its subscales than children whose daily usage of digital play was more than 2 h. Additionally, children whose daily usage of digital play was less than 1 h had a significantly lower mean value on the DPATS and its subscales, except for the Dissociation from Life subscale, than children whose daily usage of digital play was 1–2 h.

No mothers' age and employment status differences emerged in children's digital play addiction tendencies. Despite these, preschool children whose mothers had an associate degree or below had significantly higher mean values on the Constant Play subscale than preschool children whose mothers had a bachelor's degree or higher (t $_{(447)}$ = 2.20, p < 0.05).

Concerning the other variables in this study, there were significant differences in the mothers' daily digital device usage. Results from the Bonferroni test post-hoc indicated that mothers whose digital device usage was less than 1 h had a significantly lower mean value on the DPATS total score, Conflict, Constant Play, and Reflection on Life subscales than mothers whose digital device usage was more than 2 h. Not surprisingly, mothers whose digital device usage was 1–2 h had a significantly lower mean value on the DPATS, Conflict, and Constant Play subscales than mothers whose digital device usage was more than 2 h. Additionally, mothers whose digital device usage was less than 1 h had a significantly lower mean value on the Constant Play subscale than mothers whose digital device usage was 1–2 h.

Significant family-related factors were found when comparing the scores of the preschool children about the tendency level of digital play addiction. Regarding the family type and family income, the mean, standard deviation, and ANOVA F values are shown in Table 6. The findings demonstrated that preschool children from a single-parent family had a higher tendency of digital play addiction when compared to preschool children from a nuclear family on the DPATS, Dissociation from Life, and Reflection on Life subscales. Additionally, preschool children from a single-parent family had a significantly higher mean value for the Dissociation from Life subscale than preschool children from an extended family. Concerning the family income variable in this study, only in the Constant Play subscale, did the preschool children from low-income family show a higher tendency of digital play addiction when compared to preschool children from high-income families.

3.2 Correlation analyses

The associations among the study variables were analyzed using the Pearson correlation analysis. The correlations among all of the study variables can be seen in Table 7. The children's levels of digital play addiction tendency positively correlated with the mother-child relationship (r = 0.528, p < 0.001) and children's digital play usage (r = 0.478, p < 0.001). The findings indicated that children who had a higher level of digital play addiction tendency and who spent more time on digital play had

Table 6 Mean ($\bar{x}$), standard deviation (SD), and one-way ANOVA F value differences based on the family type and family income

Family type (N=439)	Nuclear family (n=364) $\bar{x}$ (SD)	Extended family (n=58) $\bar{x}$ (SD)	Single-parent family (n=17) $\bar{x}$ (SD)	F(df)	p	Post-Hoc
DPATS	45.15 (16.18)	47.38 (14.50)	55.24 (16.77)	3.54 (436)	.030*	1–3
Dissociation from life	14.77 (6.07)	15.31 (6.20)	20.00 (7.66)	5.92 (436)	0.003*	1–3 2–3
Conflict	12.17 (5.09)	12.67 (4.86)	14.59 (6.81)	1.96 (436)	0.142	
Constant play	10.81 (4.56)	11.28 (4.05)	11.47 (5.01)	0.41 (436)	0.662	
Reflection on life	7.40 (2.88)	8.12 (2.93)	9.18 (3.21)	4.31 (436)	0.014*	1–3

Family income (N=357)	Low (n=60) $\bar{x}$ (SD)	Middle (n=131) $\bar{x}$ (SD)	High (n=166) $\bar{x}$ (SD)	F(df)	p	Post-Hoc
DPATS	49.02 (14.95)	46.53 (16.80)	44.80 (16.04)	1.57 (354)	0.210	
Dissociation from life	15.33 (6.44)	15.59 (6.47)	15.01 (6.17)	0.31 (354)	0.732	
Conflict	13.78 (5.02)	12.18 (5.36)	12.07 (4.92)	2.67 (354)	0.071	
Constant play	12.17 (4.42)	11.10 (4.51)	10.40 (4.56)	3.49 (354)	0.032*	1–3
Reflection on life	7.73 (2.68)	7.66 (2.84)	7.32 (3.02)	0.72 (354)	0.486	

*p <0.05

Table 7 Bivariate correlations among the study variables

Variables	M	SD	1	2	3	4	5	6	7	8	9	10
1 DPATS	45.73	16.04	-									
2 Dissociation from life	15.04	6.21	0.896**	-								
3 Conflict	12.27	5.13	0.903**	0.735**	-							
4 Constant play	10.89	4.50	0.831**	0.593**	0.718**	-						
5 Reflection on life	7.53	2.91	0.720**	0.589**	0.533**	0.497**	-					
6 PCRS	50.13	10.52	0.528**	0.497**	0.492**	0.395**	0.369**	-				
7 Conflict	30.41	8.93	0.507**	0.459**	0.487**	0.380**	0.369**	0.965**	-			
8 Positive relationship	19.71	3.15	0.322**	0.364**	0.251**	0.224**	0.207**	0.605**	0.392**	-		
9 Child's DPU	1.82	0.81	0.478**	0.276**	0.414**	0.641**	0.322**	0.206**	0.212**	0.076	-	
10 Mother's DDU	2.07	0.83	0.205**	0.071	0.196**	0.332**	0.122**	0.076	0.081	0.016	0.635**	-

** $p < 0.001$, DPU: Digital Play Usage, DDU: Digital Device Usage

a negative mother-child relationship. In addition, mothers with high digital device usage had children who spent more time on digital play compared to the mothers with less digital device usage (r=0.635, $p<0.001$). The correlational results are summarized in Table 7.

3.3 Hierarchical linear regression analysis

The assumptions of the linear regression analysis were examined before the running regression. To assess multivariate normality, the univariate normality of residuals for children's digital play addiction tendencies was checked. The assumption of multivariate normality examined by the histogram of the standardized residuals (Fig. 2). To check for homoscedasticity of the residuals, both a P-P plot of the residuals (Fig. 3) and a scatterplot (Fig. 4) were examined. The VIF values were examined to detect the multicollinearity.

Based on Fig. 2, it can be observed that the line passes through several points, indicating that the assumptions of normality and linearity required for regression analysis have been met. The scatter plot didn't show any no pattern. There was no evidence of non-multicollinearity detected in the analysis. This finding suggests that the assumptions of normality and linearity, as required by regression analysis, have been satisfied. As the assumptions for linear regression were satisfied, linear regression analysis was conducted.

Hierarchical linear regression analysis was performed to identify whether the mother-child relationship and/or children's age, children's sex, mothers' digital device usage, and children's usage of digital play predicted children's digital play addiction tendencies (Table 8).

Fig. 2 Histogram

Mean = -3.55E-16
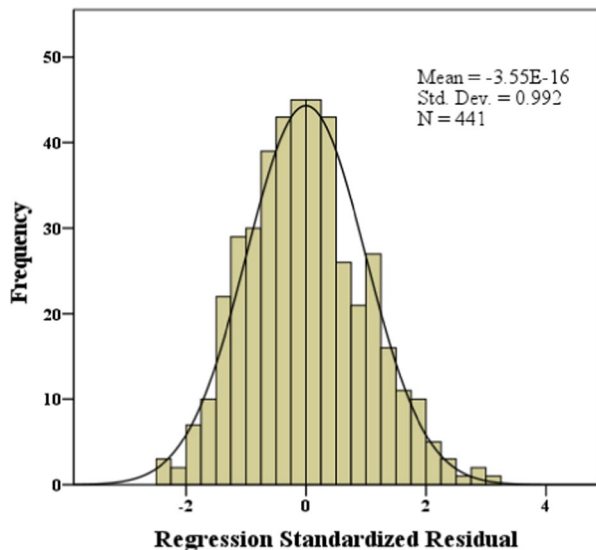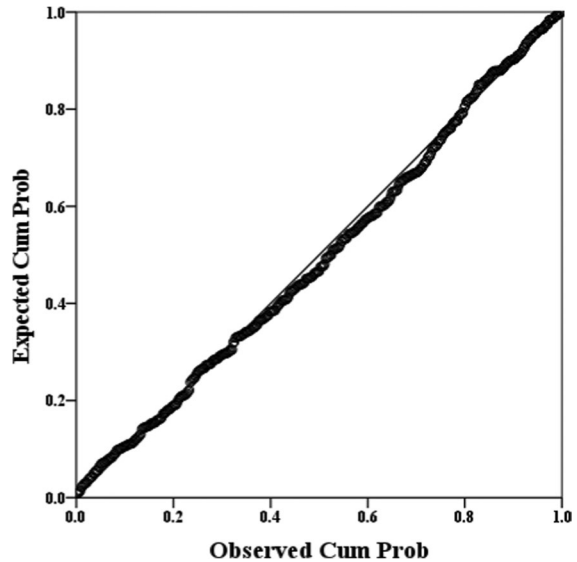Std. Dev. = 0.992
N = 441

Fig. 3 The normal p-p plot

Specifically, child- and family-related factors such as the children's sex, age, and daily usage of digital play, and the mothers' digital device usage were entered in the first step of the model, and the mother-child relationship was added in the second step. The results revealed that the child- and family-related factors, entered in the first step, accounted for 26% of the variance ($R^2 = 0.269$, F $= 27.996$, $p < 0.005$). In the first step, only the children's age did not emerge as a significant predictor of the children's digital play addiction tendency (ß $= 0.020$, F $= 53.415$, $p = 0.622$). In the second step, in which the mother-child relationship was added to the equation, the mother-child relationship was shown to be a significant positive predictor of the children's digital play addiction tendency, accounting for an additional 19% of the variance ($R^2 = 0.455$, $p < 0.005$). The children's age remained a non-significant predictor (ß $= 0.024$, $p = 0.510$). Additionally, the mothers' 1–2 h of digital device usage did not emerge as a significant predictor of the children's digital play addiction tendency (ß $= 0.196$, $p = 0.056$). Similarly in step 1,
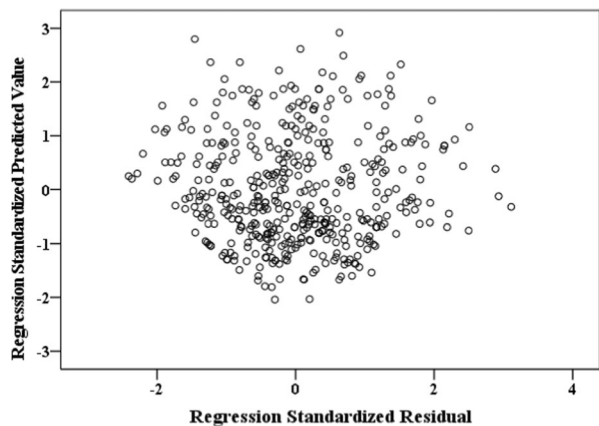
Fig. 4 The scatter plot

Table 8 Regression analysis predicting children's digital play addiction tendency

	B	SE	ß	P-value	F	R^2	ΔR^2
Step 1					27.996	0.269	0.269
Child sex							
(girl vs. boy)	5.096	1.316	0.160*	0.000*			
Child age							
(48–60 mos. vs. 61–72 mos.)	0.687	1.394	0.020	0.622			
Children's digital play usage							
(<1 h vs. 1–2 h)	8.321	2.119	0.243*	0.000*			
(<1 h vs. ≥2 h)	22.683	2.140	0.614*	0.000*			
Mothers' digital device usage							
(<1 h vs. 1–2 h)	−5.373	2.284	−0.156*	0.019*			
(<1 h vs. ≥2 h)	−6.133	2.076	−0.186*	0.003*			
Step 2					53.415	0.455	0.186
Child sex							
(girl vs. boy)	5.410	1.137	0.169*	0.000*			
Child age							
(48–60 mos. vs. 61–72 mos.)	0.794	1.204	0.024	0.510			
Children's digital play usage							
(<1 h vs. 1–2 h)	6.716	1.835	0.196*	0.000*			
(<1 h vs. ≥2 h)	17.512	1.897	0.474*	0.000*			
Mothers' digital device usage							
(<1 h vs. 1–2 h)	−3.781	1.977	−0.110	0.056			
(<1 h vs. ≥2 h)	−4.430	1.798	−0.135*	0.014*			
Mother-child relationship	0.673	0.055	0.443*	0.000*			

children's digital play usage was still a significant factor, which indicated a strong predictor of children's digital play addiction while in step 2, the mother-child relationship was the second strong predictor. Full statistics of the models are reported in Table 8.

4 Discussion

In this section, findings derived from the study will be discussed. In this research, the impact of the mother-child relationship and the child- and family-related factors on children's digital play addiction tendencies was examined. For the analysis, demographic information form, mother-child relationship scale, and digital play addiction tendency scale were used. Also, children's digital play usage and mothers' digital device usage were analysed.

The first goal of the study was to identify preschool children's digital play addiction tendencies and mother-child relationships as perceived by mothers during the COVID-19 pandemic, examining also child- and family-related factors. The descriptive analyses showed that 33.3% of preschool children had a moderate and above level of digital play addiction tendency. In a previous study in the literature, 20% of preschool children had a moderate and above level of digital play tendency (Budak, 2020). These showed that during the pandemic process, preschool children's level of digital play addiction tendency has increased. This finding is expected because several studies have revealed that during the pandemic, digital play (Lee et al., 2020) and smartphone addiction have increased (Choi et al., 2021). The second major finding herein was that the mother-child relationship perceived by the mothers was positive. This was consistent with the research performed in England during the COVID-19 pandemic which found that 97% of parents had close or very close relationships with their children (Perelli-Harris & Walzenbach, 2020). In Saudi Arabia, it was found that the mothers' relationship with their children was more conflictive before the COVID-19 quarantine (Andejany et al., 2020). This finding could be explained by the mothers' involvement in the children's daily activities. Likewise, most parents have been spending more time taking care of their children since the pandemic (Lee et al., 2021).

It should be noted that the results of this research showed that some child- and family-related factors were consistent with the children's level of digital play addiction tendency. For example, boys compared to girls, and older children compared to younger children had a high level of digital play addiction tendency. This finding could be explained by the children's digital play usage, in which is it was found a number of studies that boys spend more time playing digital games (Nikken & Schols, 2015; Hu et al., 2018). Additionally, the current study indicated that children from single-parent families had a higher level of digital play addiction tendency when compared to children from a nuclear family. Similarly, some researchers have revealed that being raised in a family with a single parent was a risk factor that increases children's game addiction (Rehbein & Baier, 2013). During COVID-19 pandemic, family structure was also found to be significantly associated with gaming behaviors. Children and adolescents in primary and secondary schools from single-parent families was at a higher risk of developing pathological gaming behaviors

(Zhu et al., 2021). Another study which aims to analyse the daily routines of 0–12 years old children during the pandemic lockdown, children in two-parent families who are separated showed a greater use of digital screen in a day (Cachón-Zagalaz et al., 2021). A recent study conducted in Japan during the COVID-19 pandemic asked parents with children aged 0–14 years to report their children's daily activities. The study demonstrated that children from single-parent households spent more time engaging in activities such as watching online entertainment, and playing games compared to those from two-parent families (Naito et al., 2022). It was also found that preschool children whose mothers had an associate degree or below had a significantly higher mean value on the Constant Play subscale than preschool children whose mothers had a bachelor's degree or higher. This could be due to parental preferences about their children's digital play. Another study that aimed to examine 500 preschool-aged children's parents' opinions and preferences about children's digital play, the less educated parents preferred digital play for their 4–6-year-old children (Isikoglu Erdogan et al., 2019). Furthermore, associations between the mother's age, working status, and the children's level of digital play addiction tendency were non-significant. Future research could also examine mothers and children with possible risk factors.

It's crucial to also consider to the parents' digital device usage. The fact that parents use digital media more frequently revealed that their children also spend more time with digital tools (Nikken & Schols, 2015), while the decrease in the parents' screen time results in a decrease in their children's screen time (Hu et al., 2018). In accordance with this, the current research found that the mothers' higher digital device usage was related to the preschool children's higher level of digital play addiction tendency. This finding was expected because researchers found that parents' smartphone addiction may affect their children's smartphone addiction (Lim & Jeong, 2022). Another factor focused on herein was the children's digital play usage, children with daily usage of digital play had a higher digital play addiction tendency. This finding was also expected because spending more time using smartphones in a day was related to the smartphone addiction of elementary school children (Lee & Kim, 2018).

In terms of the second aim, the relationship between preschool children's digital play addiction tendency and the mother-child relationship was examined. The finding indicated that a negative mother-child relationship is linked to a higher level of preschool children's digital play addiction tendencies. In accordance with the findings of a research performed in Singapore which was shown that parent-child closeness was associated with a decrease in digital game addiction (Choo et al., 2015). Besides that, French parents thought digital devices may have an impact on parent-child relationships (Danet, 2020). In this respect, it is an expected result. Nonetheless, studies exploring the mother-child relationship effects are limited. The reason behind the relationship might be due to mothers' lack of knowledge about mediation strategies and consequently their decreasing ability to manage their children's digital play in an appropriate way.

With regard to the third aim, the hierarchical regression analysis results showed that the children's sex, children's digital play usage, mothers' digital device usage, and the mother-child relationship were significant positive predictors of preschool

children's digital play addiction tendency. As mentioned earlier, the children's sex, children's digital play usage, and mothers' digital device usage have an effect on the children's digital play addiction tendency. Another noteworthy finding was that the mother-child relationship was a predicting factor for children's digital play addiction tendencies. Healthy parent-child relationships provide comfort at home, improve communication, and foster emotional relationships as well as children's attachment to their parents (Mulyadi et al., 2016). The absence of parents in their children's lives may cause a weaker and superficial parent-child interaction, and thus create complex problems for the children's future (Popov & Ilesanmi, 2015). In studies on the different samples, the parent-child relationship was found as one of the predictors of pathological indications of video gaming in children and adolescents (Choo et al., 2015). In terms of addiction, a low-quality parent-child relationship predicted early adolescents' internet gaming addiction (Zhu et al., 2015), and adolescents' smartphone addiction correlated with the parent-child relationship in a negative way (Gong et al., 2022). Thus, preschool-aged children's digital play addiction tendency was consistent with previous study samples in terms of the mother-child relationship, which is a predictive factor on digital addiction.

5 Conclusion

As previously mentioned, this study aimed to an examination of the mother-child relationship, and child- and family-related factors as potential predictors of children's digital play addiction tendency. In accordance with the purposes of current study, the preliminary and descriptive data were analyzed. It was found more than half of children (56.5%)'s daily digital play usage was more than an hour. Mothers also reported that most children were alone while playing with digital devices. The prevalence of digital play addiction tendency among preschoolers was higher in boys, daily digital play usage of more than two hours, in single-parent families, mothers' daily digital device usage of more than two hours. Another result obtained from the study reveals that mothers' age and employment status differences were not significantly in children's digital play addiction tendencies.

Another result obtained from this research is that the relation between children's digital play addiction tendency and mother-child relationship was found significantly and negatively. This finding showed that a negative mother-child relationship is linked to a higher level of preschool children's digital play addiction tendencies. This study also investigated the predictive factors on children's digital play addiction tendencies. The children- and family-related variables examined for the hierarchical regression analysis within the content of the last research question were selected based on the significant variables identified through sub-group analyses. In this regard, it was found that children's sex and digital play usage predicted children's digital play addiction tendencies in a significant way. Mother-child relationship also predicted children's digital play addiction tendency positively.

5.1 Limitations and recommendations

This study has several limitations, starting with it was a correlational survey study. For this reason, it was not possible to maintain a causal relationship among the mother-child relationship, and preschool children's digital play addiction tendency. Thus, a mixed methods research design is recommended. Secondly, we only focused on the perspective of mothers of 48–72-month-old preschool children and neglected the fathers' and children's perspectives. Third, convenience sampling was adopted in this study. Therefore, the results cannot be generalized to mothers with preschool children in general. Besides, including the fathers can give a clearer picture on the preschool children's digital play addiction tendency. Thus, it is suggested to use stratified random sampling in future studies. Finally, there may be some child- and family-related factors other than those explored in this study that affect preschool children's digital play addiction tendency (e.g., children's digital well-being, parents' digital addiction, father-child relationship, children's social activities and play preferences, and so on). Thus, future researchers can explore the relationships between these factors and preschool children's digital play addiction tendency. One practical implication of this study is that parents should be aware of their children's digital play behaviours during daily experiences.

Data availability The data are available from the corresponding author upon request.

Declarations

Conflict of interest None.

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