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The predictive relationships between children's digital game addiction tendencies and mothers' digital parenting awareness and digital literacy levels

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Abstract

The increasing prevalence of digital technologies has notably expanded children's accessibility to a diverse range of digital tools day by day. Consequently, this evolution has significantly influenced the gaming landscape, propelling the surge in popularity of digital games among children. This change has also led to the need for changes in the roles of parents. The awareness level of parents regarding digital technologies, coupled with their role as models in regulating preschool children's exposure to digital games, is believed to wield significant influence. Therefore, the present study aims to examine the predictive relationships between preschool children's digital game addiction tendencies and their mothers' digital literacy and digital parenting awareness. For this purpose, mothers of 400 children attending preschool education in Istanbul, Turkey's most populous city, were included in the study. To collect data for the study, mothers were asked to complete scales measuring their children's digital game addiction, determining their own digital parenting awareness, and assessing their digital literacy. The results show significant relationships between mothers' digital parenting awareness and children's digital game addiction tendencies and between mothers' digital literacy and digital parenting awareness. It was observed that gender, the time spent by the child and the mother with digital devices, and mothers' digital parenting awareness were significant predictors of children's digital game addiction tendencies. In addition, the study revealed that maternal age, educational attainment, the number of children, duration of engagement with digital tools, and proficiency in digital literacy serve as notable predictors across various sub-dimensions of mothers' digital parenting awareness.

Keywords Digital play · Digital literacy · Digital parenting · Play addiction tendency · Preschool children

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1 Introduction

The ever-evolving and expansive nature of digital technologies has instigated a transformation in the concept of play, influencing how children engage within their environment. The realm of childhood, once rooted in traditional games, has progressively transitioned toward computer-based technological gaming. Consequently, the interpretation encapsulated by the amalgamation of "children and technology" has gradually shifted to focus more on the domain of "children's and digital games" (Hazar, 2019).

The concept of digital games has emerged as a result of a rapid increase in the types and numbers of digital games since the early 2000s and an increase in children's interest in playing these games (Işıkoğlu Erdogan et al., 2019). As per the Digital Games Report released by the Information Technology and Communication Institution (2020), a digital game is delineated as a form of computer-based, text-based, or visual-based recreational activity accessible to one or multiple users via electronic platforms like a computer or game console. Digital games encompass interactive experiences that generate numerous options and scenarios, featuring diverse content, graphics, and varying difficulty levels. They possess the capacity for instantaneous updates and offer gameplay against artificial intelligence when multiplayer sessions are unattainable. These games are inclusive, enabling individuals of all ages to partake as players potentially (Prensky, 2001).

Various researchers have studied the positive and negative effects of digital games. Children's attention development, especially when digital games are used with an educational aspect (Liu et al., 2020), logical and strategic reasoning abilities (Bottino et al., 2007), visuospatial skills (Prot et al., 2014), and cooperative behaviors (Gentile et al., 2009) support. However, digital games also have negative effects such as children showing more aggression (Adachi & Willoughby, 2011; Greitemeyer, 2017), increased social anxiety (Griffiths, 2010), confusing the real and virtual world (Kol, 2021), shyness and depression (Peng & Liu, 2010), showing signs of inattention (Chan & Rabinowitz, 2006), decreased prosocial behaviors (Gentile & Anderson, 2006), learning disorders and decreased academic achievement (Horzum, 2011). Excessive use of digital games exacerbates its negative effects even more.

The inclusion of digital games on tablets and smartphones has increased their prevalence, leading to excessive use among some young children (Işıkoğlu et al., 2023). Uncontrolled and excessive use of digital games, becoming increasingly common, leads to addiction to digital games (Griffiths & Davies, 2005; Yalçın Irmak & Erdoğan, 2016). Digital game addiction is defined as playing digital games excessively and compulsively in a way that leads to social and/or emotional problems and being unable to control excessive use despite all these problems (Lemmens et al., 2009; Weinstein, 2010). Digital game addiction adversely affects interpersonal relationships, hobbies, general health and psychological well-being, as well as educational life (King et al., 2013).

With the integration of digital technologies into personal and social life spaces, these important changes in children's individual and social roles have also

occurred in parents' lives (Yaman et al., 2020; Yardi & Bruckman, 2011). In this issue, which can affect all areas of children's development, there are a number of characteristics that parents should have in order to be good guides in their children's digital worlds and to teach their children the correct use of technology. These characteristics have given rise to the concept of digital parenting (Sadiku et al., 2017; Yay, 2019).

Digital parenting is a popular and versatile concept that refers to the involvement of parents in regulating their children's relationships with digital media, the way they incorporate digital media into daily activities and parenting practices, and the parenting styles they exhibit while doing so (Mascheroni et al., 2018). The endeavors and strategies of parents, serving as the primary intermediaries in their children's engagement with digital tools, aimed at comprehending, aiding, and structuring their children's activities within digital environments, are encapsulated by the term "digital parenting" (Benedetto & Ingrassia, 2021). Huang et al. (2018) stated that parents who can cope with online bullying, know how to protect their children from inappropriate content, use digital resources when making decisions about their children's education, monitor social media, find other parents with similar concerns online and have the skills to join them are digital parents. Rode (2009) also explains the concept of digital parenting while talking about children's trust and privacy in online environments and their parents' protection obligations.

Parents who are primarily responsible for ensuring that children use online environments and keeping them safe by protecting them from risks (Konok et al., 2020; Livingstone & Byrne, 2018; Terras & Ramsay, 2016) apply different strategies (conciliation methods) to guide their children's technology use. These strategies are generally analyzed as active (talking about the content while the child is interacting with digital environments), restrictive (imposing restrictions on time spent, place of use, or content), and collaborative (sharing the experience without commenting while the child is interacting with digital environments) (Clark, 2011; Livingstone & Helsper, 2008; Nikken & Jansz, 2006). When the literature is examined, it is stated that digital parents have awareness, control, ethics, innovation and digital literacy roles. The role of awareness is the ability to notice the negativity in online environments, be aware of risks, perceive dangers, notice internet addiction, and distinguish what the child is doing on the Internet, while the role of control includes not leaving children alone in the unlimited environment of the Internet, using filter programs, preparing guidelines for the child's internet use, participating in fun with their children in social media environments and following the established rules. While the ethical role refers to the situations of respecting intellectual property, researching the reliability of information, and acting in accordance with the wishes of the rights holders in the information obtained, the role of innovation means being interested in innovations, making efforts to learn about innovations, following innovations, and being aware of the positive and negative aspects of innovations. Another digital parenting role, digital literacy, is explained in the form of being able to use technology at a basic level, being tolerant of technology-related problems, knowing the Internet technically, being willing to follow innovations, and knowing privacy policies (Kabakçı Yurdakul et al., 2013; Yay, 2019).

Fundamentally, digital literacy is rooted in a foundational understanding of literacy itself. Being literate is necessary for being digitally literate, but it is not enough (Belshaw, 2012). Digital literacy is not an alternative or a substitute for traditional literacy. It is an extension that is necessary for working, learning, and socializing in the modern world and contributes to general literacy (Churchill et al., 2008). It is also a survival skill in the technological age (Eshet-Alkalai, 2004).

The concept of digital literacy gained prominence through Gilster (1997), who defines the concept of digital literacy as the ability to understand and use information from a wide variety of sources presented through computers in more than one form. Digital literacy is the acquisition of skills and competencies related to new digital technologies that play a fundamental role in education, work, leisure time, and, ultimately, active citizenship in a technological society (Willem et al., 2006). According to Reddy et al. (2020), digital literacy is the ability of individuals to find and evaluate information, use this information effectively and create new content, as well as share and transmit this newly created information using appropriate digital technology. Moreover, Martin and Grudziecki (2006) expressed digital literacy as the awareness, attitude, and ability of individuals to identify, access, manage, integrate, evaluate, analyze, and synthesize digital resources, create new information and media expressions, and appropriately use digital tools and opportunities to communicate with others in order to enable constructive social interaction.

Digital literacy surpasses mere functional capabilities, extending beyond basic computer and keyboard proficiency or online search skills (Buckingham, 2008). Digital literacy is generally considered as a combination of technical-operational, cognitive and social-emotional skills (Aviram & Eshet-Alkalai, 2006). According to Brisson-Boivin (2018), digital literacy is a combination of technological capacities, intellectual competencies and ethical, social and behavioral practices.

Digital literacy is conceived as a trait inherent to individuals within a socio-cultural milieu, constituting an integral aspect of their identity (Martin, 2008). Digitally literate individuals are expected to perform basic computer-based operations and access resources for daily use; search, find and evaluate information effectively for research and content learning purposes; determine and develop the ability to use the most appropriate digital tools and features to complete a given task, solve problems or create products that best demonstrate new insights, communicate effectively by behaving appropriately in social networking communities and prevent damage in digitally enhanced environments (Ng, 2012a, 2012b). Parents who guide their children need to be digitally literate in order to follow the latest recommendations on technology use by making informed decisions. Digitally literate parents are expected to have lifelong learning skills including privacy, content and technology management, communication and interaction, and social and emotional skills; creativity, problem solving, attention and self-regulation skills; and finally, community-based information seeking and using technology as (meta)cognitive tools (Romero, 2014).

2 The importance and purpose of the study

With the proliferation and increased user-friendliness of digital technologies, children are increasingly exposed to these devices and more inclined to engage with them (Danovitch, 2019; Liu & Hwang, 2023). The apprehension surrounding this circumstance's potential impact on children's overall well-being has sparked a heightened interest in the subject (Hadlington et al., 2019). Similarly, digital games, which are very popular in today's world, have a greater impact on children, and the excessive use of such games is becoming an important concern (Hu & Fan, 2023). Parents of children exposed to technology from an early age actively facilitate and supervise their use of digital tools (Terras & Ramsay, 2016). It is important for parents to possess a fundamental understanding of digital technologies before guiding their children's utilization of these tools (Koran et al., 2022). Apart from serving as role models in their use of technology, parents' attitudes toward technology can significantly influence the home environment and subsequently impact children (Lauricella & Cingel, 2020; Lauricella et al., 2015). In addition, parents, especially preschool children, are responsible for setting rules about technological devices and allowing access (Pila et al., 2021). Parents should be careful about their children's use of digital games and introduce various measures to balance the time they spend in games with their real lives (Gao et al., 2023). Mothers considered unofficial educators, on the other hand, use digital technologies more often, besides having more and more important roles in parenting (Rahayu & Haningsih, 2021). However, it is believed that mothers are more responsible for controlling and directing their children's technology use than fathers (Tennakoon et al., 2018).

Parents collectively hold a crucial role in determining whether engagement with digital games leads to addiction or not. Children who are introduced to technology for the first time through their parents need to use technology correctly and be digitally literate in order not to be dragged into technological addictions such as gaming addiction. First of all, parents themselves need to be informed about the use, benefits and harms of digital technologies, in short. Families engaged as digital parents, actively contributing to quality education, a key component of sustainable development goals, possess vital digital literacy skills—integral to the 21st-century skill set. By fostering awareness regarding the appropriate use of technology, these families offer substantial support in both their children's daily routines and educational endeavors. It is believed that parents experience awareness about digital parenting according to their level of digital literacy; children who have digital tools in their homes since the moment they were born and observe their parents' use of digital tools are also influenced by this awareness and form a way of using technology.

The literature suggests that gender may affect children's digital game addiction tendencies (Yalçın Irmak & Erdoğan, 2016; Rehbein et al., 2010; Wittek et al., 2016). Furthermore, the time spent by both children and parents with digital devices and the way they use them may be among the important factors affecting the risk of digital game addiction (Akkaya et al., 2021; Kuss & Griffiths, 2011;

Soyoof et al., 2023; Zaman & Mifsud, 2017). It is also stated that access to digital technologies, effective and correct use of these technologies, and technological awareness can be affected by mothers' ages (Czaja & Schulz, 2006; Hargittai, 2010; Prensky, 2001), education levels (Konok et al., 2020; Livingstone & Helsper, 2007) and number of children (Nayci, 2021; Yaman, 2018). In the light of this information and in line with the objectives of the study, the study includes the variables of gender, the time spent by mother and child with digital devices, mother's education level and mother's age.

It can be asserted that there is a scarcity of research specifically assessing digital game addiction among preschool children in Turkey from a parental perspective, marking this area as relatively new and inadequately explored. These studies were on parental attitudes (Aküzüm et al., 2022), parental self-efficacy (Bağatarhan, 2023), mother–child relationship and family and child variables (Emiroğlu İlvan et al., 2023), and the effects of parental characteristics (Budak & Işıkoğlu, 2023). There is currently a dearth of studies investigating the correlation between parents' digital literacy, digital parental awareness, and children's digital game addiction, marking this as an unexplored area within research. In addition, the inclusion of the child's and parent's relationship with the screen in the study suggests that it would be useful to show to what extent these variables predict the child's digital game addiction. Hence, it is anticipated that the study will yield original findings due to the uncharted nature of this research area. Based on this importance and thought, this study aims to investigate the predictive relationship between digital game addiction tendencies of preschool children living in Istanbul, Turkey and their mothers' digital literacy and digital parenting awareness. In line with this main objective, we started from the fact that children's digital game addiction is affected by their gender, the amount of time they spend with digital devices and the amount of time their mothers spend with digital devices. In addition to these variables, we also focused on the fact that mothers' digital literacy and digital parenting awareness are also related to children's digital game addictions and sought answers to the following questions:

1. Is there a relationship between children's digital game addiction tendencies and their mothers' digital literacy and digital parenting awareness?
2. What are the predictors of children's digital game addiction tendencies?
3. What are the predictors of mothers' digital parental awareness?

3 Method

3.1 Research model

This study used the relational model, one of the quantitative research methods, to examine the relationship between digital literacy and digital parenting awareness of mothers with preschool children and their children's digital game addiction tendencies. The correlational model describes the degree of relationship between two or more quantitative variables using a correlation coefficient with the main aim of

clarifying understanding of important phenomena by describing the relationships between variables (Fraenkel et al., 2011).

3.2 Universe and sampling

The research encompasses children aged between 48 and 72 months attending preschool education across diverse districts of Istanbul and their respective mothers. The sample size comprises mothers of 400 children selected via a simple random sampling method from five districts in Istanbul. In the simple random sampling method, the number of people required is randomly selected and each individual has an equal chance of being included in the sampling (Robson, 2002). Krejcie and Morgan (1970) indicated that when the population size exceeds 100,000 individuals, a sample size of 384 is recommended. Since the number of children attending preschool education in Istanbul is over 100,000, the sample size was determined as 400. Approximately 16 million people live in Istanbul in Turkey, which has a population of 84.78 million. With this number, Istanbul comes across as the most populous city in Turkey. In Turkey, there are 15,970,951 children between the ages of 0–9 and 2,146,755 of these children live in Istanbul. This number constitutes 24.7% of the population of Turkey (TUIK, 2022). The reason for conducting this research in Istanbul is that this city, which has different demographic characteristics, is thought to cover the general characteristics of Turkey. The mothers of 191 (47.8%) girls and 209 (52.3%) boys participated in this study. 90.3% of the children's families were nuclear families and 9.8% were extended families. 77.4% of mothers and 75.8% of fathers have high school education and above. 24.3% of mothers and 96.3% of fathers are working.

3.3 Data collection tools

In the research, the "Digital Literacy Assessment Scale" was used to determine the digital literacy levels of mothers, the "Digital Parenting Awareness Scale" was used to determine their digital parenting awareness, and the "Digital Play Addiction Tendency Scale" was used to measure their children's digital addiction tendencies. In addition, the "Family Demographic Information Form" was used to find out the demographic information of the children and their mothers.

3.3.1 The digital play addiction tendency scale (DPAT)

It was developed by Budak and Işıkoğlu (2022) in order to measure the digital game addiction tendencies of children in early childhood. The scale consists of 4 sub-dimensions and a total of 20 items: Detachment from Life (7 items) *"Does not even realize that he/she is hungry while playing digital games"*, Conflict (5 items) *"Gets angry when he/she is not allowed to play digital games"*, Continuous Playing (5 items) *"Plays with digital tools too much during the day"*, and Reflection on Life (3 items) *"Mentions characters in digital games or what they do in their conversations"*. The scale, which was developed in 5-point Likert type, is

directly scored and each sub-dimension can be evaluated in itself or can be used by taking the total score. The lowest 20 and the highest 100 points are taken from the scale. It is assumed that as the total score obtained from the scale increases, children's addiction tendencies towards digital games also increase. Analyzing the structural validity of the digital game addiction scale for this study with confirmatory factor analysis (CFA), the CFA results of the model were determined as ($\chi^2 = 368$, df = 146, $p < 0.001$, CFI = 0.95, TLI = 0.95, RMSEA = 0.06). The model shows a good fit (Tabachnick & Fidell, 2013). As a result of the internal consistency analyses of the DPAT, it was observed that the cronbach alpha coefficient was 0.88 in the Life Detachment sub-dimension, 0.90 in the Conflict sub-dimension, 0.82 in the Continuous Play sub-dimension, 0.70 in the Reflection on Life sub-dimension and 0.93 in the whole scale. In this study, the cronbach alpha coefficient was 0.91 in the Life Detachment sub-dimension, 0.90 in the Conflict sub-dimension, 0.87 in the Continuous Playing sub-dimension, 0.74 in the Reflection on Life sub-dimension and 0.95 in the whole scale. The cronbach alpha coefficient obtained from the scale shows that the scale is reliable and usable.

3.3.2 Digital parenting awareness scale (DPAS)

It was developed by Manap and Durmuş (2020) to determine parents' digital parenting awareness levels. The scale consists of 4 sub-dimensions and a total of 16 items: Negative Modeling (4 items) *"My child witnesses me spending too much time with my phone"*, Digital Neglect (4 items) *"I let my child spend time with the phone/tablet when I am busy with my work"*, Productive Use (4 items) *"I analyze the benefits and risks of technological innovations for my children"* and Protection from Risks (4 items) *"I use security packages or antivirus programs to protect my child from the risks of the internet"*. In this 5-point Likert-type scale, items are scored directly. Each sub-dimension is considered separately and the scores that can be obtained from the sub-dimensions vary between 4–20. No calculations are made for the overall scale. High scores in the sub-dimensions of Protection from Risks and Productive Use indicate high digital parenting awareness, while high scores in the sub-dimensions of Negative Modeling and Digital Neglect indicate low digital parenting awareness. We tested the structural validity of the digital parenting awareness scale used in this study with confirmatory factor analysis (CFA). CFA results reveal that the model showed a good fit ($\chi^2 = 188$, df = 98, $p < 0.001$, CFI = 0.93, TLI = 0.92, RMSEA = 0.05) (Tabachnick & Fidell, 2013). To assess the reliability of the DPAS, Cronbach's alpha analyses were performed. The internal consistency coefficients revealed scores of 0.79 for the Negative Modeling sub-dimension, 0.78 for the Digital Neglect sub-dimension, 0.71 for the Productive Use sub-dimension, and 0.63 for the Protection from Risks sub-dimension. In this study, the cronbach alpha internal consistency coefficients were 0.63 in the Negative Modeling sub-dimension, 0.78 in the Digital Neglect sub-dimension, 0.60 in the Productive Use sub-dimension and 0.60 in the Protection from Risks sub-dimension. This result shows that the scale is reliable and usable.

3.3.3 The digital literacy assessment scale

It was developed by Acar (2016) in order to determine parents' digital literacy assessments of themselves and their children. Within the scope of this research, only parents are asked to evaluate their digital literacy for themselves. The scale consists of 5 sub-dimensions and 41 items: Awareness (17 items) *"Being able to evaluate the usefulness of information in digital environments for their own purposes"*, Contextual Use (9 items) *"Being able to perform online transactions such as school, hospital, banking services and hotel reservations in online environment"*, Secure Participation (6 items) *"Ability to adjust the privacy and security settings of any internet browser as they see fit"*, Digital Identity Management (4 items) *"Not to leave private information in the digital environments he/she navigates, which can later be identified by others and used against him/her"* and Basic Tool and Environment Knowledge (5 items) *"To be able to troubleshoot simple problems encountered in the digital tools he/she uses"*. In this 5-point Likert-type scale; "not at all sufficient" is evaluated as 1 point, "slightly sufficient" as 2 points, "moderately sufficient" as 3 points, "very sufficient" as 4 points and "fully sufficient" as 5 points. Based on the CFA results for the structural validity of the digital literacy scale used in this study, it was determined that the model was at an acceptable level ($\chi^2 = 3530$, df = 769, $p < 0.001$, CFI = 0.89, TLI = 0.89, RMSEA = 0.09). The χ^2 /df coefficient value is considered acceptable when it takes a value between 2 and 5 (Kline, 2013). To evaluate the reliability of the subscales and the overall scale, Cronbach's alpha values were computed using internal consistency methods. The results indicated a Cronbach's alpha value of 0.96 for the awareness subscale, 0.95 for the contextual use subscale, 0.92 for the secure participation subscale, 0.90 for the digital identity management subscale, 0.89 for the basic tool and environment knowledge subscale, and 0.98 for the entire scale. In this research, Cronbach's alpha values were calculated as 0.99 of the awareness sub-dimension, 0.98 of the contextual usage sub-dimension, 0.97 of the secure participation sub-dimension, 0.97 of the digital identity management sub-dimension, 0.90 of the basic tool and media information sub-dimension and 0.98 of the scale as a whole. This result shows that the scale is reliable and usable.

3.3.4 Family demographic information form

Information was collected about the child's gender, parent's educational status, parent's work status, the child's time spent on the screen, and the mother's time spent on the screen.

3.4 Data collection

The necessary permissions were obtained from Bursa Uludağ University Social and Humanities Research and Publication Ethics Committee before starting the research data collection process (Session Date: 25.11.2022 / Number of Sessions: 2022–10). After obtaining the permission of the ethics committee, a provincial national

education permit was obtained from the Istanbul Provincial Directorate of National Education to conduct research in schools in Istanbul. After the necessary permits were obtained, the scale forms were delivered to the schools along with the research participation permit forms.

3.5 Data analysis

The data obtained from the research were transferred to the IBM SPSS 27.0 package program and Jamovi 2.2.5 statistics software prepared for the analysis process. In this regard, in the first step, validity values were calculated by confirmatory factor analysis and reliability values were calculated by cronbach alpha analysis of the data collected with the data collection tools in the study. A cronbach alpha coefficient of 0.60 and above is considered reliable and 0.80 and above is considered highly reliable (Hair et al., 2019; Kayış, 2006). In addition, a value of 0.90 and above indicates excellent reliability (George & Mallery, 2022). The analysis conducted in this study shows that the scales are between these values and are considered to be reliable. The confirmatory factor analysis indicates that the scales are at an acceptable level. Validity indicates whether the measurement tool measures the elements it is designed to measure; reliability indicates the ability of the scale to produce consistent results. Conducting validity and reliability analyses is considered important because it ensures that the measurement error is kept to a minimum and that the results are reliable and generalizable (Babbie, 2021; Field, 2013). For this reason, we first conducted validity and reliability analyses in the study and determined that both were statistically appropriate.

In the second stage, skewness, kurtosis and Mahalanobis and Cook's calculations were made for the outlier analysis. The skewness value was between 0.327 and 0.902 and the kurtosis value was between 0.046 and -0.482. These values are indicative of the normal distribution of the data, as noted by Tabachnick and Fidell (2013). The sample did not exhibit any instances of data loss or missing data.

As part of the assumptions for the hierarchical regression analyses pertaining to digital game addiction tendencies and digital parental awareness, an assessment of Mahalanobis distance coefficients indicated that the data adhered to the assumption of multivariate normality. The analysis revealed associations between children's digital game addiction tendencies and variables such as their gender, duration of engagement with digital devices, the duration their mothers spent with digital devices, and dimensions of digital parenting awareness. The sub-dimensions of the scale used to determine digital parenting awareness are analyzed separately, and a total evaluation cannot be made. Therefore, for the Hierarchical Multiple Regression Analysis, the dimensions of Digital Parenting Awareness were analyzed separately and the relationships between the variables were examined at first. As a result of the analysis, it was determined that there was a significant relationship between the age, the time they spent with digital tools and their digital literacy levels in the Negative Model dimension; between their educational status, the time they spent with digital tools and their digital literacy levels in the Digital Neglect dimension; between the number of children

they have and their digital literacy levels in the Productive Use dimension; and between the time they spent with digital tools and their digital literacy levels in the Protection from Risks dimension. It was seen that there was no multicollinearity problem among the resulting relationships and that they met other regression assumptions such as showing normal distribution, showing linear relationships, having appropriate Tolerance and VIF values and appropriate Mahal and Cook's distances (Abu-Bader, 2021; Bennett et al., 2023; Field, 2013) and the analyses were carried out.

As part of the research, the association between children's digital game addiction tendencies, mothers' digital parental awareness, and digital literacy was investigated using Pearson Correlation Analysis. In correlation analyses, the coefficient (r value) takes a value between -1 and + 1, which indicates the strength of the relationship between two variables. A coefficient of 1 indicates a perfect relationship, while a coefficient of 0 indicates no linear relationship. In addition, a correlation coefficient between 0.10 and 0.29 indicates a low relationship; a correlation coefficient between 0.30 and 0.49 indicates a medium relationship; and a correlation coefficient of 0.50 and above indicates a high relationship. A "+" indicates a positive relationship, while a "-" indicates a negative relationship (Cohen, 1988; Coolidge, 2021; Pallant, 2020). The results of the correlation analysis were evaluated in the light of this information.

In this study, hierarchical regression analysis was utilized. Hierarchical regression is a statistical analysis method used to examine the relationship between dependent and independent variables. It allows to assess the magnitude of the effect of each set of variables on the dependent variable. This is used to determine which variables or sets of variables are more important. In this technique, independent variables are analyzed by grouping them at different levels (Geldenhuys & Henn, 2017; Jong, 1999). The present study also includes the variables that are related to the dependent variable in the model and tries to determine the effect of these variables. A hierarchical multiple regression analysis was performed in order to examine the contributions of digital parental awareness, child gender, and mother and child screen time on digital game addiction, which is the second question of the research. In addition, a hierarchical multiple regression analysis was performed to examine the contributions of parents' digital literacy and mother and child screen time on parents' digital parental awareness within the scope of the third question of the study.

The final step was to show all the relationships related to the findings obtained in the research on a diagram. Diagrams, which are among the frequently used shapes to represent various concepts and relationships, are used to record and communicate data or to provide more information about its structure (Chambers et al., 1983; Kembhavi et al., 2016). In this way, multiple information is presented visually, data at various levels of detail are revealed from a broad perspective, and different pieces of data are encouraged to be compared (Few, 2006; Tufte, 2001). Diagrams have been utilized in many studies examining predictive relationships (Kılıç & Aydın, 2024; Lucas et al., 2024; Seifert & Bar-Tal, 2023; Vujić & Szabo, 2022). In this study, we prepared a diagram that includes the relationships of all variables in order to look at the final findings from a broad perspective.

Table 1 Descriptive analysis results of the scales

Scales	Sub-dimensions	n	x̄	Sd
Digital Parenting Awareness Scale	Negative Modeling	400	6,970	2,322
	Digital Neglect	400	8,375	2,936
	Productive Use	400	15,990	2,506
	Protection from Risks	400	15,457	3,400
Digital Literacy Assessment Scale	Awareness	400	53,357	21,883
	Contextual Use	400	25,100	13,278
	Secure Participation	400	17,217	8,252
	Digital Identity Management	400	11,722	5,811
	Basic Tool and Environment Knowledge	400	15,375	5,385
	Scale's Total	400	122,772	52,043
Digital Play Addiction Tendency Scale	Detachment from Life	400	13,747	5,936
	Conflict	400	8,927	3,834
	Continuous Playing	400	11,230	4,345
	Reflection on Life	400	6,807	2,571
	Scale's Total	400	43,455	15,023

4 Findings

The findings obtained in this part of the research were examined in parallel with the questions of the research.

The descriptive statistical results of mothers' digital parenting awareness and digital literacy levels and their children's digital game addiction tendencies are shown in Table 1.

Upon scrutinizing the scores derived from the digital parental awareness scale as depicted in Table 1, it is evident that mothers obtained the highest average score in Efficient Use ($\bar{x} = 15.99$), succeeded by Protection from Risks ($\bar{x} = 15.45$), Digital Neglect ($\bar{x} = 8.37$), and Negative Modeling ($\bar{x} = 6.97$). Although the total score is not calculated for the entire scale, when its sub-dimensions are evaluated together, it is seen that they receive low scores from the dimensions of Negative Modeling and Digital Neglect, and high scores from the dimensions of Efficient Use and Protection from Risks. Their low scores in the Digital Neglect sub-dimensions and high scores in the Productive Use and Protection from Risks sub-dimensions indicate their high Digital Parenting Awareness levels. Upon examination of the scores obtained by mothers from the digital literacy scale, it was discerned that they demonstrated a "Moderately Adequate" level of digital literacy across all sub-dimensions and the overall scale, with scores as follows: Awareness ($\bar{x} = 53.35$), Contextual Use ($\bar{x} = 25.10$), Safe Participation ($\bar{x} = 17.21$), Digital Identity Management ($\bar{x} = 11.72$), Basic Tool and Environment Knowledge ($\bar{x} = 15.37$), and an average score from the entire scale ($\bar{x} = 122.77$). Then, upon reviewing the scores attained by the children on the digital game addiction tendency scale, it was determined that they exhibited a "Low Addiction Tendency," based on their scores in the following sub-dimensions:

Table 2 The relationship between children's digital game addiction tendencies and parents' digital literacy and digital parenting awareness

Scales		M	SD	1	2	3	4	5	6	7	8	9	10
Digital Parenting Awareness Scale	1.Negative Modeling	6,970	2,322	1									
	2.Digital Neglect	8,375	2,936	,412**	1								
	3.Productive Use	15,990	2,506	-,221**	-,186**	1							
	4.Protection from Risks	15,457	3,400	-,185**	-,259**	,512**	1						
Digital Literacy Assessment Scale	5.Digital Literacy	122,77	52,04	-,098*	-,129**	,193**	,174**	1					
Digital Play Addiction Tendency Scale	6.Detachment from Life	13,747	5,936	,425**	,503**	-,142**	-,300**	-,062	1				
	7.Conflict	8,927	3,834	,368**	,534**	-,127*	-,262**	-,107*	,669**	1			
	8.Continuous Playing	11,230	4,345	,216**	,605**	-,081	-,219**	-,074	,593**	,721**	1		
	9.Reflection on Life	6,807	2,571	,291**	,471**	-,069	-,219**	-,058	,602**	,531**	,513**	1	
	10.Scale's Total	43,455	15,023	,398**	,629**	-,133**	-,304**	-,091	,886**	,876**	,842**	,730**	**1**

Detachment from Life ($\bar{x}=13.74$), Continuous Game Playing ($\bar{x}=11.23$), Conflict ($\bar{x}=8.92$), Reflection on Life ($\bar{x}=6.80$), and the overall score from the digital game addiction tendency scale ($\bar{x}=43.45$).

The findings of the Pearson Correlation Analysis conducted to answer the question "Is there a relationship between children's digital game addiction tendencies and parents' digital literacy and digital parenting awareness?" are presented in Table 2.

Table 2 shows that there are numerous positive and negative relationships of various sizes. "Negative Modeling" dimension of mothers' digital parenting awareness was correlated with the dimensions of children's digital game addiction tendencies: moderately and positively with Detachment from Life dimension ($r=0,425$; $p<0,01$), moderately and positively with Conflict dimension ($r=0,368$; $p<0,01$), moderately and positively with Continuous Game Playing dimension ($r=0,216$; $p<0.01$), low and positive ($r=0.291$; $p<0.01$) with the Reflection on Life dimension, and moderate and positive ($r=0.398$; $p<0.01$) with the overall digital game addiction tendencies. "Digital neglect" dimension of mothers' digital parenting awareness was correlated in the dimensions of children's digital game addiction tendencies highly and positively with Detachment from Life ($r=0,503$; $p<0,01$), highly and positively with Conflict ($r=0,534$; $p<0,01$), highly and positively with Continuous Game Playing ($r=0,605$; $p<0.02$), moderate and positive ($r=0.471$; $p<0.01$) with Reflection on Life, and high and positive ($r=0.629$; $p<0.01$) with the overall digital game addiction tendencies. Mothers' "Productive Use" dimension of digital parenting awareness was found to have a low and negative correlation ($r=-0.142$; $p<0.01$) with the "Detachment from Life" dimension, a low and negative correlation ($r=-0.127$; $p<0.05$) with the "Conflict" dimension, and a low and negative correlation ($r=-0.133$; $p<0.01$) with the overall digital game addiction tendencies. The "Protection from Risks" dimension of mothers' digital parenting awareness was moderately and negatively correlated with the Detachment dimension ($r=-0,300$; $p<0,01$), low and negatively correlated with the Conflict dimension ($r=-0,262$; $p<0,01$), low and negatively correlated with the Continuous Game Playing dimension ($r=-0,219$; $p<0.01$), low and negative ($r=-0.219$; $p<0.01$) with the Reflection on Life dimension, and moderate and negative ($r=-0.304$; $p<0.01$) with the overall digital game addiction tendencies.

Between mothers' digital literacy and digital parenting awareness dimensions, there were low-level and negative relationships with the dimension of Negative Modeling ($r=-0.098$; $p<0.05$), low-level and negative relationships with the dimension of Digital Neglect ($r=-0.129$; $p<0.01$), low-level and negative relationships with the dimension of Productive Use ($r=-0.193$; $p<0.01$), and low-level and negative relationships with the dimension of Protection from Risks ($r=-0.174$; $p<0.01$). Although there was a low and negative relationship ($r=-0.107$; $p<0.05$) between mothers' digital literacy and their children's digital game addiction tendencies with the Conflict dimension, it was determined that there was no statistically significant relationship ($p>0.05$) with the dimensions of Detachment from Life, Continuous Gaming, Reflection in Life and the overall digital game addiction tendency.

Table 3 shows the findings of the Hierarchical Multiple Regression Analysis conducted to answer the question "What are the predictors of children's digital game addiction tendencies?".

Table 3 Predictors of children's digital game addiction tendencies

M		B	Std. Er	β	T	p	F	R2	ΔR2
1	Constant	36,485	2,385	-	15,300	0,00	9,464	0,023	0,021
	Children's Gender	4,578	1,488	0,152	3,076	0,00			
2	Constant	25,555	2,957		8,642	0,00	24,761	0,158	0,152
	Children's Gender	3,886	1,389	0,129	2,798	0,00			
	Mothers' Digital Tool Time	0,128	0,763	0,008	0,168	0,86			
	Children's Digital Tool Time	3,917	0,532	0,365	7,360	0,00			
3	Constant	13,884	5,027	-	2,762	0,00	51,409	0,479	0,469
	Children's Gender	2,646	1,105	0,088	2,395	0,01			
	Mothers' Digital Tool Time	-1,412	0,617	-0,091	-2,286	0,02			
	Children's Digital Tool Time	1,985	0,454	0,185	4,374	0,00			
	Negative Modeling	0,503	0,258	0,084	1,946	0,05			
	Digital Neglect	1,262	0,267	0,195	4,734	0,00			
	Productive Use	2,311	0,229	0,452	10,107	0,00			
	Protection from Risks	-0,841	0,192	-0,190	-4,381	0,00			

As can be seen in Table 3, hierarchical regression analysis was created in a 3-stage model in order to determine the predictors of digital game addiction trends. In the first model of the analysis, the gender of the children was examined. It seems that this variable explains 2% of the variance in the tendency of digital game addiction in children ($\Delta R^2 = 0.021$; $F = 9.464$; $p < 0.005$). During the second phase of the analysis, variables concerning the duration spent with digital tools by both the mother and the child were included. Following the second stage, it was established that the variables pertaining to the duration spent by the mother and the child with digital tools accounted for 13% of the previously described variance. Thus, the explained variance has increased to 15% ($\Delta R^2 = 0.152$; $F = 24{,}761$; $p < 0.005$). The second stage revealed that the duration the mother spent with a digital tool did not significantly predict the gender of her children, whereas the duration the children spent with digital tools emerged as a significant predictor. At the last stage of the hierarchy, the dimensions of digital parental awareness, digital neglect, efficient use, negative modeling and protection from risks, which are the dimensions of digital parental awareness, were added to the hierarchy and examined. It was found that digital parenting awareness contributed to the previously described variance by 32%. Thus, the total variance explained has increased to 47% ($\Delta R^2 = 0.469$; $F = 51{,}409$; $p < 0.005$). Negative modeling, which is one of the dimensions of digital parental awareness, was not found to be a significant predictor, and all other variables, including the mother's time spent with digital tools, which was not a significant predictor in the second stage, were found to be significant. Upon scrutiny of the final stage, the importance of predictor variables on digital game addiction is delineated in descending order based on the standardized regression coefficient (β), highlighting the significance of predictor variables such as efficient use, digital neglect, and protection from risks under digital parental awareness. Subsequently, the time the child spends with digital devices, the gender of the child, and the time the mother

Table 4 Predictors of mothers' digital parenting awareness

	M		B	Std. Er	β	T	p	F	R^2	ΔR^2
Negative Modeling	1	Constant	5,042	0,437	-	11,539	0,00	11,778	0,056	0,051
		Mothers' Age	0,255	0,118	0,105	2,157	0,03			
		Mothers' Digital Tool Time	0,510	0,116	0,214	4,380	0,00			
	2	Constant	5,636	0,510	-	11,061	0,00	9,597	0,068	0,061
		Mothers' Age	0,236	0,118	0,097	1,997	0,04			
		Mothers' Digital Tool Time	0,531	0,116	0,222	4,570	0,00			
		Mothers' Digital Literacy	-0,005	0,002	-0,109	-2,236	0,02			
Digital Neglect	1	Constant	7,541	0,514	-	14,672	0,00	14,172	0,067	0,062
		Mothers' Educational Status	-0,284	0,108	-0,129	-2,635	0,00			
		Mothers' Digital Tool Time	0,723	0,147	0,240	4,910	0,00			
	2	Constant	8,127	0,561	-	14,477	0,00	11,674	0,081	0,074
		Mothers' Educational Status	-0,218	0,110	-0,099	-1,976	0,04			
		Mothers' Digital Tool Time	0,744	0,147	0,246	5,072	0,00			
		Mothers' Digital Literacy	-0,007	0,003	-0,125	-2,510	0,01			
Productive Use	1	Constant	16,796	0,394	-	42,631	0,00	4,647	0,012	0,009
		Number of Children	-0,397	0,184	-0,107	-2,156	0,03			
	2	Constant	15,532	0,519	-	29,906	0,00	9,095	0,044	0,039
		Number of Children	-0,303	0,183	-0,082	-1,653	0,09			
		Mothers' Digital Literacy	0,009	0,002	0,181	3,660	0,00			
Protection from Risks	1	Constant	16,717	0,467	-	35,771	0,00	8,347	0,021	0,018
		Mothers' Digital Tool Time	-0,501	0,173	-0,143	-2,889	0,00			
	2	Constant	15,353	0,582	-	26,376	0,00	11,604	0,055	0,050
		Mothers' Digital Tool Time	-0,554	0,171	-0,159	-3,242	0,00			
		Mothers' Digital Literacy	0,012	0,003	0,187	3,818	0,00			

spends with digital devices also influence digital game addiction, albeit to a lesser extent.

Hierarchical Multiple Regression Analysis was conducted to answer the question "What are the predictors of parents' digital parenting awareness?". Each dimension exhibited no issues of multicollinearity among the interrelated variables, meeting the regression assumptions. The consolidated results have been aggregated and presented in Table 4.

As can be seen in Table 4, hierarchical regression analysis was created separately for four dimensions and in 2 models in order to determine the predictors of mothers' digital parenting awareness. In exploring the "Negative Modeling" dimension of Digital Parenting Awareness, the examination included mothers' ages and time spent with digital tools in the first model, followed by their digital literacy in the second model. The mothers' ages in the first stage and the time they spent with digital tools were significant predictors of mothers' negative model status in digital parenting and explained 5% of them ($\Delta R^2 = 0.051$; $F = 11.778$; $p < 0.005$). In the second stage, it was determined that digital literacy was a significant predictor and contributed 1% to the previously explained variance. As a result, the age of mothers, the time they spend with digital tools and their digital literacy predict their negative model status by 6 percent from their digital parenting awareness ($\Delta R^2 = 0.068$; $F = 9.597$; $p < 0.005$). When examining the final stage, the significance of predictor variables on negative model status, as per the standardized regression coefficient (β), is ranked in the following order: time spent with digital tools, digital literacy levels, and age.

In the analysis of the "Digital Neglect" dimension within Digital Parenting Awareness, the initial model assessed mothers' educational status and time spent with digital tools. Subsequently, the second model expanded upon this examination by incorporating digital literacy levels alongside these variables. In the first model, it was found that the educational status of mothers and the time they spend with digital tools are significant predictors of digital neglect situations in digital parenting and explain 6% of them ($\Delta R^2 = 0.062$; $F = 14.172$; $p < 0.005$). It was found that the digital literacy taken in the second stage is a significant predictor, but contributes to the previously described variance by about 1%. Thus, it has been determined that mothers' educational status, the time they spend with digital tools and their digital literacy predict digital neglect situations by a ratio of 7% from their digital parenting awareness ($\Delta R^2 = 0.074$; $F = 11.674$; $p < 0.005$). Upon examining the final stage, the significance of predictive variables on negative model status, as denoted by the standardized regression coefficient (β), is ranked in the following order: time spent with digital tools, digital literacy levels, and educational status.

In Table 4, the "Productive Use" dimension analysis within Digital Parenting Awareness initially considered the number of children mothers had in the first model. Subsequently, the second model expanded upon this examination by incorporating their digital literacy levels alongside this variable. In the first model, it was found that the number of children of mothers are significant predictors of productive use cases in digital parenting and explain about 1% ($\Delta R^2 = 0.009$; $F = 4.647$; $p < 0.005$). It was found that the digital literacy taken in the second stage was a significant predictor and contributed 3% to the previously described variance. As a result, the number of children and their digital literacy predict their effective use cases by a ratio of

4% from their digital parenting awareness ($\Delta R^2 = 0.039$; $F = 9.095$; $p < 0.005$). Upon examination of the final stage, the significance of predictor variables on efficient use cases, as indicated by the standardized regression coefficient (β), is listed in the following order: digital literacy levels and the number of children.

In the examination of the "Protection from Risks" dimension of Digital Parenting Awareness, the initial model evaluated the time spent by mothers with digital tools. Subsequently, the second model expanded upon this by incorporating digital literacy levels alongside this variable. In the first model, it was found that the time spent by mothers with digital tools was a significant predictor of their risk protection status in digital parenting and explained about 2% ($\Delta R^2 = 0.018$; $F = 8.347$; $p < 0.005$). The digital literacy taken in the second stage was a significant predictor, but contributed to the previously described variance of 3%. Thus, it has been found that the time spent by mothers with digital tools and their digital literacy predict their risk protection status by a ratio of 5% from their digital parenting awareness ($\Delta R^2 = 0.050$; $F = 11.604$; $p < 0.005$). Upon final examination, the significance of predictive variables on risk protection situations, as indicated by the standardized regression coefficient (β), is outlined in the following order: digital literacy levels and the time spent with digital tools.

Finally, the diagram showing the predictive relationships between children's digital game addiction tendencies and their mothers' Digital parenting awareness and digital literacy levels is examined in Fig. 1.

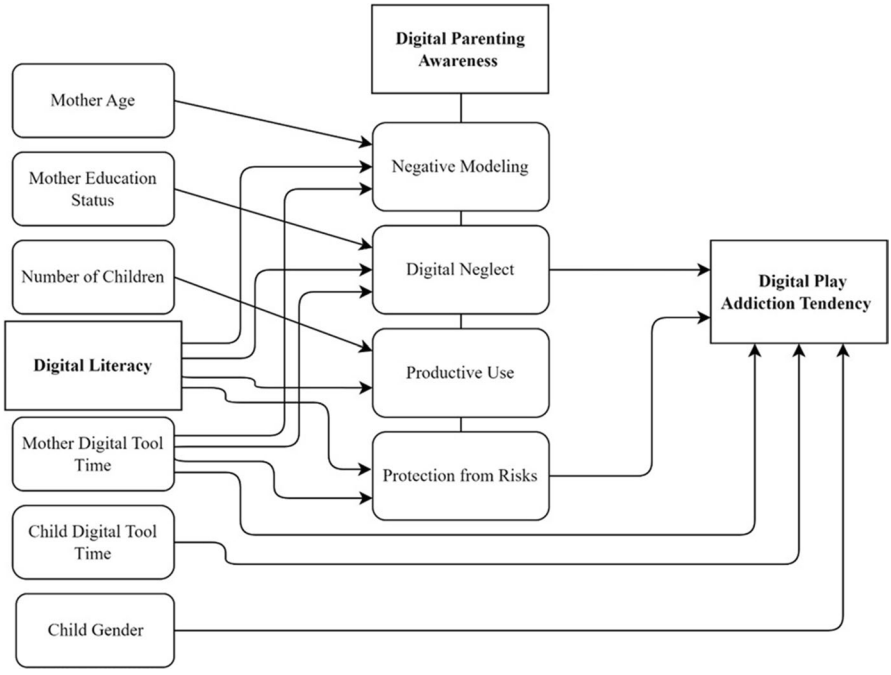


Fig. 1 Diagram showing the predictive relationships between children's digital game addiction tendencies and their mothers' digital parenting awareness and digital literacy levels

Consequently, it was determined that mothers' age affected the negative modeling dimension of digital parenting awareness, educational status affected the digital neglect dimension of digital parenting awareness, the number of children affected the productive use dimension of digital parenting awareness, mother's time spent with digital devices affected the negative modeling, digital neglect and protection from risks dimensions of digital parenting awareness, and children's gender and the time they and their mothers spent with digital devices affected their digital game addiction tendencies. Furthermore, it was uncovered that mothers' digital literacy levels predicted all dimensions of their digital parenting awareness. Additionally, specific sub-dimensions such as digital neglect, productive use, and protection from risks within mothers' digital parenting awareness significantly predicted their children's digital game addiction tendencies in a statistically meaningful manner. Although mothers' digital literacy levels do not directly affect children's digital game addiction tendencies, it can be said that there is an indirect effect on their digital parenting awareness.

5 Discussion

The findings obtained in this part of the research, which was conducted to investigate the predictive relationship between the digital game addiction tendencies of preschool children and their mothers' digital literacy and digital parenting awareness, were discussed in light of the literature.

The digital literacy levels observed among the mothers in our sample were identified to be at an intermediate level. Moreover, an observation indicated that mothers obtained low scores in the Negative Modeling and Digital Neglect dimensions, reflecting negative aspects of digital parenting awareness, while scoring high in the Efficient Use and Protection from Risk dimensions, indicative of positive aspects of digital parenting awareness. This situation shows that mothers' digital parental awareness is high. In the research conducted by Rahayu and Haningsih (2021), it was stated that most mothers have limited skills in using digital technology and are at the basic user level. On the other hand, Hashim (2008) found that the sample group consisted only of women, and it was found that women had average skills in information communication technology. Similar to our findings, when the descriptive statistical results of digital parenting awareness were examined in the literature, it was found that digital parenting awareness was above average, although not very high (Bostancı & Çakır, 2022); there were studies that concluded that it was low in the dimensions of negative modeling and digital neglect, very high in the dimension of efficient use, and high in the dimension of protection from risks (Tüysüz, 2023). When the average digital game addiction tendency of the children in the study was examined, it was determined that their addiction tendencies were low. It is observed that there are studies in the literature with different results. In the study of Aküzüm et al. (2022), children's digital game addiction tendencies were low; Uslu (2022) children's digital game addiction tendency was high; and Emiroğlu İlvan and Ceylan (2023) determined that 33% of the children in their study had medium and above digital game addiction tendencies. This study can be interpreted as the fact that

children's digital game addiction tendencies are low; they are far from the negative effects of digital games. This scenario aligns with the desired outcome.

The research outcome unveiled several statistically significant relationships between mothers' digital parenting awareness and their children's inclinations toward digital game addiction. It has been determined that as mothers' awareness of digital parenting becomes a negative model and the levels of digital neglect increase, their children's digital game addiction tendencies increase with the situations of detachment from life, conflict, constant game playing and reflection on life, and total digital game addiction tendencies also increase. The research revealed that an increase in mothers' adeptness in employing digital parenting awareness corresponds to a decrease in their children's tendencies towards disengagement from life, conflict instances, and overall digital game addiction tendencies. In addition, as mothers' protection from risks increased, their children's digital game addiction tendencies observed to decrease due to detachment from life, conflict, constant gaming and reflection on their lives, as well as total digital game addiction tendencies. Parents with preschool-age children have important tasks in managing their children's use of digital technologies (Wu et al., 2014). Parents' existing behaviors regarding technology use shape their children's technology habits (Kurtdede Fidan & Olur, 2023). Manap and Durmuş (2021) concluded that as parents' negative model and digital neglect levels increased, their children's Internet addiction increased, and their children's internet addiction levels decreased as their protection from risk levels increased. In the research conducted by Kay (2022), it was also found that there is a negative relationship between digital parenting awareness and children's digital game addictions. In the studies conducted in the literature, it has been determined that there are relationships between children's media use and parents' tablet use (Pila et al., 2021) and technology attitudes (Lauricella & Cingel, 2020). It has been found that the digital parenting attitudes of parents who are aware that children may be negatively affected by online games are significantly higher in those who are unaware (Tosun & Mihci, 2020). In addition, a study conducted by Nikken and Jansz (2006) found that children supervised less by their parents spend more time online during the week. Therefore, the increase in parents' digital awareness as children's digital game addiction tendencies decrease shows that parents are acting consciously about their children's use of digital games and using digital environments correctly and consciously. However, this study found no significant relationship between children's digital game addiction tendencies and their parents' digital literacy. This may be due to the fact that the parents' digital literacy is at an intermediate level. Moreover, considering that digital parenting awareness inherently encompasses digital literacy, it indirectly suggests a potential relationship, despite its absence in the observed outcomes.

This research unveils a statistically significant relationship between mothers' digital literacy levels and their digital parenting awareness. As the mothers' digital literacy levels increase, their negative digital parenting awareness of negative modeling and digital neglect decreases, and their positive digital parenting awareness of productive use and protection from risks increases. In a literature review conducted by Huang et al. (2018), a noteworthy correlation was discovered between parents' fundamental digital skills and their digital parenting self-efficacy. Lou et al. (2010)

found that there is a relationship between internet literacy and internet parenting. It is determined that there is no statistically significant relationship between mothers' digital literacy levels and all sub-dimensions and overall digital game addiction tendencies of their children. Having a positive attitude towards the Internet and being able to use multiple devices does not improve skills and types of use; it takes more than experience to fully adopt internet technology (Van Deursen & Van Dijk, 2015). In this respect, it is desirable that there is a positive relationship between digital literacy and the sub-dimensions of efficient use of technology and protection from risks in this study.

The present study revealed that children's gender, the duration spent with digital tools by both the children and their mothers, along with their mothers' digital parenting awareness, emerged as significant predictors of digital game addiction tendencies. Similar to our findings, a study conducted by Emiroğlu İlvan and Ceylan (2023) with mothers with preschool children found that the use of digital games by children's gender and the use of digital devices by mothers significantly predicted their children's digital game addiction tendencies. In another study conducted with preschool children, it was similarly found that children's gender and parents' digitalization strategies were significant predictors of digital game addiction tendencies (Budak & Işıkoğlu, 2023). In another study examining the screen time of children aged 0–8 years, it was found that children's screen time in all digital devices such as television, computer, smartphone, and tablet had a strong relationship with the time spent by parents with digital devices, and was also affected by parental attitudes (Lauricella et al., 2015). Valcke et al. (2010), on the other hand, determined that parents' Internet style and behavior and educational background variables predict children's internet use. Parents' level of education and access to financial resources, as well as the strategies parents use in their children's relationship with technology, are among the important factors in children's digital skills (Cabello-Hutt et al., 2018). It is observed that the state of playing digital games changes depending on the child's gender, however, the time spent by the parent with a digital tool also affects the time spent by the child with a digital tool, and these variables significantly predict the child's digital game addiction with digital parenting awareness. In this case, considering that parents with high digital parental awareness will stay in front of the screen less, it can be stated that digital game addiction in children will also be low.

The results reveal that the age of the mothers and the time spent with digital tools significantly predicts the negative modeling level of digital parenting awareness; the educational level of the mothers and the time spent with digital tools significantly predict the digital neglect level of digital parenting awareness; the number of children significantly predicts the efficient use of digital parenting awareness; and the time spent with digital tools significantly predicts the level of protection from risks of digital parenting awareness. In addition, mothers' digital literacy levels are found to be a significant predictor of all dimensions of digital parenting awareness. It is seen that parallel studies have been conducted with our findings in the literature. Parents need to use technological devices carefully and develop digital parenting strategies to control their children's relationship with technology (Rahmawati & Latifah, 2019). However, it is stated in the literature that digital parenting also has the role and responsibility of having digital literacy (Kabakçı Yurdakul et al.,

2013; Yay, 2019; Yazıcı, 2021). From this perspective, this study appears to corroborate existing literature in this field. Upon reviewing the literature concerning demographic factors predicting digital parenting awareness, it's evident that comparable outcomes to our findings have been reported. Durak and Kaygin (2020) found that the mediation shown by parents in the Internet use of young children showed a significant difference in terms of their own age. In a study conducted by Cingel and Krcmar (2013), it was determined that parents who are more educated avoid their young children's constant use of the media. Konok et al. (2020) also reached the conclusion that children of parents with lower educational level spend more time with mobile digital tools. In the relationship between the number of children and digital parenting awareness, it was determined that the number of children was related to the dimension of efficient use as well as the dimension of protection from risks (Nayci, 2021). Álvarez et al. (2013) found that one of the variables affecting the parents' level of guiding their children's content on the Internet is the amount of time they spend on the Internet. The proficiency in using digital tools, possibly correlated with the mother's age, might influence their increased engagement with these tools, thereby impacting their level of negative modeling for their children. In addition, based on these results, it can be said that mothers can protect their children from digital neglect by supporting the awareness of their educational level, while mothers who spend much time in the digital environment themselves may neglect their children digitally. It is thought that the number of children may affect the ability to manage the efficient use of digital media, especially for parents with more than one child. This is because the amount of time parents need to spend with their children is increasing, and it is becoming more difficult to control how each child uses digital media. The duration of time mothers spend in digital environments is believed to influence their capability to identify and shield their children from risks within digital settings. This scenario, which also impacts children's digital game addiction inclinations, demonstrates a connection between the duration mothers spend in the digital environment and their children's engagement in similar environments. Nevertheless, it is presumed that the digital literacy levels of mothers influence their understanding of digital parenting by empowering them to comprehend the risks and advantages of technology, identifying and employing diverse aspects of digital technologies.

6 Conclusion

The present study shows that mothers exhibit moderate levels of digital literacy, low negative digital parenting awareness, and high positive digital parenting awareness. In addition, it has been found that children's digital game addiction tendencies are low. The study underscores statistically significant relationships between mothers' digital parenting awareness and their children's digital game addiction tendencies, as well as between mothers' digital parenting awareness and their levels of digital literacy. Gender, the amount of time the child spends with digital devices, the amount of time the mother spends with digital devices, and mothers' digital parenting awareness are significant predictors of children's

digital game addiction tendencies. The analysis of the predictors of mothers' digital parenting awareness reveals that the mother's age and time spent with digital tools are significant predictors in negative modeling, the mother's education level and time spent with digital tools are significant predictors in digital neglect dimension, number of children variable in productive use dimension and time spent with digital tools by mother in protection from risks dimension; however, mothers' digital literacy has a significant predictive effect on all digital parenting awareness.

7 Limitations and recommendations

There are some limitations to the research that was carried out. Firstly, the research was carried out using only quantitative methods. For this reason, although the appropriate number that can be generalized in the obtained meanings has been reached, the contents related to their causes have not been examined. Future studies could incorporate mixed research designs, amalgamating qualitative data to enrich the investigation further. In addition, we collected data on children's digital game addictions using a measurement tool filled out by their mothers since there is no Turkish measurement tool for collecting data from children. For this reason, data collection tools can be developed to measure preschool children's digital game addiction directly from themselves. Secondly, fathers were excluded from the research because the effect of some factors aimed at mothers on their children's digital game addiction tendencies was examined with a large sample group in the study. By conducting research in which fathers are included in a wide range, the effect of fathers on their children's digital game addiction can also be examined. Finally, the province of Istanbul, where people with different demographic characteristics live, was included in the study, and the research was limited to this province. For this reason, sample groups can be further expanded, and studies involving different demographic characteristics and cultures can be conducted. Moreover, in light of the study's revelations linking mothers' digital literacy to their digital parenting awareness and the impact of children's and mothers' digital tool usage on children's digital game addiction, there is an opportunity to conduct awareness campaigns.

Teachers can organize trainings for parents to improve their basic skills such as accessing information in the digital world, distinguishing between correct and incorrect information, and showing them ways to improve themselves. In this way, parents' awareness of positive digital parenting will increase, and parents will be role models for their children in ensuring that children develop healthy habits in the digital world. In addition, parents need to be able to control the time they and their children spend with digital devices, set certain limits, and abide by these limits. To this end, it is important that they use security measures such as filtering software and parental control tools to protect their children from the risks they may encounter in the digital world. It can be recommended that teachers should conduct awareness-raising activities for parents on these issues.

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Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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References

Abu-Bader, S. H. (2021). *Using statistical methods in social science research* (3rd ed.). Oxford University Press.

Acar, Ç. (2016). Opinions of parents about their children and their own level of digital literacy. *Educational Sciences and Practice, 15*(30), 45–72.

Adachi, P. J. C., & Willoughby, T. (2011). The effect of video game competition and violence on aggressive behavior: Which characteristic has the greatest influence? *Psychology of Violence, 1*(4), 259–274. https://doi.org/10.1037/a0024908

Akkaya, S., Burcu, G. S., & Kapıdere, M. (2021). Examining the relationship between multidimensional parenting styles and digital parenting awareness levels of parents. *World Journal on Educational Technology: Current Issues, 13*(4), 546–573. https://doi.org/10.18844/wjet.v13i4.6132

Aküzüm, C., Baran, E., & Çelebi, S. (2022). The relationship between parental attitudes and digital game addiction tendencies in preschool period. *Electronic Turkish Studies, 17*(3), 27–458. https://doi.org/10.7827/TurkishStudies.61958

Álvarez, M., Torres, A., Rodríguez, E., Padilla, S., & Rodrigo, M. J. (2013). Attitudes and parenting dimensions in parents' regulation of Internet use by primary and secondary school children. *Computers & Education, 67*, 69–78. https://doi.org/10.1016/j.compedu.2013.03.005

Aviram, A., & Eshet-Alkalai, Y. (2006). Towards a theory of digital literacy: Three scenarios for the next steps. *European Journal of Open, Distance and E-Learning, 9*(1), 1–11.

Babbie, E. R. (2021). *The practice of social research* (15th ed.). Cengage Learning.

Bağatarhan, T. (2023). The mediating role of anxiety and ıntroversion of children in the relationship between parenting self-efficacy and digital game addiction tendency of preschool children. *Korkut Ata Journal of Studies in Turcology,* Special Issue 1, 1289- 1304. https://doi.org/10.51531/korkutataturkiyat.1359011

Belshaw, D. A. (2012). *What is 'digital literacy'?: A pragmatic investigation [Unpublished doctorate dissertation]*. Durham University.

Benedetto, L., & Ingrassia, M. (2021). Digital parenting: Raising and protecting children in media world. In L. Benedetto & M. Ingrassia (Eds), *Parenting: Studies by an ecocultural and transactional perspective*, (pp.127–148.) IntechOpen. https://doi.org/10.5772/intechopen.92579

Bennett, K., Heritage, B., & Allen, P. (2023). *SPSS statistics: A practical guide* (5th ed.). Cengage.

Bostancı, S., & Çakır, R. (2022). Investigation of the mediations and digital parenting awareness of parents who have early childhood children in making their children use media. *Turkish Journal of Primary Education, 7*(2), 86–116. https://doi.org/10.52797/tujped.1192163

Bottino, R. M., Ferlino, L., Ott, M., & Tavella, M. (2007). Developing strategic and reasoning abilities with computer games at primary school level. *Computers & Education, 49*(4), 1272–1286. https://doi.org/10.1016/j.compedu.2006.02.003

Brisson-Boivin, K. (2018). *The digital well-being of Canadian families*. MediaSmarts.

Buckingham, D. (2008). Defining digital literacy: What do young people need to know about digital media. *Digital Literacies: Concepts, Policies and Practices, 30*, 73–90.

Budak, K. S., & Işıkoğlu, N. (2022). Development of children's digital play addiction tendency and parental mediation scales. *Journal of Faculty of Educational Sciences, 55*(3), 673–719. https://doi.org/10.30964/auebfd.939653

Budak, K. S., & Işıkoğlu, N. (2023). Digital play addiction tendencies in early childhood: Effects of child and parent characteristics. *Mehmet Akif Ersoy University Journal of Education Faculty, 66*, 1–25.

Cabello-Hutt, T., Cabello, P., & Claro, M. (2018). Online opportunities and risks for children and adolescents: The role of digital skills, age, gender and parental mediation in Brazil. *New Media & Society, 20*(7), 2411–2431. https://doi.org/10.1177/1461444817724168

Chambers, J. M., Cleveland, W. S., Kleiner, B., & Tukey, P. A. (1983). *Graphical methods for data analysis*. CRC Press.

Chan, P. A., & Rabinowitz, T. (2006). A cross-sectional analysis of video games and attention deficit hyperactivity disorder symptoms in adolescents. *Annals of General Psychiatry, 5*, 16. https://doi.org/10.1186/1744-859x-5-16

Churchill, N., Ping, L. C., Oakley, G., & Churchill, D. (2008). Digital storytelling and digital literacy learning. *In Readings in Education and Technology: Proceedings of ICICTE, 2008*, 418–430.

Cingel, D. P., & Krcmar, M. (2013). Predicting media use in very young children: The role of demographics and parent attitudes. *Communication Studies, 64*(4), 374–394. https://doi.org/10.1080/10510974.2013.770408

Clark, L. S. (2011). Parental mediation theory for the digital age. *Communication Theory, 21*(4), 323–343. https://doi.org/10.1111/j.1468-2885.2011.01391.x

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Awrence Erlbaum Associates Publishers.

Coolidge, F. L. (2021). *Statistics*. SAGE Publications.

Czaja, S., & Schulz, R. (2006). Innovations in technology and aging introduction. *Generations, 30*(2), 6–8.

Danovitch, J. H. (2019). Growing up with Google: How children's understanding and use of internet-based devices relates to cognitive development. *Human Behavior and Emerging Technologies, 1*(2), 81–90. https://doi.org/10.1002/hbe2.142

Digital Games Report (2020). *Digital games report*. Information Technology and Communication Institution. Retrieved March 20, 2023, from https://www.guvenlioyna.org.tr/uploads/ck-editor/family-reports/Dijital%20Oyunlar%20Raporu%202020.pdf

Durak, A., & Kaygin, H. (2020). Parental mediation of young children's internet use: Adaptation of parental mediation scale and review of parental mediation based on the demographic variables and digital data security awareness. *Education and Information Technologies, 25*, 2275–2296. https://doi.org/10.1007/s10639-019-10079-1

Emiroğlu İlvan, T., & Ceylan, R. (2023). Predicting preschool children's digital play addiction tendency during covid-19 pandemic: Regarding the mother-child relationship, and child-and family-related factors. *Education and Information Technologies, 28*, 15687–15716. https://doi.org/10.1007/s10639-023-11802-9

Eshet-Alkalai, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia, 13*(1), 93–106.

Few, S. (2006). *Information dashboard design*. O'Reilly.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). SAGE Publications.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2011). *How to design and evaluate research in education* (8th ed.). McGraw Hill Publishing.

Gao, B., Liao, F., & Xie, H. (2023). Parents, children, and electronic games: Analyzing the formation path and countermeasures of contradictions. *Environment and Social Psychology, 8*(1), 1–12. https://doi.org/10.18063/esp.v8.i1.1638

Geldenhuys, M., & Henn, C. M. (2017). The relationship between demographic variables and well-being of women in South African workplaces. *SA Journal of Human Resource Management, 15*(1), 1–15.

Gentile, D. A., & Anderson, C. A. (2006). Video games. In N. J. Salkind (Ed.), *Encyclopedia of human development* (Vol. 3, pp. 1303–1307). Sage Publications.

Gentile, D. A., Anderson, C. A., Yukawa, S., Ihori, N., Saleem, M., Lim Kam, M., Shibuya, A., Liau, A. K., Khoo, A., Bushman, B. J., Rowell Huesmann, L., & Sakamoto, A. (2009). The effects of prosocial video games on prosocial behaviors: International evidence from correlational, longitudinal, and experimental studies. *Personality and Social Psychology Bulletin, 35*(6), 752–763. https://doi.org/10.1177/0146167209333045

George, D., & Mallery, P. (2022). *IBM SPSS statistics 27 step by step* (17th ed.). Routledge.

Gilster, P. (1997). *Digital literacy*. Wiley Computer.

Greitemeyer, T. (2017). The spreading impact of playing violent video games on aggression. *Computers in Human Behavior, 80*, 216–219. https://doi.org/10.1016/j.chb.2017.11.022

Griffiths, M. D. (2010). Computer game playing and social skills: A pilot study. *Aloma: Revista de Psicologia Ciències De L'educació i De L'esport, 27*, 301–310.

Griffiths, M. D., & Davies, M. N. O. (2005). Videogame addiction: Does it exist? In J. Goldstein & J. Raessens (Eds.), *Handbook of computer game studies.* MIT Pres.

Hadlington, L., White, H., & Curtis, S. (2019). "I cannot live without my [tablet]": Children's experiences of using tablet technology within the home. *Computers in Human Behavior, 94*, 19–24. https://doi.org/10.1016/j.chb.2018.12.043

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Hargittai, E. (2010). Digital na (t) ives? Variation in internet skills and uses among members of the "net generation." *Sociological Inquiry, 80*(1), 92–113. https://doi.org/10.1111/j.1475-682X.2009.00317.x

Hashim, J. (2008). Learning barriers in adopting ICT among selected working women in Malaysia. *Gender in Management: An International Journal, 23*(5), 317–336.

Hazar, Z. (2019). An analysis of the relationship between digital game playing motivation and digital game addiction among children. *Asian Journal of Education and Training, 5*(1), 31–38.

Horzum, M. B. (2011). Examining computer game addiction level of primary school students in terms of different variables. *Education and Science, 36*(159), 56–68.

Hu, X., & Fan, Z. (2023). Games to control gaming behavior: An observation based on teenager families. *Deviant Behavior*, 1–20. https://doi.org/10.1080/01639625.2023.2244636

Huang, G., Li, X., Chen, W., & Straubhaar, J. D. (2018). Fall-behind parents? The influential factors on digital parenting self-efficacy in disadvantaged communities. *American Behavioral Scientist, 62*(9), 1186–1206. https://doi.org/10.1177/0002764218773820

Işıkoğlu, N., Erol, A., Atan, A., & Aytekin, S. (2023). A qualitative case study about overuse of digital play at home. *Current Psychology, 42*(3), 1676–1686. https://doi.org/10.1007/s12144-021-01442-y

Işıkoğlu Erdogan, N., Johnson, J. E., Dong, P. I., & Qiu, Z. (2019). Do parents prefer digital play? Examination of parental preferences and beliefs in four nations. *Early Childhood Education Journal, 47*(2), 131–142.

Jong, P. F. (1999). Hierarchical regression analysis in structural equation modeling. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(2), 198–211. https://doi.org/10.1080/10705519909540128

Kabakçı Yurdakul, I., Dönmez, O., Yaman, F., & Odabaşı, H. F. (2013). Digital parenting and changing roles. *Gaziantep University Journal of Social Sciences, 12*(4), 883–896.

Kay, M. A. (2022). *As predictives of digital play addiction in early childhood; digital parenting, family relations and social competence [Unpublished doctorate dissertation]*. İnönü University.

Kayış, A. (2006). Güvenilirlik analizi [Reliability analysis]. In Ş Klayalcı (Ed.), *SPSS uygulamalı çok değişkenli istatistik teknikleri [SPSS applied multivariate statistical techniques]* (pp. 403–426). Asil Broadcast Distribution.

Kembhavi, A., Salvato, M., Kolve, E., Seo, M., Hajishirzi, H., & Farhadi, A. (2016). A diagram is worth a dozen images. In *Computer Vision–ECCV 2016: 14th European Conference, Proceedings, Part IV* (pp. 235–251). Springer International Publishing. https://doi.org/10.1007/978-3-319-46493-0_15

Kılıç, A., & Aydın, B. (2024). Relationship between teachers' perception of organizational justice, perceptions of ıntention to leave and subjective well being. *TEBD, 22*(1), 384–411. https://doi.org/10.37217/tebd.1389345

King, D. L., Delfabbro, P. H., & Griffiths, M. D. (2013). Video game addiction. In P. M. Miller (Ed.), *Principles of addiction: Comprehensive addictive behaviors and disorders* (pp. 819–825). Elsevier Inc.

Kline, R. B. (2013). Exploratory and confirmatory factor analysis. In Y. Petscher, C. Schatschneider, & D. L. Compton (Eds.), *Applied quantitative analysis education and the social sciences.* USA: Routledge.

Kol, D. (2021). *Erken çocuklukta teknoloji kullanımı [Technology use in early childhood]* (7th ed.). Pegem Academy Publishing.

Konok, V., Bunford, N., & Miklósi, Á. (2020). Associations between child mobile use and digital parenting style in Hungarian families. *Journal of Children and Media, 14*(1), 91–109. https://doi.org/10.1080/17482798.2019.1684332

Koran, N., Berkmen, B., & Adalıer, A. (2022). Mobile technology usage in early childhood: Pre-COVID-19 and the national lockdown period in North Cyprus. *Education and Information Technologies, 27*, 321–346. https://doi.org/10.1007/s10639-021-10658-1

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement, 30*(3), 607–610.

Kurtdede Fidan, N., & Olur, B. (2023). Examining the relationship between parents' digital parenting self-efficacy and digital parenting attitudes. *Education and Information Technologies, 28*, 15189–15204. https://doi.org/10.1007/s10639-023-11841-2

Kuss, D. J., & Griffiths, M. D. (2011). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction, 10*(2), 278–296. https://doi.org/10.1007/s11469-011-9318-5

Lauricella, A. R., & Cingel, D. P. (2020). Parental influence on youth media use. *Journal of Child and Family Studies, 29*, 1927–1937. https://doi.org/10.1007/s10826-020-01724-2

Lauricella, A. R., Wartella, E., & Rideout, V. J. (2015). Young children's screen time: The complex role of parent and child factors. *Journal of Applied Developmental Psychology, 36*, 11–17. https://doi.org/10.1016/j.appdev.2014.12.001

Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a game addiction scale for adolescents. *Media Psychology, 12*(1), 77–95. https://doi.org/10.1080/15213260802669458

Liu, C., & Hwang, G. J. (2023). Roles and research trends of touchscreen mobile devices in early childhood education: Review of journal publications from 2010 to 2019 based on the technology-enhanced learning model. *Interactive Learning Environments, 31*(3), 1683–1702. https://doi.org/10.1080/10494820.2020.1855210

Liu, W., Tan, L., Huang, D., Chen, N., & Liu, F. (2020). When preschoolers use tablets: The effect of educational serious games on Children's attention development. *International Journal of Human-Computer Interaction, 37*(3), 234–248. https://doi.org/10.1080/10447318.2020.1818999

Livingstone S, & Byrne J. (2018) Parenting in the digital age: The challenges of parental responsibility in comparative perspective. In Mascheroni, G., Ponte, CC., & Jorge, A. (Eds.). *Digital parenting: The challenges for families in the digital age* (pp. 19-30). Nordicom.

Livingstone, S., & Helsper, E. (2007). Gradations in digital inclusion: Children, young people and the digital divide. *New Media & Society, 9*(4), 671–696.

Livingstone, S., & Helsper, E. J. (2008). Parental mediation and children's internet use. *Journal of Broadcasting & Electronic Media, 52*(4), 581–599. https://doi.org/10.1080/08838150802437396

Lou, S. J., Shih, R. C., Liu, H. T., Guo, Y. C., & Tseng, K. H. (2010). The influences of the sixth graders' parents' internet literacy and parenting style on internet parenting. *Turkish Online Journal of Educational Technology-TOJET, 9*(4), 173–184.

Lucas, M., Zhang, Y., Bem-haja, P., & Vicente, P. N. (2024). The interplay between teachers' trust in artificial intelligence and digital competence. *Education and Information Technologies*, 1–20. https://doi.org/10.1007/s10639-024-12772-2

Manap, A., & Durmuş, E. (2020). Development of digital parental awareness scale. *Inonu University Journal of the Faculty of Education, 21*(2), 978–993. https://doi.org/10.17679/inuefd.711101

Manap, A., & Durmuş, E. (2021). Investigation of digital parenting awareness according to various variable, family roles and internet addiction in children. *E-International Journal of Educational Research, 12*(1), 141–156. https://doi.org/10.19160/ijer.837749

Martin, A. (2008). Digital literacy and the "digital society." In C. Lankshear & M. Knobel (Eds.), *Digital literacies: Concepts, policies and practices* (pp. 151–174). Peter Lang.

Martin, A., & Grudziecki, J. (2006). DigEuLit: Concepts and tools for digital literacy development. *Innovation in Teaching And Learning in Information and Computer Sciences, 5*(4), 249–267. https://doi.org/10.11120/ital.2006.05040249

Mascheroni, G., Ponte, C., & Jorge, A. (2018). *Digital parenting: The challenges for families in the digital age*. Te International Clearinghouse on Children, Youth and Media.

Nayci, Ö. (2021). Examination of digital parenting awareness of the primary school students' parents during the Covid-19 Pandemic. *Pegem Journal of Education and Instruction, 11*(2), 58–71. https://doi.org/10.14527/pegegog.2021.07

Ng, W. (2012a). Can we teach digital natives digital literacy? *Computers & Education, 59*(3), 1065–1078. https://doi.org/10.1016/j.compedu.2012.04.016

Ng, W. (2012b). *Empowering scientific literacy through digital literacy and multiliteracies*. Nova Science Publishers.

Nikken, P., & Jansz, J. (2006). Parental mediation of children's videogame playing: A comparison of the reports by parents and children. *Learning, Media and Technology, 31*(2), 181–202. https://doi.org/10.1080/17439880600756803

Pallant, J. (2020). *Survival manual: a step by step guide to data analysis using IBM SPSS* (7th ed.). Routledge.

Peng, W., & Liu, M. (2010). Online gaming dependency: A preliminary study in china. *Cyberpsychology, Behavior, and Social Networking, 13*(3), 329–333. https://doi.org/10.1089/cyber.2009.0082

Pila, S., Lauricella, A. R., Piper, A. M., & Wartella, E. (2021). The power of parent attitudes: Examination of parent attitudes toward traditional and emerging technology. *Human Behavior and Emerging Technologies, 3*(4), 540–551. https://doi.org/10.1002/hbe2.279

Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. *On the Horizon, 9*(5), 1–6. https://doi.org/10.1108/10748120110424816

Prot, S., Anderson, C. A., Gentile, D. A., Brown, S. C., & Swing, E. L. (2014). The positive and negative effects of video game play. In A. Jordan & D. Romer (Eds.), *Media and the Well-Being of Children and Adolescents* (pp. 109–128). Oxford University Press.

Rahayu, N. W., & Haningsih, S. (2021). Digital parenting competence of mother as informal educator is not inline with internet access. *International Journal of Child-Computer Interaction, 29*, 1–11. https://doi.org/10.1016/j.ijcci.2021.100291

Rahmawati, M., & Latifah, M. (2019). The effect of mother-child ınteraction and maternal gadget use on child's gadget addiction in preschool children. In M. Simanjuntak & B. I. Rahmaniah (Eds.), *The 2nd international seminar on family and consumer ıssues in Asia Pacific* (pp. 73–81). Department of Family and Consumer Sciences.

Reddy, P., Sharma, B., & Chaudhary, K. (2020). Digital literacy: A review of literature. *International Journal of Technoethics (IJT), 11*(2), 65–94. https://doi.org/10.4018/IJT.20200701.oa1

Rehbein, F., Psych, G., Kleimann, M., Mediasci, G., & Mößle, T. (2010). Prevalence and risk factors of video game dependency in adolescence: Results of a german nationwide survey. *Cyberpsychology, Behavior, and Social Networking, 13*(3), 269–277. https://doi.org/10.1089/cyber.2009.0227

Robson, C. (2002). *Real world research: A resource for social scientists and practitioner-researchers* (2nd ed.). Blackwell Publishing.

Rode, J. A. (2009). Digital parenting: Designing children's safety. *People and computers XXIII celebrating people and technology*, 244–251. https://doi.org/10.14236/ewic/HCI2009.29

Romero, M. (2014). Digital literacy for parents of the 21st century children. *Elearning Papers, 38*, 1–9.

Sadiku, M. N., Tembely, M., & Musa, S. M. (2017). Digital parenting. *Journal of Multidisciplinary Engineering Science and Technology, 4*(1), 6454–6456.

Seifert, T., & Bar-Tal, S. (2023). Student-teachers' sense of belonging in collaborative online learning. *Education and Information Technologies, 28*(7), 7797–7826. https://doi.org/10.1007/s10639-022-11498-3

Soyoof, A., Reynolds, B. L., Neumann, M., Scull, J., Tour, E., & McLay, K. (2023). The impact of parent mediation on young children's home digital literacy practices and learning: A narrative review. *Journal of Computer Assisted Learning, 40*(1), 65–88. https://doi.org/10.1111/jcal.12866

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson.

Tennakoon, H., Saridakis, G., & Mohammed, A. M. (2018). Child online safety and parental intervention: A study of Sri Lankan internet users. *Information Technology & People, 31*(3), 770–790.

Terras, M. M., & Ramsay, J. (2016). Family digital literacy practices and children's mobile phone use. *Frontiers in Psychology, 7*(1957), 1–11. https://doi.org/10.3389/fpsyg.2016.01957

Tosun, N., & Mihci, C. (2020). An examination of digital parenting behavior in parents with preschool children in the context of lifelong learning. *Sustainability, 12*(18), 7654. https://doi.org/10.3390/su12187654

Tufte, E. R. (2001). *The visual display of quantitative information* (2nd ed.). Graphics Press.

TUİK (2022). Adrese dayalı nüfus kayıt sistemi sonuçları [Address-based population registration system results]. Retrieved June 15, 2023, from https://data.tuik.gov.tr/Bulten/Index?p=49685

Tüysüz, H. (2023). Investigation of the relationship between digital parent awareness and self-efficiencies of student parents during the basic education period. *Ulusal Eğitim Dergisi [national Educational Journal], 3*(6), 951–960. https://doi.org/10.5281/zenodo.8146128

Uslu, E. M. (2022). Examination of children's digital gaming addictions and parents' digital gaming guidance strategies. *Route Educational & Social Science Journal, 9*(5), 406–421. https://doi.org/10.17121/ressjournal.3249

Valcke, M., Bonte, S., De Wever, B., & Rots, I. (2010). Internet parenting styles and the impact on Internet use of primary school children. *Computers & Education, 55*(2), 454–464. https://doi.org/10.1016/j.compedu.2010.02.009

Van Deursen, A. J., & Van Dijk, J. A. (2015). Toward a multifaceted model of internet access for understanding digital divides: An empirical investigation. *The Information Society, 31*(5), 379–391. https://doi.org/10.1080/01972243.2015.1069770

Vujić, A., & Szabo, A. (2022). Hedonic use, stress, and life satisfaction as predictors of smartphone addiction. *Addictive Behaviors Reports, 15*, 100411.

Weinstein, A. M. (2010). Computer and video game addiction: A comparison between game users and non-game users. *The American Journal of Drug and Alcohol Abuse, 36*(5), 268–276. https://doi.org/10.3109/00952990.2010.491879

Willem, C., Aiello, M., & Bartolome, A. (2006). Self-regulated learning and new literacies: An experience at the University of Barcelona. *European Journal of Education, 41*(3/4), 437–452. https://doi.org/10.1111/j.1465-3435.2006.00275.x

Wittek, C. T., Finseras, T. R., Pallesen, S., Mentzoni, R. A., Hanss, D., Griffiths, M. D., & Molde, H. (2016). Prevalence and predictors of video game addiction: A study based on a national representative sample of gamers. *International Journal of Mental Health and Addiction, 14*(5), 672–686. https://doi.org/10.1007/s11469-015-9592-8

Wu, C. S. T., Fowler, C., Lam, W. Y. Y., Wong, H. T., Wong, C. H. M., & Yuen Loke, A. (2014). Parenting approaches and digital technology use of preschool age children in a Chinese community. *Italian Journal of Pediatrics, 40*(44), 1–8.

Yalçın Irmak, A., & Erdoğan, S. (2016). Digital game addiction among adolescents and younger adults: A current overview. *Turkish Journal of Psychiatry, 7*(2), 128–137. https://doi.org/10.5080/u13407

Yaman, F., Kabakçı Yurdakul, I., & Dönmez, O. (2020). Dijital vatandaşlıktan dijital ebeveynliğe dönüşüm [Transformation from digital citizenship to digital parenting]. In A. Görgün Baran, O. Hazer, & M.S. Öztürk (Ed.) *Gençlik ve dijital çağ* [*Youth and the digital age*] (pp. 165-180). Hacettepe University.

Yaman, F. (2018). *An empirical investigation of digital parenting self-efficacy among turkish parents.* (Unpublished doctoral dissertation). Anadolu University, Eskişehir.

Yardi, S., & Bruckman, A. (2011). Social and technical challenges in parenting teens' social media use. Proceedings of ACM Conference on Human Factors in Computing Systems (CHI'11). 3237–3246. https://doi.org/10.1145/1978942.1979422

Yay, M. (2019). *Dijital ebeveynlik [Digital parenting]* (2nd ed.). Yeşilay Publishing.

Yazıcı, Z. N. (2021). A new role in the e-world: Digital motherhood. *Ondokuz Mayıs University Journal of Women's and Family Studies, 1*(2), 115–132.

Zaman, B., & Mifsud, C. L. (2017). Young children's use of digital media and parental mediation. *Cyberpsychology:Journal of Psychosocial Research on Cyberspace, 11*(3). https://doi.org/10.5817/CP2017-3-xx

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