Accepted: 18 May 2022

DOI: 10.1111/chso.12599

ORIGINAL ARTICLE

Children & Society ncb WILEY

Parental mediation in the age of mobile technology

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Funding information
The research was supported by the Hungarian National Research Development and Innovation Office. Grant number: K120086, 'Race against time.' Principal investigator: Beáta Nagy.

Abstract

This paper explores the impacts of adolescents' screen time, learning outcomes and parental performance in relation to different mediation strategies. These issues are addressed through the analysis of a representative survey carried out with 1000 families in Hungary in 2017. Within this research, 12–16-year-old teenagers and their parents were asked about their experiences and perceptions of mediation. Four main parental strategies can be identified: balancing mediation, restriction, permission and ad hoc mediation. The significance of parental performance in the analyses indicates that parental mediation forms part of the contemporary parenting skillset and correlates with perceptions of children's screen time and subjective quality of parenting.

KEYWORDS

adolescents' use of technology, age differences, gender differences, learning outcome, parental mediation, parenting/parental performance

INTRODUCTION

There is growing interest in parental mediation strategies related to children's technology use in public and academic discourse (Brito et al., 2017; Kalmus et al., 2022; Mascheroni et al., 2018).

The spread of different technologies has increasingly caused parents to feel that they have no effective means of handling children's technology use (Wartella et al., 2013).

Whether it is beneficial to control children's access to technology may be a dilemma for parents, since the future labour market will expect specialised knowledge and skills in relation to the use of technology (Jeffrey et al. 2021). Related to this, Harvey (2015) highlights that parents attempt to balance the advantages of the use of technologies and the related risks that they perceive.

Moreover, there is growing empirical evidence that parenting is more stressful today than it was in earlier decades (Nomaguchi & Milkie, 2020). Recent studies from the US (Crouch, 2017; Pew Research Center, 2020) showed that parents also consider that technology and social media use play the most important role in the feeling that parenting is so complicated.

Technical affordances can be used to increase the knowledge and cognitive skills of children, but also for entertainment and communication purposes using social media platforms. Based on the time-displacement hypothesis (Putnam, 1995) that screen time may risk eroding social capital, the latter activities might compete with that available for other enrichment activities such as school-related assignments or extracurricular activities (Camerini et al., 2018).

Since contemporary cultural parenting norms emphasise that parents are strongly responsible for fostering their children's cognitive skills and proper development (Dermott & Pomati, 2016), the mediation of adolescents' technology use might be a particularly relevant topic within the framework of contemporary parenting. Previous investigations focus primarily on the role of parental mediation in influencing the child's screen time, online risk-taking behaviour (e.g. Lee, 2013; Livingstone et al., 2017; Shin & Lwin, 2017) or school performance (e.g. Cingel & Hargittai, 2018; Gentile et al., 2012). The novelty of our research model is that we looked at how these factors, parenting performance, children's estimated screen time and school outcomes impact strategy, not the other way around.

This paper explores what kinds of strategies are used by Hungarian parents, how these strategies are related to sociodemographic variables, and whether they are connected to adolescents' perceived screen time, school outcomes or parental performance. We analyse data from a representative survey, and unlike in the EU Kids Online project (Helsper et al., 2013; Talves & Kalmus, 2015) and other quantitative studies (e.g. Livingstone et al., 2017), we apply different measures of these practices and use an inductive data-driven approach to identify dominant patterns associated with the strategies. This different approach is typically applied in qualitative studies (Symons, Ponnet, Emmery, et al., 2017; Zaman et al., 2016), thus we argue that the current representative analysis might enrich our understanding of parental mediation approaches in Central and Eastern Europe. Understanding such parental approaches related to adolescents' technology use and the sociological investigation of the related strategies––including the factors of gender and age––might increase understanding of the expectations and diverse patterns associated with contemporary parenting, as well as of young people's use of technology.

With declining state support in Hungary for public education, the attention and resources that parents devote to their children's development are increasingly important factors. In line with this, recent findings (Nagy et al., 2022) show that parental involvement strongly predicts adolescents' subjective well-being. Concerning media use, parents report that they lack any support from state schools in terms of mediating their children's technology use (Kutrovátz, 2022). On the other hand, recent research findings (Fodor et al., 2021) showed that in Hungary the pandemic increased gender inequality most in middle-class, highly educated families who pursue intensive parenting practices and worry more about their children's development and the danger of lagging behind. Moreover, in terms of learning outcomes

Hungarian students perform worse on PISA tests (Programme for International Student Assessment) than the OECD average (Schleicher, 2019). Therefore, parents try to compensate for the deficiencies of the school system and the stakes associated with parenting decisions are incredibly high.

As a point of departure, the paper introduces parental mediation types and concepts. The following section, based on earlier empirical findings, provides an overview of the important factors that explain these strategies in relation to the use of digital technology. Afterwards, we describe the sample and the methodology that is applied, then discuss the results of the analysis. Last, we present and discuss the main conclusions.

LITERATURE REVIEW

Concepts and types of parental mediation in the framework of contemporary parenting ideal

The term 'parental mediation' is used to describe parent–child interactions––both communication and behavioural strategies––related to children's use of media. It also includes parental responsibility for setting and enforcing rules about technology and internet use to minimise the potentially negative impacts of media and maximise the benefits of usage (Livingstone et al., 2017).

There is consensus in the academic literature about the main forms of parental mediation: these include *active mediation*, *restriction* and *co-using* strategies (Camerini et al., 2018; Clark, 2011; Gentile et al., 2012). This classical approach was introduced in line with empirical investigations into control over watching television (Valkenburg et al., 1999). Over past decades, the focus has gradually shifted from the study of television to the mediation of internet and mobile device usage. Due to digitalisation and the emergence of new tools and platforms, it is necessary to better understand more recent mediation strategies (Konok et al., 2020; Symons, Ponnet, Emmery, et al., 2017).

Consequently, there are several typologies in the academic literature regarding the parental mediation of children's technology use, making it difficult to compare and assess the different strategies. We discuss these practices in the framework of contemporary parenting ideals.

A recent systematic literature review of articles published over the past 10 years identified four partially different parental mediation strategies; namely, restrictive strategy, active strategy, monitoring and deference (Kutrovátz et al., 2018). First, *restriction* concerns limiting access, content or social media use or buying affordances and devising specific rules about how to use technical devices (Symons, Ponnet, Emmery, et al., 2017; Talves & Kalmus, 2015). Although restrictive mediation might be especially effective in terms of reducing screen time or risk, it can also result in a forbidden fruit effect; on the other hand, its effectiveness might depend on the authority of parents (Naab, 2018), which might conflict with contemporary parenting standards. Moreover, the restriction approach hinders the opportunity to enhance children's digital literacy and resilience, and undermines the child's agency in their relationship with their parents (Mascheroni et al., 2018).

The second form is *active mediation*, which, often implemented with the *co-use* of technology, is aimed at educating users to behave properly on social media, including negotiating, interpreting and discussing both buying and accessing to content (Symons, Ponnet, Walrave, & Heirman, 2017; Zaman et al., 2016). In terms of parenting, active mediation might enhance the acquisition of specific skills and knowledge that enable appropriate online behaviour and improve digital literacy.

Further, these practices also support the child's agency, enable negotiations and promote reasoned explanations. Additionally, the fact that the active mediation strategy has been investigated most frequently (Gentile et al., 2012) underlines the expectation that parents should both screen and help with the proper use of new technologies. The recent trend to increasing active mediation and decreasing restriction among parents in European countries also underlines that parental behaviour is changing in line with the new expectations about parenting (Kalmus et al., 2022).

Monitoring is the third form of mediation: as a strategy it focuses mostly on controlling activities and checking the content thereby consumed or shared. A part of monitoring may involve checking children's electronic devices (investigating browsing history, interactions and messages) (Symons, Ponnet, Emmery, et al., 2017; Talves & Kalmus, 2015). As surveillance is a highly important factor in contemporary parenting, monitoring children's online activities might be a relevant part of this ideal.

A strategy of deference is intended to educate children to engage in independent and responsible behaviour and tries to avoid parental intervention with use (Padilla-Walker et al., 2012; Zaman et al., 2016). Consequently, related aims are also in line with those of modern parenting; however, this form is not an active one in terms of practices but rather emphasises the significance of showing an example. In connection to this, parents might acknowledge the increasing independence of adolescents because they might feel the 'need to grant more decision-making authority to young people as they age' (Clark, 2011, p. 325). What is more, several studies (Clark, 2011; Riesmeyer 2020) have pointed to the relevance of the issue of reverse socialisation (when children teach parents how to use digital media devices) in parental mediation, underlining the equal agency of parents and children (Clark, 2011).

In relation to the aforementioned concepts, we can witness further changes in the theoretical landscape. Livingstone et al. (2017), for example, identified a new strategy called enabling mediation. This is a more complex category than active mediation, as it focuses on setting up frameworks that guarantee safe internet use, while leaving enough free space for positive effects to emerge. Accordingly, it not only includes the attributes of the active mediation strategy, but also utilizes technical control and monitoring. This form of parental practice empowers children and supports their active engagement and strengthens the positive effect of appropriate internet use (Livingstone et al., 2017). Enabling mediation therefore covers the widest spectrum of modern parenting practices.

In conclusion, parental mediation is strongly connected to social and cultural expectations concerning parenthood itself. Therefore, these practices change in accordance with how parental responsibilities and tasks are perceived.

In the following section we turn our attention to empirical investigations of parental meditation strategies.

Earlier research findings about parental mediation

Age and gender

Most research has attempted to understand how the age and gender of a child affect mediation strategies. In terms of age, empirical findings are consistent: as children get older, parents use all strategies less frequently and less intensely, and while younger children's use of digital device tends to be mediated by restrictions, parents of older children tend to apply active mediation strategies (Mascheroni et al., 2016; Symons, Ponnet, Emmery, et al., 2017; Symons, Ponnet, Walrave, & Heirman, 2017; Talves & Kalmus, 2015). The age of the child is the main determinant of type of parental mediation

(Symons, Ponnet, Emmery, et al., 2017). Also, older parents control children more intensely until the phase of adolescence, when this becomes a source of conflict (Brito et al., 2017). However, Vanweesenbeeck et al. (2016) underline that, during adolescence, risky behaviour related to children's privacy increases (e.g. they may provide of data when downloading or using applications), while teenagers still lack the ability to think critically about their privacy. Therefore, we argue that investigating parental mediation of teenagers' technology use is of crucial significance.

Concerning gender, empirical results indicate more complexity. Girls are more likely to spend time on social media, while computer gaming is more typical among boys (Kutrovátz 2020; Pew Research Center, 2018)––and, related to this, the perceived risks of use define parental mediation approaches (Cingel & Hargittai, 2018).

The *EU Kids Online* project utilizes representative data about the internet usage of 9-16-year-old children from the 25 EU Member States. Talves and Kalmus (2015) examined gender patterns and other determinants of strategies at the macro and micro level. The comparison found that, in most countries, parents applied a variety of parental mediation strategies in relation to girls' internet usage, with the domination of an active mediation strategy, whereas boys' internet usage was much less stringently regulated. If boys' use was regulated at all, it was mainly done through restrictive strategies, technical devices and monitoring.

A study of Belgian families (Symons, Ponnet, Emmery, et al., 2017) reported that the restriction of girls' interactions on social media platforms was more common, mostly by mothers, whereas boys' access to such sites was more restricted (Symons, Ponnet, Emmery, et al., 2017). Brito et al. (2017) also found that if both parents exercise a high level of control, they tended to limit girls more than boys.

Concerning parents' gender, there is persistent empirical evidence that mothers usually exercise a high level of control with a high level of warmth, offering greater emotional support (Brito et al., 2017; de Haan et al., 2018; Kirwil et al. 2009; Symons, Ponnet, Emmery, et al., 2017).

There is relatively little empirical knowledge about parental mediation in Hungary. International comparisons (Helsper et al., 2013; Kirwil et al. 2009) show that a passive strategy is the most typical among Hungarian parents. Further inquiries might contribute to the debate on parental mediation in the framework of contemporary parenting ideals by contributing an understanding of the Hungarian experience.

Parenting and school performance

Parents actively mediate the children's technology use as it is typically them who buy technical equipment for their children, but they may also try to monitor closely the proper use of the former and ensure that time is spent on these devices is productive.

New concepts of ‘digital parenting’ (Livingstone & Blum-Ross, 2020; Mascheroni et al., 2018) or ‘transcendent parenting’ (Lim, 2016) refer to the widening scale of parental duties and practices related to media use of the family, and it points to the refinement of mediation framework and to emergent forms of parenting. Therefore, broader understanding and cultural expectations with regard to parenthood can affect the time spent on technology, the media content that is consumed, and the development of digital knowledge.

New technological devices might operate as distractive forces. Parents' impact on the learning process is the main point of reference in the related discussions (Brito et al., 2017; Ollier-Malaterre et al., 2019). From the perspective of children's school outcomes, the parents' position is very often investigated (Camerini et al., 2018; Cingel & Hargittai, 2018). In order to understand

the real impact of internet use on academic performance, a longitudinal survey was carried out in Switzerland in the mid-2010s. The investigation, which focused on 10–15-year-old adolescents, made it obvious that the socioeconomic status of parents moderates the effects of technology use. Interestingly, the intensive use of digital media for information- and education-related purposes was not shown to have increased academic performance within the period investigated. However, the use of digital tools mainly for communication and entertainment purposes was shown to have decreased school grades (Camerini et al., 2018).

Parental control appears to reduce children's screen time, which might contribute to better school performance. Gentile et al. (2012) found a correlation between parental monitoring and school outcomes for students in elementary school. Both the application of an active mediation strategy and the restriction of screen time were found to potentially affect grades. However, the authors did not find a correlation between active mediation (discussing TV shows, movies and video games) and parents' education level. Additionally, recent Hungarian qualitative findings (Kutrovátz, 2022) point to interaction between patterns of parental mediation and children's school performance: namely children's outcomes at school strongly influence the parental perception of the child's screen time and the choice of strategy.

Research questions

We can conclude that the concepts and the understanding of the determinants of parental mediation strategies are rather mixed. However, few studies have investigated the multifaceted relations between parental mediation and sociodemographic characteristics and described their complex patterns of interaction based on the Hungarian data, we intend to describe parents' mediation strategies of adolescents' media usage using in a complex framework. First, we answer the question *what kind of mediation strategies are used among Hungarian parents?* (RQ1). As there is a lack of empirical studies about the relations between sociodemographic characteristics and parental mediation, this paper describes *how parental mediation strategies are associated with the sociodemographic attributes of parents, and the gender/age of their children* (RQ2). Last, we investigate *how factors such as parental performance, screen time, and school grades affect the choice of mediation strategies* (RQ3). We assume that perceived parental performance, the parental perception of adolescents' screen time and the school outcome of teenagers might determine the mediation strategy parents apply (Figure 1). We suggest that these three measures might involve an assessment of

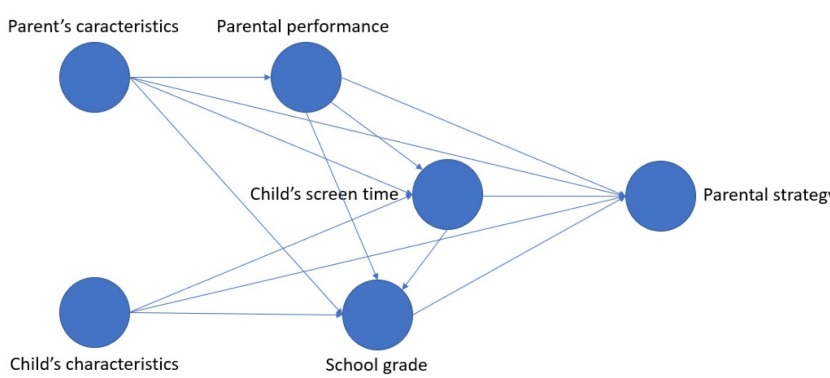

FIGURE 1 Theoretical model

parenting as well, since parents tend to evaluate themselves according to their child's school outcomes, or by the amount of time their child spends using a device with a screen.

METHODS AND DATA

Sample

We implemented a research project with the aim of obtaining knowledge about teenagers' and their parents' perceptions of the time they spend together, as well as adolescents' technology use and screen time, parenting, their well-being and parents' work-life balance. A polling company was used to conduct a nationally representative, parent–child linked survey. The survey data are from F2F CAPI research carried out with 1000 Hungarian families in the autumn of 2017. Data collection was restricted to families with children aged between 12 and 16 in Hungary. The sample was representative of region, type of settlement and age of child. Furthermore, the sample included a 40% quota for fathers (Table 1). During the data collection phase, parents and children were addressed separately. The survey included questions related to the usage of technologies and different types of parental mediation. Furthermore, the questionnaire addressed the topic of parental time, well-being, academic performance and parenting.

Measures

Parental mediation strategy

Parental mediation strategies were identified and labelled based on the following six questions that address the digital media use in general: 1. *How often do you restrict access to digital devices as*

TABLE 1 Sample characteristics

	Mean (%)	SD	Min	Max
Child				
Boy	41.2	–	–	–
Girl	58.8	–	–	–
Age	14.13	1.50	12	16
Parent				
Father	43.3%	–	–	–
Mother	56.7%	–	–	–
Age	42.20	5.55	25	63
Highest educational attainment				
Elementary	9.3%	–	–	–
Vocational	36.5%	–	–	–
Secondary	38.1%	–	–	–
Higher	16.1%	–	–	–

a form of punishment? 2. How closely do you follow the use of technology of your child? 3. How often do you check what your child uses their digital devices for? 4. How often do you read messages to/from your child? 5. How often do you quarrel with your child over the use of digital devices? 6. How often do you discuss the appropriate use of digital devices with your child? The frequencies were measured with 4-to-6-point Likert scales (See the distributions of responses based on parental mediation strategies in Figures A1–A6 in the Appendix).

Screen time

This indicator refers to parent's perceptions about adolescent screen time. Parents reported what they think about the screen time of their teenager in general. Response options ranged from 'too little' (1) to 'too much' (5). Most parents (63.9%) find the amount of time that their teenage child spends in front of screens to be appropriate. However, a third of parents (33.7%) think that their teenager's screen time is 'a lot' or even 'too much'. Parents' perceptions correlated with the child's age and composition of the household.

School grade

Parents reported the teenager's grade point average in the last school year. Response options ranged from 'satisfactory' (1) to 'excellent' (5). The greatest proportion of adolescents (43%) received a 'good' grade (4) in their last school year, while more than a third of them (36%) got a higher, and 21% a lower grade on average.

Parental performance

This was measured using the following three variables: (1) parental satisfaction with child's school grade, (2) perceived influence/control over child's screen time (*How much do you think you can influence your child's screen time?* measured with a five-item Likert scale) and (3) subjective quality of parenting. To create a measure of subjective quality of parenting, we applied a question about the assessment of parenting skills from Galinsky's research (1999) on children's and parents' perspectives about parents' work-life balance. The items were designed to assess a range of parenting skills that are strongly linked to children's social and emotional development and success in school.

Subjective quality of parenting was measured by average level of agreement with 12 different statements about parenting, such as *I take the time to talk to my son/daughter, We have family routines and traditions, I know what is really going on in his/her life*, etc. Responses to these questions were also recorded on a five-item Likert scale.

Control variables

Parent indicated their highest education level, ranging from elementary education (1) to higher education (4), their age, their child's age and gender. These variables and the parent's gender were included as control variables in the analyses.

Methods of data analysis

In this paper we analyse the answers of parents related to the children's usage of technologies and parental mediation. Since we opted to forego adapting a pre-existing typology, we could not measure the parental mediation strategy directly. Instead, we relied on the non-supervised learning method of k-means cluster analysis (Lloyd, 1982) to reveal potential groups based on a set of Likert-scale questions regarding different aspects of the parents' approach to their child's use of digital devices and technology. Based on the aforementioned empirical research, we formulated the six questions (above) that cover parents' general attitudes and also specific topics––from the frequency of parent–child discussions about the appropriate use of technology to restricting children's access to digital devices. Responses to these six questions were considered to be quasi-continuous variables, were recorded on 4-to-6-level Likert scales, and standardised for use in the model (see Figures A1–A6 in Appendix).

To assess the robustness of our findings, we compared k-means clustering results to those obtained from a two-step cluster approach. The latter was based on a combination of a cluster feature tree (Zhang et al., 1996) and hierarchical clustering. This is a model-based approach whereby likelihood and likelihood-based information criteria (AIC or BIC) can be computed by relying on a mixture of multinomially or normally distributed data. The best fitting number of clusters can be determined by choosing the arrangement which minimises one of the information criterion in the two-step clustering method, or by maximising the silhouette-index (Rousseeuw, 1987) which describes the consistency of the clustering generated by both methods. Solutions involving two to five clusters were tested, and while AIC and BIC values and the silhouette-indices were similar for all solutions, interpretability was determined to be best for the four-cluster version. We must note that respondents were classified into clusters in a hard-clustering fashion, which occurred somewhat arbitrarily for respondents located close to the cluster boundaries.

After determining cluster memberships, we investigated their relationship to potential determinants; mainly sociodemographic characteristics. Bivariate analyses were implemented using mean comparisons with one-way ANOVA and chi-squared independence testing in simple two-dimensional contingency tables. Multivariate analysis was conducted using multinomial logistic regression to account for correlations between explanatory factors.

RESULTS

Parental mediation strategies

As mentioned above, using cluster analysis we identified several groups among the parents based on their responses in relation to mediation (Table 2). The first type constructed is the *balancing mediation*. Parents who predominantly chose this strategy follow and control their child's use of digital devices, sometimes reading their online messages, but not to the extent that it results in regular conflict. Accordingly, they can and do discuss the preferred way to use ICT in a normal fashion.

The second type of activity may be called an ad hoc *approach*; thus, it is less of a clear, wilfully adopted strategy of parents. It is characterised by a lack of discussion about technology use and screen time, with parents not really following what the child does. This is coupled with occasional quarrels about proper ICT use, and restrictions on it from time to time. Parents who fall

TABLE 2 Distribution of mediation strategies in the sample

Strategy	*n* (%)
Balancing mediation	384 (38.4%)
Ad hoc approach	122 (12.2%)
Permissive strategy	325 (32.5%)
Restrictive strategy	169 (16.9%)

into this category often do not have enough spare time to spend with their children because they work in shifts or are single parents with many obligations. These characteristics demonstrate the 'involuntary choice' of this strategy.

The third type is a *strategy of permission*. Parents in this category mostly have older (14–15 years of age) children whom they trust to be able to use ICT without major risks. In general, they are satisfied with their children's school performance and the time they spend together, which may not motivate them to adopt a more hands-on approach.

The fourth *strategy is one of restriction*. Parents in this group try to impose strict control over their child's use of digital devices, and often punish them by restricting access to them. They seek to have regular discussions about ICT with their child, but these often end in quarrels instead of reaching mutual understanding.

Mediation strategies and the sociodemographic attributes of parents and their children

In terms of the gender and age of the parents and children interviewed, we found that all parameters have a statistically significant relationship with the choice of mediation strategy (all *p*-values <.001; see Figures A7, A8 and Table A1 in Appendix).

While men tend to employ a permissive strategy more often than women (38.1% of fathers and 28.2% of mothers choose this strategy), they are less likely to be restrictive (13.1% of fathers compared to 19.8% of mothers). The difference is not significant for the balancing mediation strategy nor the ad hoc approach. (See Figure A7 in Appendix.)

Girls' parents are more likely to follow a balancing mediation strategy than boys' parents: 33.0% of the parents of boys tend to choose this strategy compared to 42% of girls' parents. The differences are not significant for the other strategies. (See Figure A8 in Appendix.) Looking at the connection between the mediation strategy and the gender of child separately for mothers and fathers, we see that this relationship is only significant for mothers. However, mothers are almost 1.5 times more likely to choose a balancing mediation strategy and choose an ad hoc approach about half as often for girls as boys (Figure 2).

Concerning the correlation with age, we conclude that, on average, parents who had their child at a later age, and whose child is older as well, tend to care less about their offspring's use of digital devices and employ a permissive strategy more often. One additional year of age of the parent at the time of their child's birth increases the odds of a permissive strategy being employed by a factor of 1.04 (95% C.I.: 1.02–1.07). Younger parents and those who had their child at a younger age tend to choose a restrictive strategy as opposed to another approach; one additional year of age of the parent at the time of the child's birth decreases the odds of employing a restrictive strategy by a factor of 0.93 (95% C.I.: 0.90–0.96). (See Table A1 in Appendix.)

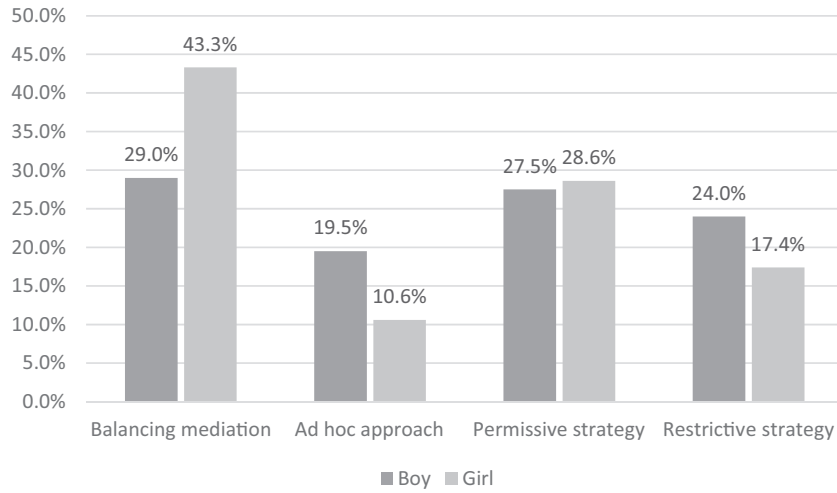

FIGURE 2 Mothers' mediation strategy by gender of child

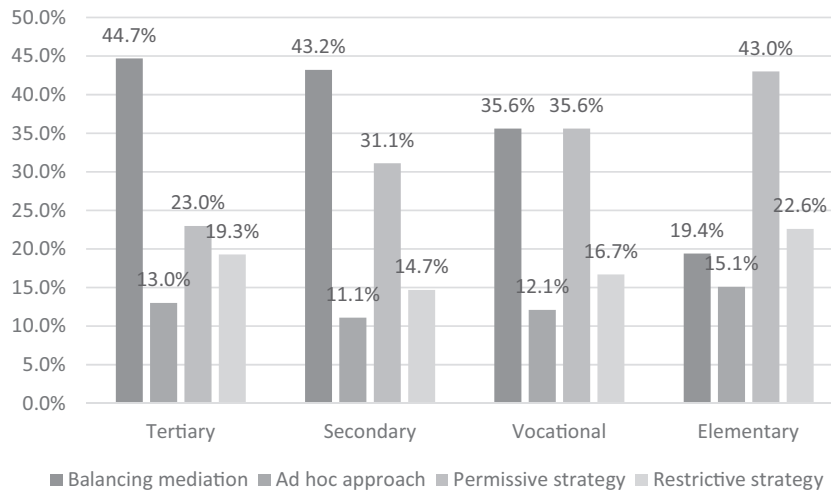

FIGURE 3 Distribution of parental education level by mediation strategy

There is a strong association between parents' educational level and the mediation strategy as well (Figure 3). While the proportion of parents who take an ad hoc or restrictive approach is about the same in each education category, balancing mediation is much more prevalent among parents with at least a secondary than those with a lower level education. Use of a permissive strategy shows the opposite pattern: the higher the education level, the fewer the parents who choose this strategy.

The average school grade of the child has a significant relationship with the parental mediation strategy (Figure 4). Children whose parents choose a balancing strategy have the highest grade average, and those whose follow the ad hoc approach have the lowest GPA. Looking at the differences in more detail, grade averages are about the same for 12- and 13-year-olds, thus parental strategy only starts to matter at above the age of 13. Average grades decrease with age in general, but the older children of parents who apply a balancing mediation have the same grade average as younger kids

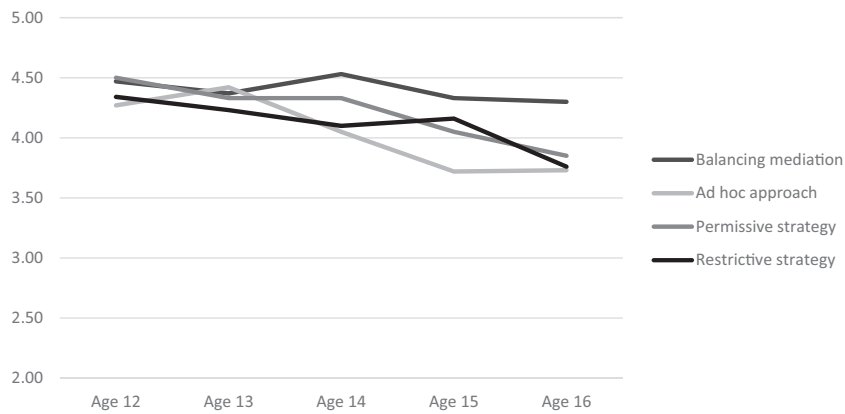

FIGURE 4 Average school grade of children in relation to age and parental mediation strategy

in the sample. Children whose parents follow any other mediation strategy have significantly lower average grades than those of the younger children in the sample.

Since the factors described above are not independent of each other, multinomial logistic regression was used to assess their importance in determining which parental strategy is followed, allowing the estimation of effects while controlling for the other explanatory variables in the model. The following table shows the relative risk ratios (Table 3). The reference dependent category is a strategy of balancing mediation.

All relative risk ratio values shown in the table compare the probability of following the given strategy relative to a strategy of balancing mediation. The gender of the parent and child are not significant factors in this multivariate model. In terms of the educational level of the parent, we conclude that a decrease in education has a significant effect on the choice of a permissive

TABLE 3 Multinomial regression coefficients (relative risk), with strategy of balancing mediation as the reference category for the dependent variable

	Relative risk compared to a strategy of balancing mediation		
Variable	**Ad hoc**	**Permissive**	**Restrictive**
Age of parent	1.01	1.03*	0.94**
Age of child	1.20*	1.40***	0.88
Gender of parent: Female	1.39	0.85	1.35
Gender of parent: Male		ref. cat.	
Gender of child: Girl	0.68	0.79	0.67*
Gender of child: Boy		ref. cat.	
Education: Higher ed.	0.64	0.29**	0.63
Education: Secondary ed.	0.48	0.39**	0.42*
Education: Vocational ed.	0.62	0.50*	0.61
Education: Elementary		ref. cat.	
School grade	0.62***	0.81	0.72*

*$p < .05$; **$p < .01$; ***$p < .001$.

Note: Exact *p*-values in Appendix Table A2.

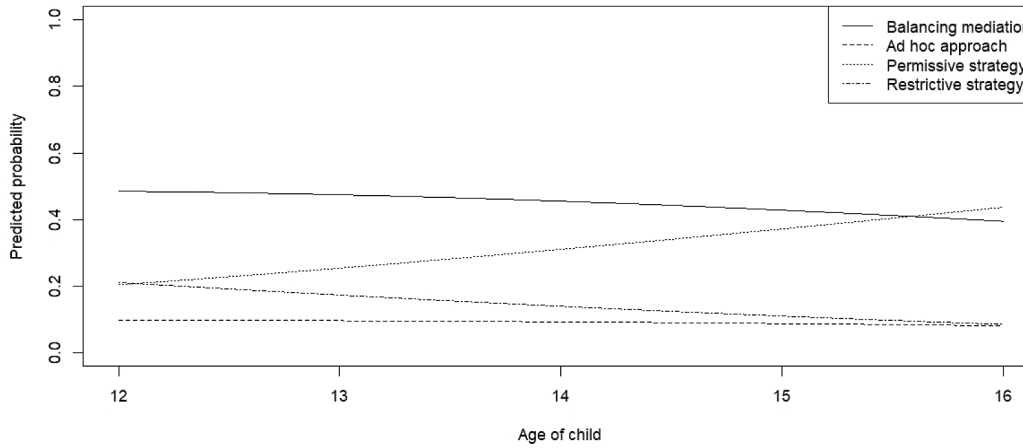

FIGURE 5 Predicted probability of employing specific parenting strategy by age of child

strategy relative to balancing mediation. Compared to balancing mediation, parents with a better education are less liable to engage in permissive mediation than parents with only an elementary education.

As discussed in relation to the bivariate relationship, even when controlling for all other variables in the model, the older the parent, the more likely it is that they use balancing mediation rather than a permissive strategy. They are also less likely to switch to a strategy of restriction (See Figure A9 in Appendix). This is also true in relation to the age of the child. The graph below (Figure 5) shows the marginal predicted probabilities for the different strategies conditional upon the age of the child.

Concerning the school outcome of the child (see Figure 6 below) we conclude that lower grades increase the likelihood of choosing other strategies relative to balancing mediation. Better grades correspond to an increase in the relative probability of a balancing mediation strategy being employed. The digital media use of children with the lowest grades is almost three times as likely to be mediated by a restrictive strategy as that of children with the highest grades.

Impact of screen time, school grade and parental performance on mediation strategies

Since growing attention is currently being devoted to the responsibility associated with parenting (Dermott & Pomati, 2016), we focus on parental performance that is captured by parents' ability to supervise adolescents' screen time, their satisfaction with their child's school grade and their subjective quality of parenting. The interrelations between school performance and digital media use (Cingel & Hargittai, 2018; Kutrovátz, 2022) support the involvement of school grade in the investigation. We tested our theoretical model about the impact of screen time, school grade and parental performance on mediation strategies by applying multinomial logistic regression models.

In the first model (i.e. the model without control variables), three explanatory variables––evaluation of child's screen time, parental satisfaction with school grades and influence on child's screen time––were found to have a significant impact on the choice of parental mediation strategy,

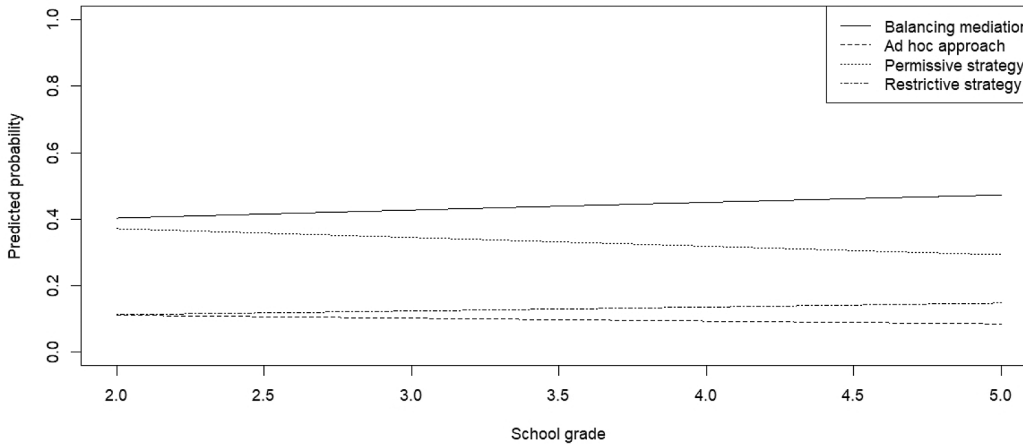

FIGURE 6 Predicted probability of employing specific parenting strategy by average school grade of child

while two variables––school grade, and subjective quality of parenting––were not. However, in the model with control variables, parental satisfaction with school grades is no longer a significant variable, while the p-value for the subjective quality of parenting decreases to below 5%. The difference in model deviances shows that the second model with control variables fits the data significantly better (*p*-value <.001) (See Table A2 in Appendix). The description of the variables used in the models can be found in the section on measures.

Concerning the relative risk ratios (see Appendix Table A3), we conclude that even though the introduction of control variables modified the p-values, model coefficients did not change substantively. We would thus draw the same qualitative conclusions based on the relative risk indicated by both models.

Looking at the control variables, the coefficients of age and parents' educational attainment show similar trends to those discussed above. However, in this model the gender of the child and parent also significantly affect the choice of mediation strategy. This further confirms the results of the bivariate analyses presented above. Mothers are more likely to follow an ad hoc strategy compared to a balancing mediation than fathers. The parents of girls, however, are less likely to choose a restrictive or ad hoc strategy compared to a balancing mediation one than the parents of boys.

With regards to parental performance, model coefficients (Table 4) show that the stronger the opinion of the parent that the child's screen time is too much, the higher the probability of taking an ad hoc or restrictive strategy relative to one of the balancing mediation. School grade does not significantly affect strategy selection considering the effect of all other variables. A stronger belief in being able to influence the child's screen time is associated with a significant decrease in the chance of taking an ad hoc or permissive approach compared to one of the balancing mediation (Figure 7). A higher subjective quality of parenting is also inversely connected to the relative chance of adopting an ad hoc approach.

The graphs below (Figures 8, 9) show the marginal predicted probabilities for the different strategies, conditional on the evaluation of the child's screen time and subjective quality of parenting. If parents think that the child's screen time is appropriate, or even too little, they predominantly take a balancing mediation approach. Conversely, as they start to think the child spends too much time in front of a screen, the probability of taking a restrictive or ad hoc approach increases, while that of a balancing mediation and permissive strategy decreases.

TABLE 4 Multinomial regression coefficients (relative risk), with strategy of balancing mediation as the reference category for the dependent variable

	Relative risk compared to a strategy of balancing mediation		
Variable	**Ad hoc**	**Permissive**	**Restrictive**
Age of parent	0.99	1.02	0.93***
Age of child	1.00	1.27***	0.84*
Gender of parent: Female	1.64*	0.82	1.38
Gender of parent: Male		ref. cat.	
Gender of child: Girl	0.59*	0.75	0.64*
Gender of child: Boy		ref. cat.	
Education: Higher ed.	0.67	0.30**	0.62
Education: Secondary ed.	0.44	0.37**	0.41*
Education: Vocational ed.	0.59	0.46*	0.60
Education: Elementary		ref. cat.	
School grade	0.87	0.88	1.04
Evaluation of child's screen time	2.60***	1.11	1.85***
Parental satisfaction with child's school grade	0.90***	1.02	0.74***
Influence/control on child's screen time	0.51	0.51	1.02*
Subjective quality of parenting	0.51***	0.87***	0.70

*$p < .05$; **$p < .01$; ***$p < .001$.

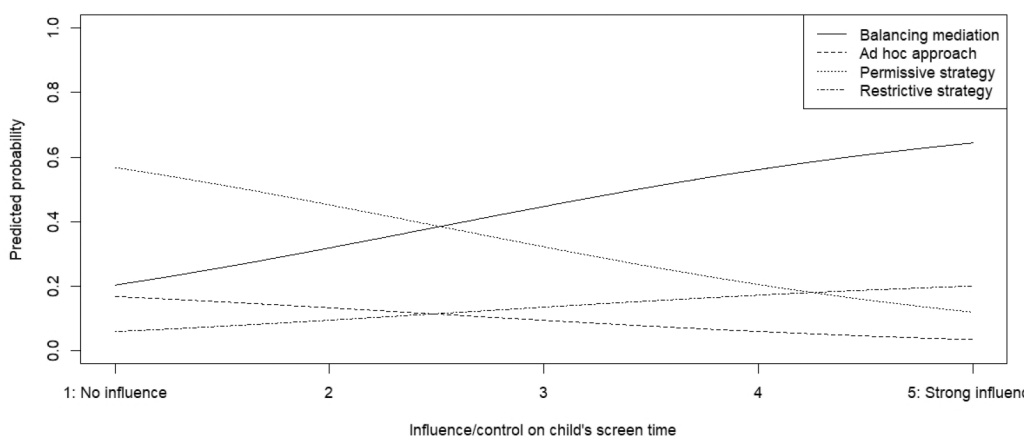

FIGURE 7 Predicted probability of employing specific parenting strategy by perceived influence on child's screen time

About 40% of parents who score their subjective quality of parenting lower take an ad hoc approach, followed by only just over 7% of those who scores themselves higher. The probability that parents pursue strategy of balancing mediation follows a reverse trend, increasing from about 18% for parents who evaluate themselves as providing a low level of quality of parenting to 48% for parents with high a level of subjective quality of parenting.

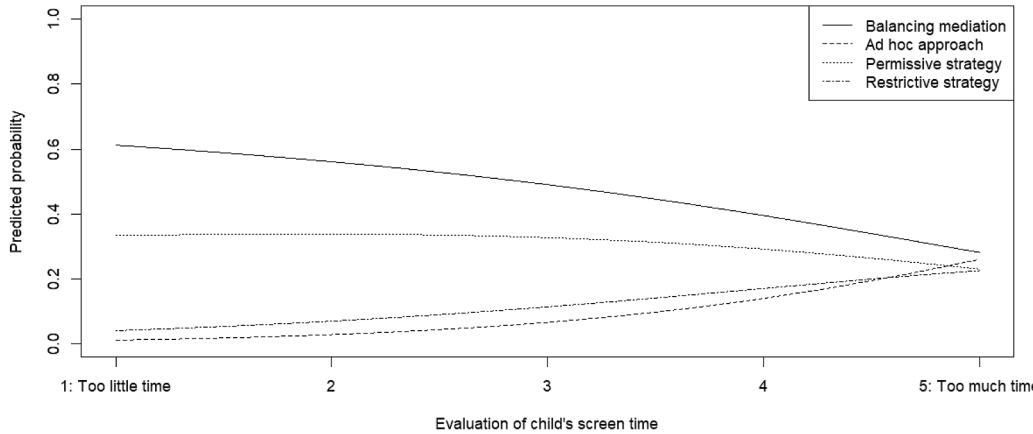

FIGURE 8 Predicted probability of employing specific parenting strategy by average evaluation of child's screen time

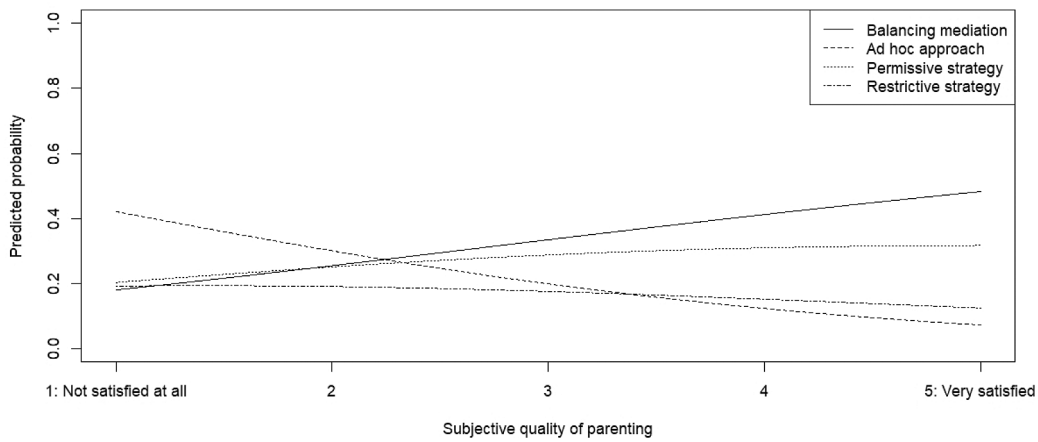

FIGURE 9 Predicted probability of employing specific parenting strategy in relation to subjective quality of parenting

DISCUSSION

As the literature review section of the paper has demonstrated, there are various competing typologies of parental mediation. This conceptual diversity makes it very difficult to compare the results. Therefore, for this paper we have chosen a different tactic. Instead of attempting to squeeze our data into predefined categories distilled from the literature, we started from the data and identified different strategies inductively. This data-driven approach was supported by the methodological approach of cluster analysis, which was used in an exploratory fashion.

Based on a nationally representative survey, we applied this approach to delineate different parental mediation strategies in Hungarian society. As a result of this process, we were able to identify four mediation strategies. The first approach can be called balancing mediation, which designates an involved, active role for parents in negotiating the appropriate use of technology

by their children and also monitoring their activity. Similar to the digital parenting practice described recently by Livingstone and Blum-Ross (2020), in this group parents effectively balance between the contrasting approaches.

The second type is defined as an ad hoc strategy, characterised by a less consistent parental approach involving less parental reflection about appropriate usage, yet technology remains a source of conflict, as well as an occasional object of prohibition-based restrictions. The next approach can be called a permissive strategy, which is characterised by a lack of parental involvement.

Last, the fourth parental approach can be called a strategy of restriction, which implies a controlling, 'tight-leash' type of parental involvement accompanied by frequent parent–child conflict.

The distributions of the strategies show that balancing mediation and permissiveness are the most typical approaches among Hungarian parents. These results may be explained as meaning that parents prefer balancing mediation since more restrictions––especially threats and punishment––run counter to contemporary parenting values, particularly concerning offering support for the autonomy of adolescents and reinforcing their capacity for self-regulation (Steinfeld 2021) or building their digital literacy (Mascheroni et al., 2018). However, the large proportion of permissive parents in the sample is also consistent with international comparisons (Kirwil et al. 2009, Helsper et al., 2013) that tend to show the passivity of Hungarian parents in this regard.

It is worth mentioning that the exploratory approach that leads to the identification of these parental approaches is hardly new in relation to this research problem. Several other qualitative papers have opted for a similar tactic; that is, an inductive data-driven approach (Symons, Ponnet, Emmery, et al., 2017; Zaman et al., 2016) to identifying different parental approaches towards children's technology use. The added value of our research is that the data on which we base our findings stems from a nationally representative survey. This enhances the generalisability of our findings, which nevertheless remain exploratory at this phase of our research. Moreover, the delineation of these clusters also allows for the testing of the relationships with other variables. In our case, the latter included 'standard,' sociologically relevant (that is, sociodemographic) factors, as well as topic-specific variables such as parenting, evaluations of the child's screen time or school grades.

Concerning these characteristics, we conclude that, similarly to previous empirical findings (Brito et al., 2017; Mascheroni et al., 2016; Symons, Ponnet, Emmery, et al., 2017; Symons, Ponnet, Walrave, & Heirman, 2017; Talves & Kalmus, 2015), gender and age are significantly associated with mediation strategies. This is true for both children and parents. For example, parents with older children tend to care less about their child's use of digital devices. This reinforces the claim that many parents might disapprove of this form of control as it might conflict with their parental values related to trusting children and supporting their autonomy, which is consistent with Nelson's finding (2010).

We identify that fathers also apply a permissive strategy more often than mothers, as it is consistent with previous findings that mothers are more likely to be responsible for negotiating children's technology use (de Haan et al., 2018; Kirwil et al. 2009; Symons, Ponnet, Emmery, et al., 2017). In other words, mothers more frequently mediate their children's media use because the expectations of contemporary parenting ideal primarily concern women (Ishizuka, 2019).

Parents of girls may be more likely to follow a balancing mediation strategy, and are less likely to be permissive. On the one hand, this finding is similar to previous claims (Talves & Kalmus, 2015) that girls' media use is more likely to be mediated actively than boys'. The diverse screen time patterns of boys and girls might explain the form of parental mediation which is typical among

Hungarian adolescents, too. The mediation of screen time on smart devices might be more challenging for parents, while the use of computers––video gaming––can be restricted more easily since such gaming devices are stationary and parents and children do not consider these gadgets to be private ones, in contrast to smart phones. The explanatory model also confirms previous results, with older parents tending to be more permissive, and fathers more likely to choose an ad hoc or restrictive strategy relative to one of balancing mediation. There is no difference in terms of the gender of parents concerning balancing mediation. Furthermore, as our and other scholars' results show, variables such as the educational attainment of parents (Gee, 2014) strongly affect which type of mediation approach is chosen by parents. We found that the main difference is between balancing and permissive strategies, given that the higher the educational background of the parents, the more likely they are to choose a strategy of balancing mediation. Similarly, the lower their educational attainment, the more likely it is that they utilise a permissive strategy.

The significance of parental performance, especially the perception of influence on child's screen time, also strengthens the idea that parental practices related to children's technology usage have become important parenting skills. In this regard, parental mediation appears to have become a new and highly relevant aspect of contemporary parenting ideals and practices. In this sense, balancing mediation and restrictive mediation strategies also form part of the contemporary parenting skill set. This skill set can be mobilised to guide and monitor technology usage in order to protect children from risks, while enabling the development of their digital literacy. Our results clearly show that these issues and dilemmas are part of the lived, everyday reality of most of the families we investigated. The choice of parental mediation strategies, however, considered this may be, is a topical and relevant question for the majority of parents. Given the fact that parenting practice is so important with regard to this issue, further research should explore these mechanisms in more detail.

To sum up, and to be more precise, we claim that the word ‘chosen’ is too strong and value laden as far as parental mediation is concerned. It would be better to say that the full spectrum of parental mediation strategies is not equally *available* to family households with different socioeconomic backgrounds. We argue that different mediation strategies involve different costs in terms of parents' time and cognitive energy. In our opinion, the exploration of these issues remains an interesting and fruitful domain for future research.

Despite the clear results that emerge from the analysis, the present paper has limitations. Although the real effect of parental practices and parental mediation may be evaluated only in the long term, this cross-sectional database does not permit us to predict long-lasting effects. Similarly, rapid changes in mobile technology and the differences in its social diffusion make it difficult to make any definitive statements about developed societies in general. Additionally, this paper has analysed only the standpoint of parents. Finally, we have to admit that the coronavirus pandemic has temporarily rearranged the use of technology. However, one impact has been to further reinforce the importance of parenting and increase the responsibility of parents to both provide and facilitate the use of technology. As a result, pre-existing inequalities in technology usage and parenting practices have become much more salient in society, making the ongoing study of parenting essential.

AUTHOR CONTRIBUTIONS

Nagy was the principal investigator of this study. The idea was developed by the four authors. The analyses were conducted by Rakovics. The first draft was written by Kutrovátz and Nagy, and, subsequently, all four authors contributed to the writing of the study.

CONFLICT OF INTEREST

This study has no conflict of interest of any sort.

CODE AVAILABILITY (SOFTWARE APPLICATION OR CUSTOM CODE)

Analyses were conducted with the statistical software SPSS. Data coding can be made accessible to the scientific community.

ETHICS APPROVAL

Ethics approval was granted by the Ethics Committee of Corvinus University of Budapest.

CONSENT TO PARTICIPATE

Not applicable.

CONSENT FOR PUBLICATION

Not applicable.

DATA AVAILABILITY STATEMENT

The data used in this study were obtained from the survey ”Race against time”, following the ethical criteria of Corvinus University of Budapest, and according to EU data protection policies.

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How to cite this article: Nagy, B., Kutrovátz, K., Király, G., & Rakovics, M. (2022). Parental mediation in the age of mobile technology. *Children & Society*, *00*, 1–28. https://doi.org/10.1111/chso.12599

APPENDIX

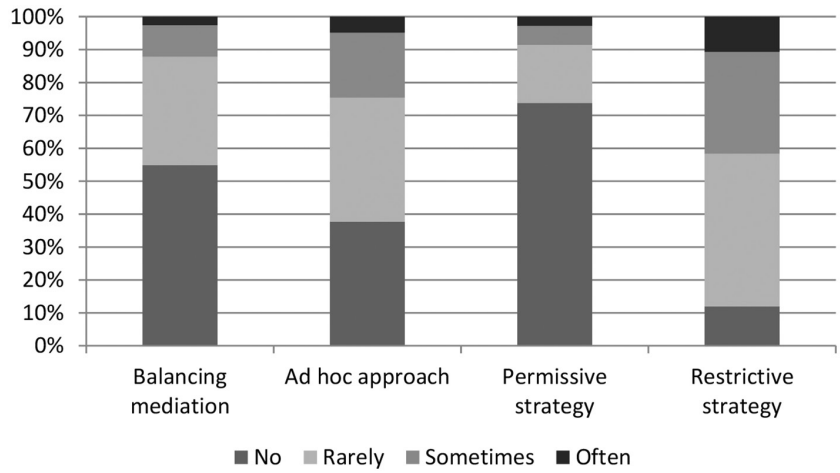

FIGURE A1 How often do you restrict access to digital devices as a form of punishment?

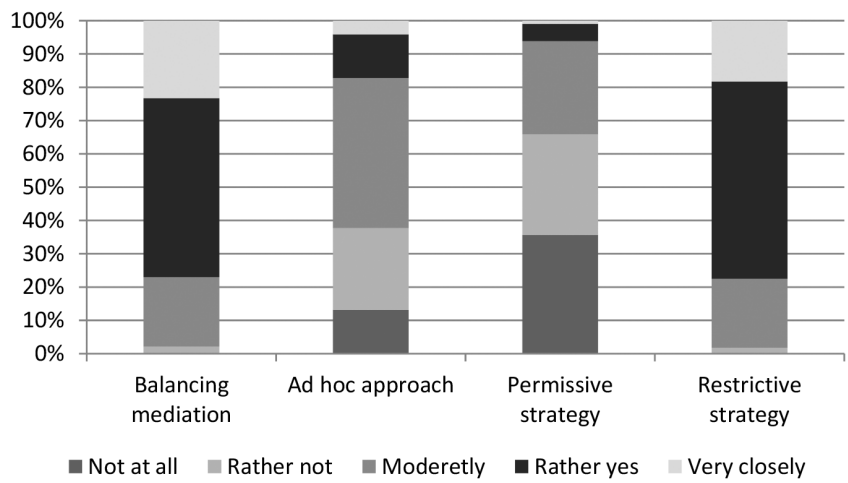

FIGURE A2 How closely do you follow the use of technology of your child?

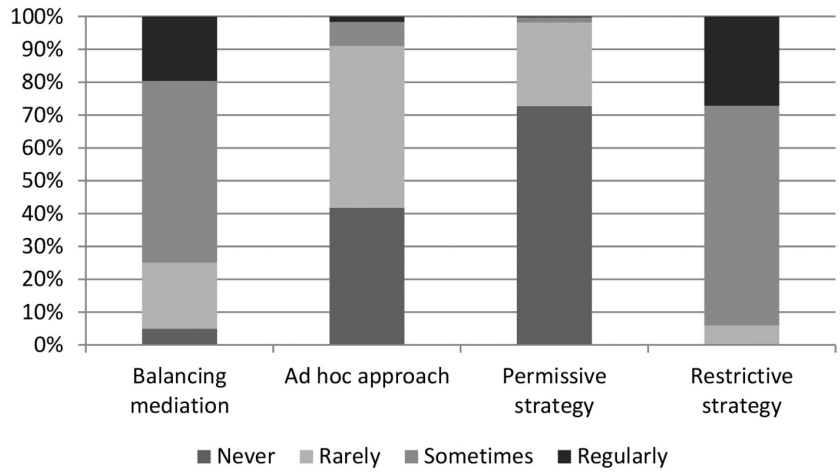

FIGURE A3 How often do you check what your child uses their digital devices for?

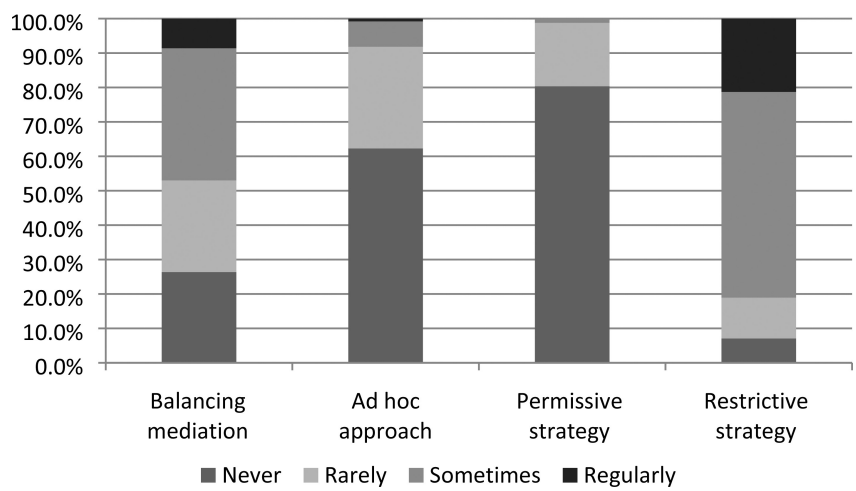

FIGURE A4 How often do you read the messages your child sends/receives?

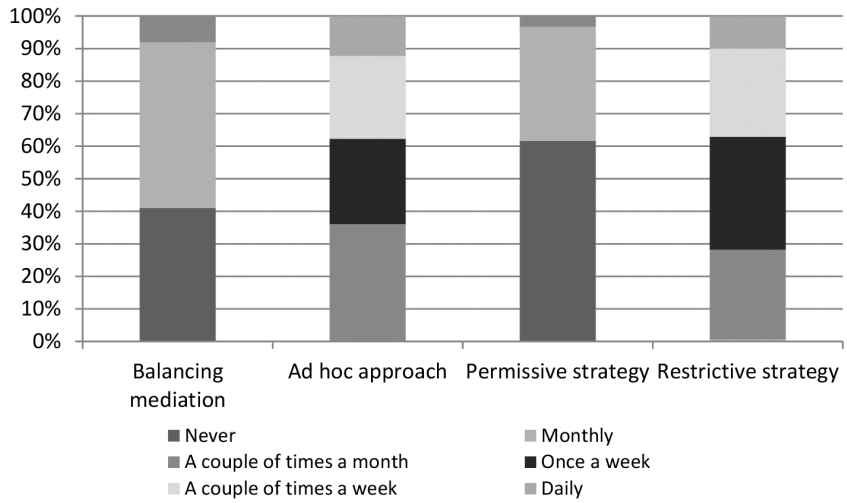

FIGURE A5 How often do you quarrel with your child over the use of digital devices?

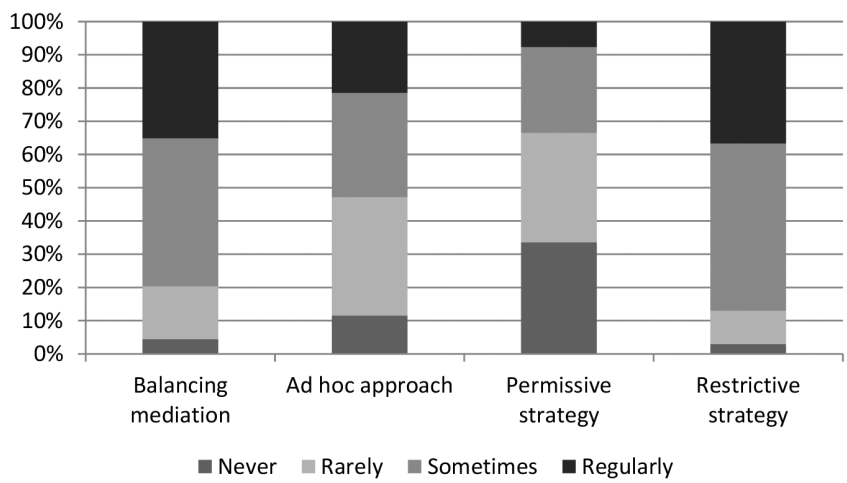

FIGURE A6 How often do you discuss the appropriate use of digital devices with your child?

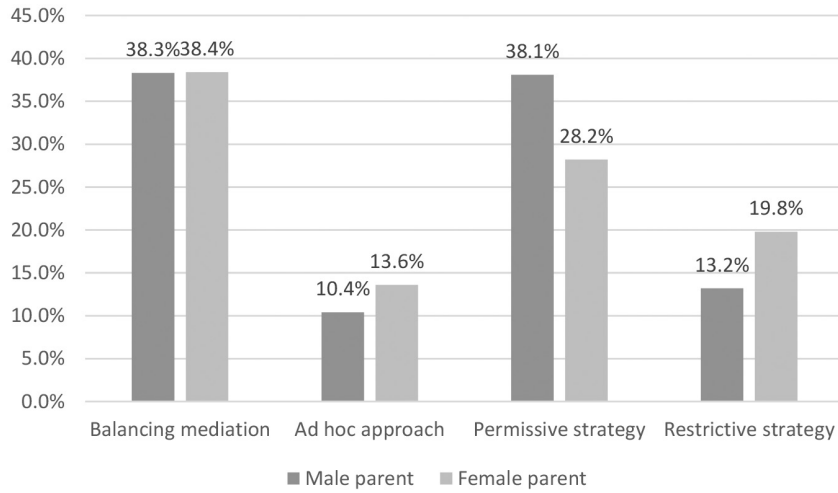

FIGURE A7 Distribution of parental mediation strategy by gender of parent. For the chi-squared test of independence, the test statistic is 15.738 (df = 3), *p*-value = .001

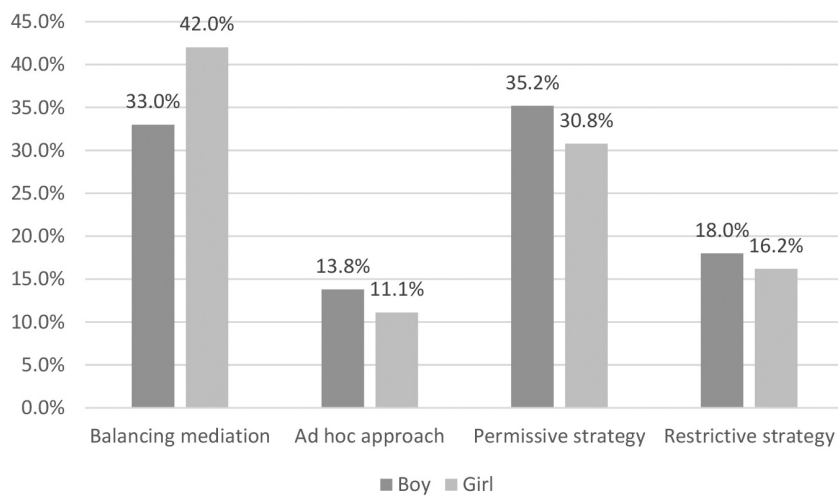

FIGURE A8 Distribution of parental mediation strategy by gender of child. For the chi-squared test of independence, the test statistic is 8.569 (df = 3), *p*-value = .036

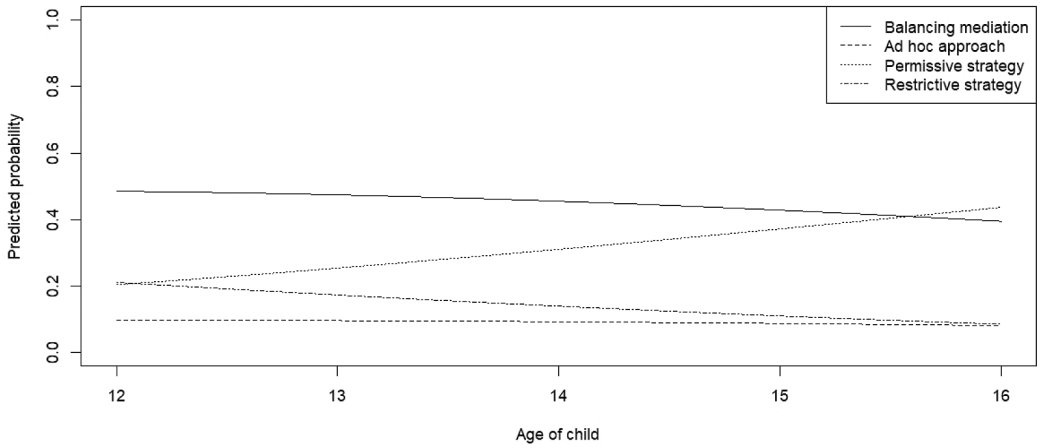

FIGURE A9 Predicted probability of employing specific parenting strategy by age of parent

TABLE A1 Average age in relation to parental mediation strategy

	Parents	Children	Parents age at child's birth
Balancing mediation	41.9	13.9	28.0
Ad hoc approach	42.6	14.3	28.2
Permissive strategy	43.5	14.7	28.9
Restrictive strategy	40.0	13.5	26.4
ANOVA *F*-test statistic	16.567	29.383	7.784
p-value	<0.001	<0.001	<0.001

TABLE A2 *p*-values of explanatory and control variables in the models

Variable	Model without control variables (*p*-value)	Model with control variables (*p*-value)
Evaluation of child's screen time	<.001	<.001
School grade	.091	.677
Parental satisfaction with child's school grade	.019	.058
Influence/control on child's screen time	<.001	<.001
Subjective quality of parenting	.097	.031
Child's gender		.055
Parent's gender		.011
Educational level of parents		.057
Age of child		<.001
Age of parent		<.001

TABLE A3 Multinomial regression coefficients (relative risk) with strategy of balancing mediation as the reference category for the two models

Ad hoc approach	M1: Model without control variables	M2: Model with control variables
Evaluation of child's screen time	2.58	2.66
School grade	0.74	0.83
Parental satisfaction with child's school grade	0.90	0.91
Influence/control on child's screen time	0.52	0.51
Subjective quality of parenting	0.57	0.52
Permissive strategy	*M1*	*M2*
Evaluation of child's screen time	1.18	1.11
School grade	0.71	0.86
Parental satisfaction with child's school grade	1.05	1.02
Influence/control on child's screen time	0.47	0.51
Subjective quality of parenting	0.79	0.89
Restrictive strategy	*M1*	*M2*
Evaluation of child's screen time	1.71	1.87
School grade	0.97	1.01
Parental satisfaction with child's school grade	0.72	0.74
Influence/control on child's screen time	1.11	1.01
Subjective quality of parenting	0.76	0.72