



Adolescents' smartphone use in family interactions: acceptability, behavior, and consequences

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Título: El uso de teléfonos móviles por parte de los adolescentes en las interacciones familiares: aceptabilidad, comportamiento y consecuencias.

Resumen: Basado en la Teoría del Comportamiento Planificado y el Modelo de Aceptación de la Tecnología, este estudio longitudinal investiga la relación entre la aceptabilidad del uso del teléfono móvil por parte de los adolescentes durante las interacciones familiares, su comportamiento de uso real y las consecuencias negativas percibidas sobre la dinámica familiar. Los datos proceden de 284 menores croatas de entre 11 y 15 años. Los participantes informaron sobre la aceptabilidad del uso del teléfono móvil en interacciones familiares (ola 2), su comportamiento de uso del teléfono (ola 3) y las consecuencias de dicho uso en las interacciones padre-hijo (ola 4). La modelización de ecuaciones estructurales no reveló un efecto directo de la aceptabilidad sobre las consecuencias negativas. No obstante, una mayor aceptabilidad del uso del teléfono durante las interacciones predijo un uso más frecuente, y el uso del teléfono móvil durante interacciones familiares indirectas se relacionó con consecuencias negativas más frecuentes. Estos hallazgos subrayan que la aceptación cognitiva se traduce en patrones de comportamiento que pueden perturbar las interacciones cara a cara, especialmente cuando la atención está compartida y no está enfocada. Las intervenciones preventivas deberían abordar tanto las actitudes como los desencadenantes situacionales para promover un uso consciente del teléfono móvil en las familias.

Palabras clave: Uso del teléfono móvil. Interacciones familiares. Aceptabilidad. Adolescentes. Comportamiento digital. Relación padre-hijo. Comunicación. Interferencia tecnológica.

Abstract: Grounded in the Theory of Planned Behavior and the Technology Acceptance Model, this longitudinal study examines the relationship between adolescents' perceived acceptability of smartphone use during family interactions, their actual smartphone use, and the perceived negative consequences on family dynamics. The data come from 284 Croatian early and middle adolescents between the ages of 11 and 15. Adolescents reported the acceptability of smartphone use in family interactions (wave 2), their smartphone use behavior (wave 3), and the consequences of smartphone use in parent-child interactions (wave 4). Structural equation modeling revealed no direct effect of the acceptability of smartphone use in family interactions on negative consequences. However, higher acceptability of smartphone use during interactions predicted more frequent use, and smartphone use during indirect family interactions was related to more frequent negative consequences. These findings underscore that cognitive acceptance translates into behavioral patterns that can disrupt face-to-face interactions, especially when attention is shared but not focused. Preventive interventions should address both attitudes and situational triggers to promote mindful smartphone use among families.

Keywords: Smartphone use. Family interactions. Acceptability. Adolescents, digital behavior. Parent-child relationship. Communication. Technology interference.

Introduction

Nowadays, adolescents often use smartphones during social activities. Since such use has almost become a routine, it remains unclear when and how it may affect the interaction itself and whether beliefs about the acceptability of smartphone use can predict the actual smartphone use and consequences of such behavioral patterns. This paper addresses that gap by testing a longitudinal model linking acceptability of smartphone use, actual smartphone use in direct and indirect family interactions, and negative cognitive consequences due to smartphone use.

Navarro and Tudge (2023) posit that the microsystem, the closest ecological system of child development, incorporates a virtual microsystem, which includes digital technology and its use. Currently, scientists are exploring factors related to digital technology use that influence the development of children and youth within their closest developmental context. Among digital technology devices, the performance and capabilities of smartphones make them one of the most desirable and commonly used digital devices (Radesky et al.,

2015), especially among children and youth. Smartphones are the most common means of media consumption among children and youth, which includes gaming, social media engagement, communication, and information seeking (Kabali et al., 2015; Park & Park, 2021; Varga & Kotrla Topić, 2022). Results indicate that the average daily smartphone use among elementary school children range from 2 to 3 hours (Trošelj & Kalebić Maglica, 2024; Radesky et al., 2020). Children use smartphones during different everyday activities and situations. This study specifically focuses on adolescents' smartphone use in close relationships, namely family interactions, and how it is preceded by adolescents' acceptability of use and followed by certain negative consequences.

Smartphone use in face-to-face interactions has almost become a social norm (Stockdale et al., 2018). However, some research indicates that parents and children usually do not perceive digital device use during face-to-face interactions as an acceptable behavioral pattern (Davis et al., 2019). Researchers question whether this norm of using smartphones during face-to-face interactions might have negative effects on relationship quality. Some studies show digital device use during interactions with others is associated with negative affect and lower relationship quality (Chotipitayasunondh & Douglas, 2018; Kostić, 2022; Meeus et al., 2021). The negative effects of smartphone use in social interactions can be explained by the postulations of Expectan-

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cy Violation Communication Theory (Burgoon, 1978). According to the theory, expectations about others' behavior play an important role in interpersonal interactions. The perception that a person involved in interaction does not meet and/or violates behavioral expectations during interactions is related to negative reactions or conflicts. In face-to-face interactions, people are generally expected to be engaged and to focus on their interaction partner. Using a smartphone during the interaction can be interpreted as a violation of expectations.

Building on this, Frackowiak et al. (2024) define co-present smartphone use as using a smartphone in the presence of others in ways that disrupt the quality of those relationships. While smartphone use indicates the behavioral measure of usage, terms like technofence, screen distraction, and phubbing imply a causal mechanism of association between behavior (smartphone use) and typically negative effects of that behavior (Frackowiak et al., 2024). Research on technofence and phubbing (McDaniel, 2015; Chotpitayasunondh et al., 2018; McDaniel, 2015) emphasizes the negative short-term effects of smartphone use during face-to-face interactions. Furthermore, the literature suggests that prolonged smartphone use might have harmful effects, not only on children's well-being and developmental outcomes (Cunningham et al., 2021) but also on their social and family interactions and relationships (Chotpitayasunondh et al., 2018; Garrido et al., 2021). What is more, smartphone use during face-to-face interactions may contribute to people feeling less connected and empathetic, and they rate such interactions as less pleasant (Dwyer et al., 2018; Misra et al., 2016).

The association between smartphone use acceptability in close relationships, the behavior of smartphone use, and the consequences of such behavior can be explained through various theoretical frameworks, among which are the Theory of Planned Behavior (TPB; Ajzen, 1991) and the Technology Acceptability Model (TAM; Davis, 1989). These theories offer insight into how specific behavior and the consequences of those behaviors may be predicted by perceived acceptability that shapes behavioral intention.

The Theory of Planned Behavior (Ajzen, 1991) tends to explain human behavior by examining the intention underlying it. According to the theory (Ajzen, 2002), behavior is likely to be performed if there is a strong intention to engage in it, meaning that (1) the individual has a positive attitude toward the behavior, (2) important close people and the individual's social environment support the behavior, and (3) the individual is confident in their ability to perform the behavior. Besides, Ajzen (2002) emphasizes that behavioral intention is the key predictor of behavior; however, perceived behavioral control may directly influence one's behavior when individuals feel they can readily perform it. Applied to smartphone use, adolescents typically (1) hold positive attitudes toward smartphone use, primarily because of the benefits it provides (Rosič et al., 2025); (2) experience supportive subjective norms from peers (Su et al., 2022); and (3) view

the behavior as easy and effortless, indicating high perceived behavioral control (Serra et al., 2021). Taken together, these components may help explain why smartphone use is both intended and easily performed among adolescents (Ajzen, 1991; 2002). According to the Technology Acceptability Model (Davis, 1989), perceived usefulness, perceived ease of use, and awareness may significantly affect user acceptability and engagement with digital devices (Hsu, 2012; Venkatesh & Davis, 2000). What is more, the model was expanded over time and included factors such as enjoyment and trust (Venkatesh & Bala, 2008). Thus, if a behavior, in this case smartphone use, is perceived as beneficial and easy to adopt, it will be more widely accepted, which may trigger widespread behavioral patterns and, consequently, lead to social and individual consequences. Some research raise a question about whether these consequences may manifest negatively. For example, on a child's well-being or developmental outcomes, or on the quality of the parent-child relationship (Kostić, 2022), if, due to smartphone use, digital distractions emerge frequently in parent-child interactions. There is little research focusing on this "micro-moment" related to the immediate consequences of smartphone use during family interactions. More studies investigate the distal effects of smartphone use in face-to-face interactions.

There is a lack of studies that examine the specific cognitive aspect of smartphone use, namely, smartphone use acceptability among adolescents. A lot of literature relies on the behavioral aspect of smartphone use in terms of self-reported information on the time of smartphone use, although research shows that children are not very accurate when it comes to their perceptions of the time of smartphone use (Hodes, 2021; Lee et al., 2021; Mahalingham et al., 2023). Children tend to give socially desirable responses on self-report measures when assessing smartphone use (Kwak et al., 2019). Children, particularly adolescents, may consciously or unconsciously adjust (e.g., minimize) their self-reports on usage to align with perceived social norms or expectations to avoid judgment or criticism from peers or parents, thus impacting the validity of their self-reported data regarding their behavior, namely problematic smartphone use (Kliesener et al., 2022; Marciano & Camerini, 2022). Leaning on this, it seems important to examine adolescents' perception of smartphone use acceptability as a potential predictor of their behavior, on which adolescents could give unadjusted reports.

Overall, this study aimed to examine the relationship between the acceptability of smartphone use in family interactions among adolescents, their smartphone use behavior in family interactions, and the negative consequences of smartphone use in family interactions, namely interactions with their parents. Based on literature and in line with the aim, the model of the effects of smartphone acceptability and use in family interactions is postulated in Figure 1. The main hypothesis of the model is that the more acceptable it is for adolescents to use smartphones in family interactions, the more they will use them and consequently experience

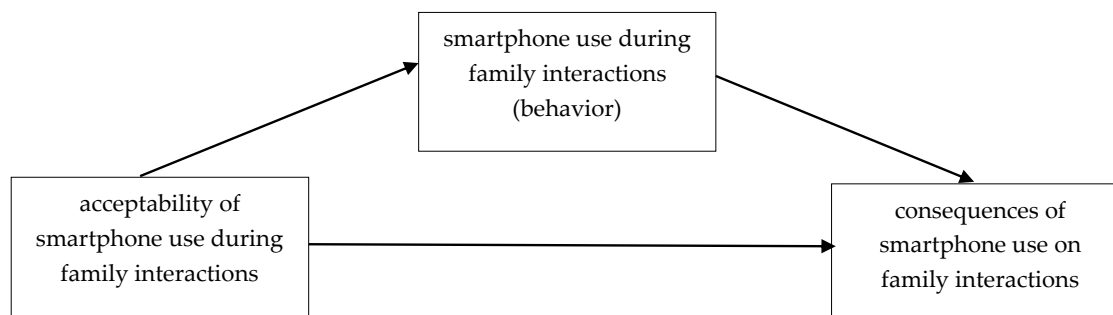
more negative consequences pertaining to these interactions. Two hypotheses were formulated:

Hypothesis 1. A higher acceptability of smartphone use during family interactions among adolescents will directly and positively contribute to the negative consequences on family interactions.

Hypothesis 2. A higher acceptability of smartphone use in family interactions among adolescents will indirectly and positively contribute to the negative consequences on family interactions via association with smartphone use in family interactions.

Figure 1

The model of the effects of smartphone acceptability and use in family interactions



Method

Design

We used a longitudinal study design with four waves. The data used in this paper comes from the longitudinal (S2) study of the research project (blinded for the review process). For this paper, we used measures from waves 2 to 4: acceptability of smartphone use in family interactions (wave 2), smartphone use behavior (wave 3), and the consequences of smartphone use in parent-child interactions (wave 4). Inter-wave intervals were approximately 5 to 6 months.

Participants

The sample at wave 1 included 284 Croatian adolescents (59.4% girls, 40.6% boys) who participated in the longitudinal study (S2) of the research project. During the second wave of the study, adolescents were aged 11 to 15, with a mean age of 12.64 ($SD = 1.21$). Their ages at wave 4 ranged from 11.58 to 16.58 ($SD = 1.21$). Most adolescents' fathers (58.7%) and mothers (49.1%) completed high school, while a notable portion of fathers (37.3%) and mothers (48.4%) obtained higher degrees. A small percentage of their fathers (4%) and mothers (2.5%) had only completed elementary school. When it comes to employment status, most adolescents' fathers (80.1%) and mothers (73.1%) were employed full-time, with a minority of fathers (5.1%) and mothers (14.2%) being unemployed. Some fathers (11%) and mothers (11.6%) worked part-time, while a small percentage of fathers (3.7%) and mothers (1.1%) were retired. Most adolescents' families were two-parent households (85.6%). Most of the parents had two adolescents (50.2%), while 13.4% had one child, and 36.5% had more than two adolescents. In terms of income, the monthly income for most adolescents'

families (66.9%) was below EUR 730.00 per family member, while one-third of families (33.1%) had a monthly income above this threshold. The range of monthly household income per person varied from below EUR 199.08 (1.2%) to above EUR 1260.87 (10.8%). In summary, most families included in this sample were from middle- to upper-socioeconomic backgrounds.

Of the initial sample, 85.6% of adolescents participated in the third wave of data collection (time 2 to time 3), 87.7% of adolescents participated in the fourth wave of data collection (time 3 to time 4), and 78.9% of adolescents participated in the study from time 2 to time 4. Time intervals between each wave of data collection were approximately 5 to 6 months. A logistic regression analysis was conducted to test whether sample attrition can be predicted by the measured sociodemographic characteristics of adolescents and parents included in this study. The results show that the attrition can be predicted only based on the child's age ($\chi^2(5) = 46.71, p < .01$; $b = 1.098, p < .01$). Specifically, older adolescents dropped out of this study, which was expected since our initial sample consisted of adolescents attending the final grade of primary school, and it was more difficult to reach them and collect their data at later measurement points when they transitioned to high school or left the educational system.

Instruments

Given the length of the questionnaire, the purpose, and goals of the project from which data for this study were taken, not all variables were measured at all waves in the S2 study. In this paper, we use measures applied in waves 2, 3, and 4. Measures related to adolescents' perception of acceptability of smartphone use in family interactions were measured in the second wave, adolescents' perceptions of their habits of actual smartphone use in family interactions were

measured in the third wave, and adolescents' perceptions of some negative consequences of smartphone use in family interactions, namely parent-child, were measured in the fourth wave of the longitudinal study. The newly developed scales are based on the results of focus groups and interviews done with adolescents in Study 1 of the same project.

1. Acceptability of smartphone use in family interactions was assessed in the second wave of the S2 study using a newly constructed scale for the project's purposes. The scale measures adolescents' self-reported acceptability of smartphone use during family interactions. Adolescents were asked to rate how acceptable it is for them to use a smartphone in different family situations, using a scale from 1 (not at all) to 5 (completely). The scale consists of 12 items ("How acceptable is it to check your phone while... (1) talking with your parents?; (2) talking with other family members (e.g., brother, sister, grandmother)?; (3) working on a task or activity with your parents (e.g., making crafts, cooking)?; (4) parents are explaining something to the child?; (5) during a family meal?; (6) playing a board game with your parents?; (7) riding somewhere with your parents?; (8) waiting somewhere with your parents?; (9) parents are occupied with something else?; (10) shopping with your parents?; (11) watching a movie, series, etc., with your parents?; (12) parents are doing something work-related?"). Exploratory factor analysis (EFA) revealed a two-component structure of the scale: (1) acceptability of smartphone use during direct family interactions, face-to-face activities (items: 1, 2, 3, 4, 5, 6) (explaining 37.52% of variance, Cronbach $\alpha = .82$), and (2) acceptability of smartphone use during indirect family interactions (items: 7, 8, 9, 10, 11, 12) (explaining 14.34% of variance, Cronbach $\alpha = .87$). In this research, items were averaged to obtain a total score for each subscale, with higher scores indicating more acceptability of smartphone use by adolescents during direct and indirect family interactions.

2. Smartphone use in family interactions was measured using a scale constructed for the project's purposes in the third wave of the S2 study. The scale measures adolescents' self-reported smartphone use during family interactions. Adolescents were asked to rate how often they use smartphones in different family situations, using a scale from 1 (never) to 5 (always). The scale consists of 11 items ("I check my phone while... (1) talking with my parents; (2) having a family meal; (3) talking with other family members (e.g., brother, sister, grandmother); (4) my parents are explaining something; (5) playing a board game with my parents; (6) working on a task or activity with my parents (e.g., making crafts, cooking); (7) watching a movie, series, etc., with my parents; (8) waiting with my parents; (9) my parents are doing something work-related; (10) my parents are occupied with something else; (11) riding somewhere with my parents"). Exploratory factor analysis (EFA) revealed a two-component structure of the scale: (1) smartphone use in direct family interactions (including joint activities where the primary focus is on the parent, the child, or their face-to-face interaction; items: 1, 2, 3, 4, 5, 6, 7), and (2) smartphone use in indirect family

interactions (including joint activities where the primary focus is not on the parent, the child, or their face-to-face interaction, but their shared common goals; items: 8, 9, 10, 11). The extracted components represent two subscales with satisfactory reliability. The first component explained 31.52% of the variance (Cronbach $\alpha = 0.82$), and the second one explained 14.87% of the variance (Cronbach $\alpha = 0.79$). Items were averaged to obtain a total score for each subscale, with higher scores indicating frequent smartphone use by adolescents during family interactions.

3. Consequences of smartphone use in parent-child interactions were assessed using a scale constructed for the project's purposes in the fourth wave of the S2 study. The scale measures adolescents' self-reported negative consequences related to their own smartphone use during family interactions, namely parent-child conversation. The scale consists of a total of 11 items, with responses ranging from 1 (never) to 5 (always), ("When I check my phone during a conversation with my parents (it happens that I)... (1) have difficulty following what they say; (2) don't follow the flow of the conversation; (3) pay more attention to the smartphone than to my parents; (4) am less engaged in the conversation; (5) forget that I am in a conversation; (6) ask them to repeat what was said; (7) continue using the smartphone; (8) delay my response; (9) don't hear what they are saying; (10) ignore what my parents say; (11) argue with them because of it"). The results of the exploratory factor analysis (EFA) indicate a one-factor structure. The extracted component relates to consequences that adolescents experience due to smartphone use while in conversation with parents, explaining a total of 52.51% of the variance (Cronbach $\alpha = .92$). Items were averaged into a total score, with higher scores indicating more frequent negative consequences of adolescents' smartphone use while with parents.

Procedure

The data used for this paper were drawn from the second, third, and fourth waves of the longitudinal study (Study 2) (wave 2: May–June 2022; wave 3: November–December 2022; wave 4: April–June 2023) of the project (blinded for the review process). Ethical clearance for this study was obtained from the (blinded for the review process), and it was approved to be conducted in elementary schools by the Ministry of Science and Education of Croatia. Given that participation in this study was voluntary, the selection of schools and participation were convenient. A total of 22 schools located in the research area, the city of Zagreb and Zagreb County, Croatia, were contacted via email, 6 of which agreed to participate in this study via their principals signing a consent form. A total of 1096 pupils were approached through the participating schools, with informed consent forms and parental questionnaires distributed. The response rate was 26%. Following the signing of consent forms by participating parents (83% being mothers) and adolescents ($N = 284$; comprising 59.4% girls and 40.6% boys) at their residences,

data collection occurred partly in school settings during regular classes and partly through the completion of questionnaires by adolescents and parents at home, given the extensive length of the questionnaires at each wave. The questionnaire was administered by school psychologists and the project team, with group administration sessions lasting approximately 20 to 30 minutes. Each child and parent who participated in this study received a gift voucher for the local zoo.

Data Analysis

Descriptive statistical parameters (means, standard deviations, minimum and maximum observed results) were calculated using the SPSS 26.0 software package (Table 1). Correlations between the study variables were computed using Pearson correlation coefficients (Table 2). To address the research objective, structural equation modeling was used to test the assumed model using Mplus (Muthén et al., 2017). Specifically, the model tested the direct effect of adolescents' acceptability of smartphone use during family interactions on the consequences of smartphone use in family interactions, as well as the indirect effect of acceptability through actual smartphone use behavior in direct and indirect interactions

with family members (Figure 2, Figure 3). The bootstrap method ($N = 1000$ samples) was used to estimate the magnitude of the effects and the associated confidence intervals in the final model.

Results

Table 1 presents descriptive statistics for the variables used in the study. According to the descriptive data, adolescents estimate the use of smartphones to be moderately acceptable during indirect family interactions, while they find the use of smartphones less acceptable in direct family interactions. Additionally, adolescents estimate that, on average, they rarely use their smartphones during direct family interactions, while they estimate that, on average, they sometimes use their smartphones during indirect family situations. Overall, adolescents use smartphones less frequently during direct interactions and more frequently during indirect family situations. The descriptive parameters show that adolescents, on average, rarely experience the consequences of interference due to smartphone use during direct interactions with their parents.

Table 1
Descriptive statistics for the study variables

		<i>N</i>	<i>M</i>	<i>SD</i>	Min-Max
Acceptability of smartphone use (2 nd wave)	acceptability of smartphone use during direct family interactions, face-to-face activities	227	1.56	.73	1-5
	acceptability of smartphone use in indirect family interactions	227	2.53	.92	1-5
Adolescents' smartphone use in family interactions (3 rd wave)	smartphone use in direct family interactions	221	1.86	.69	1-4.57
	smartphone use in indirect family interactions	224	3.44	.90	1-5
Consequences of smartphone use in family interactions (4 th wave)		189	1.78	.71	1-4.36

Table 2 shows the Pearson correlation coefficients between the study variables. A positive correlation was found between the acceptability of smartphone use in direct family interactions and the acceptability of smartphone use in indirect family interactions. Adolescents' acceptability of smartphone use in family interactions is positively associated with their actual smartphone use behavior in family interactions, but is not related to the consequences of smartphone

use in family interactions. A moderate positive correlation was found between smartphone use during direct family interactions and indirect family interactions among adolescents. Furthermore, smartphone use behavior in both direct and indirect family interactions is positively correlated with the negative consequences of smartphone use in parent-child interactions.

Table 2
Correlations among the study variables

	1	2	3	4	5
1. Adolescents' acceptability of smartphone use in direct family interactions (2 nd wave)	1	.41**	.23**	.21**	.03
2. Adolescents' acceptability of smartphone use in indirect family interactions (2 nd wave)		1	.14	.44**	-.02
3. Smartphone use in direct family interactions (3 rd wave)			1	.32**	.22**
4. Smartphone use in indirect family interactions (3 rd wave)				1	.30**
5. Consequences of smartphone use in family interactions (4 th wave)					-

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

To test Hypothesis 1 and Hypothesis 2, according to which there are significant direct effects of acceptability of smartphone use on negative consequences on family interac-

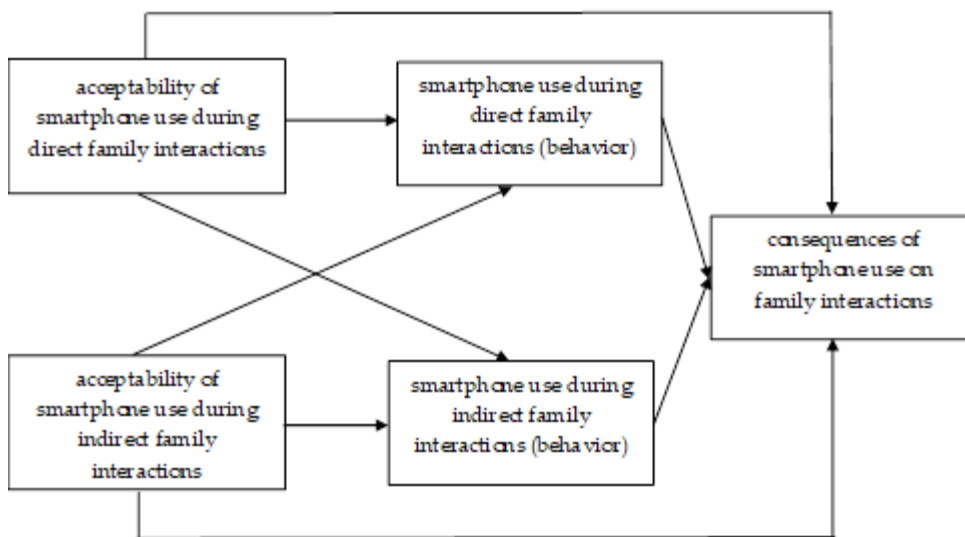
tions, as well as indirect effects via association with smartphone use in family interactions (Figure 2). The model (Figure 2) showed a good fit to the data ($n = 270$; $\chi^2 =$

92.341 df = 9, $p < .000$, CFI = 1.000, TLI = 1.000, SRMR = 0.000, RMSEA = 0.000, C.I. 95% [0.000–0.000]) indicating that there is no significant direct path from acceptability of smartphone use in direct and indirect family interactions on the negative consequences of smartphone use (acceptability of smartphone use in direct family interactions $\rightarrow$ conse-

quences $\beta = -.02$, $p = .77$; acceptability of smartphone use in indirect family interactions $\rightarrow$ consequences $\beta = -.13$, $p = .16$). The path from smartphone use during direct family interactions to consequences of smartphone use was also insignificant ($\beta = .145$, $p = .10$).

Figure 2

The effects of adolescents' acceptability of smartphone use in direct and indirect family interactions through adolescents' behaviors of smartphone use on the consequences of smartphone use in family interactions

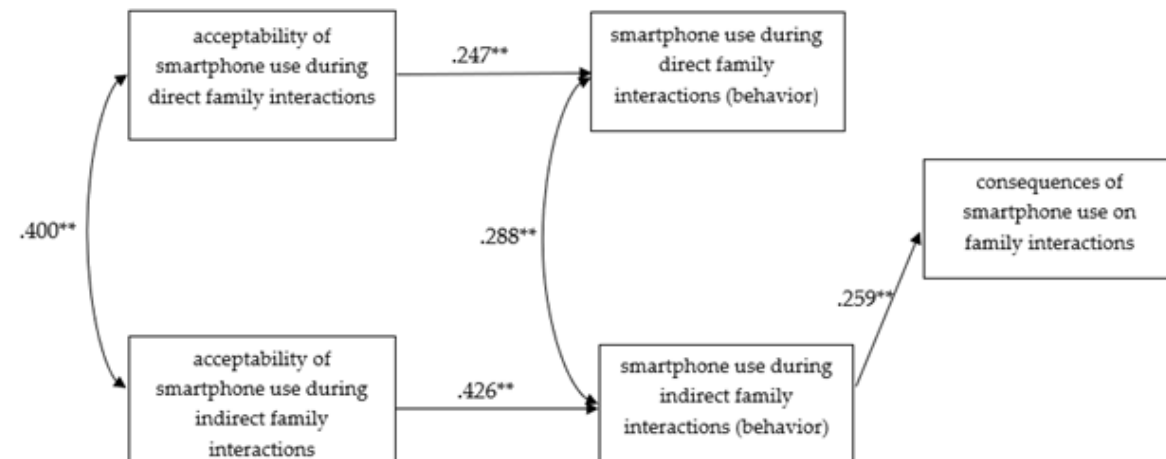


Thus, these insignificant paths were removed from the model, and the trimmed model was tested again. The final trimmed model is shown in Figure 3. This model (Figure 3) showed a good fit to the data ($n = 270$; $\chi^2 = 92.341$, df = 9, $p = .000$, CFI = .992, TLI = .965, SRMR = .028, RMSEA = .035, C.I. 95% [.000– .131]). The indirect effect of adoles-

cents' smartphone use in indirect family interactions on the consequences of smartphone use via actual smartphone use in indirect family interactions ($\beta = .11$, $p = .001$; 99% CI [.001 – .223]) was found to be significant. The model is shown in Figure 3.

Figure 3

The effects of adolescents' acceptability of smartphone use in direct and indirect family interactions through adolescents' behaviors of smartphone use on consequences of smartphone use in family interactions: the results derived from testing the final model



Note: ** $p < .01$; * $p < .05$. Only significant paths were shown.

Discussion

This study aimed to examine the association between the acceptability of smartphone use in family interactions among early and middle adolescents, their actual smartphone use behavior in family interactions, and the negative consequences of smartphone use in family interactions. The results showed that the more adolescents consider smartphone use in family interactions acceptable, the more frequently they will use smartphones in both direct and indirect family interactions. Furthermore, the more adolescents perceive smartphone use in indirect family interactions as acceptable, the more consequences of smartphone use they will experience when using smartphones in indirect, but not direct, family interactions. Thus, Hypothesis 1, "A higher acceptability of adolescents' smartphone use during family interactions will directly and positively contribute to consequences of adolescents' smartphone use in family interactions," was not confirmed. On the other hand, Hypothesis 2, "A higher acceptability of adolescents' smartphone use in family interactions will indirectly and positively contribute to consequences of adolescents' smartphone use in family interactions via an association with actual smartphone use in family direct and indirect interactions," was partly confirmed.

The results of this study, which indicate that the more adolescents consider smartphone use in family interactions acceptable, the more frequently they will use smartphones in both direct and indirect family interactions, align with the assumption of the Theory of Planned Behavior (Ajzen, 1991). According to the Theory of Planned Behavior (Ajzen, 1991), the intention to perform a behavior and the behavior itself are determined by attitudes toward the behavior. In other words, if an individual holds a positive attitude toward the behavior, it is more likely for them to perform a specific behavior. Since the most mentioned motives for smartphone use among adolescents relate to fun and entertainment, interaction and communication, relaxation, learning, and seeking information (Varga & Kotrla Topić, 2022), it is not surprising that adolescents have positive and approving attitudes toward smartphone use. Moreover, if a special behavioral pattern is perceived as both beneficial and easy to adopt, which is often the case with smartphones, it becomes more widely accepted, spreads through everyday routines and can manifest in social interactions. What is more, in this research, on average, adolescents find smartphone use moderately acceptable during indirect family interactions, while they find the use of smartphones less acceptable in direct family interactions. The prevalence of such perceptions may contribute to the more frequent smartphone use among adolescents in general, including in social and family interactions. Another explanation of such behaviors may arise from one of the crucial characteristics of adolescence as a developmental period. Namely, since peers gain an increasingly important role in adolescents' lives, it is not surprising that adolescents use mobile phones to communicate and main-

tain contact with their peers, even during familial engagement (Bae, 2015). So, the behavioral pattern of smartphone use during family interactions may be related to the adolescents' attempts to connect through digital means, prompting adolescents to seek affirmation and interactions via their smartphones (Bae, 2015; Kim et al., 2017).

Furthermore, the results of this research indicate that the more adolescents perceive smartphone use in indirect family interactions as acceptable, the more negative consequences of smartphone use they will experience when using smartphones in indirect family interactions. Adolescents may use smartphones more often in indirect interactions, which include joint activities where the primary focus is not on the parent, the child, or their face-to-face interaction, but where they share a common goal. Accordingly, since the focus of the parent is not on the child and their supervision is reduced, adolescents may interpret such situations as signals that they can engage in activities they enjoy, which is, in this case, smartphone use. In situations of indirect communication, adolescents may feel more immersed in smartphone activities and more frequently experience negative consequences, such as having difficulty following what others say, not following the flow of the conversation, and paying more attention to the smartphone than to their parents. In other words, adolescents are physically present in these situations, but their focus is on the smartphone. Generally, higher acceptance of smartphone use and smartphone use itself may lead to miscommunication and misunderstanding within the family. Such patterns can have some negative effects in different areas of family functioning, not just in parent-child communication (Kostić, 2022). For example, when adolescents use smartphones during family engagements, the lack of direct communication may result in feelings of neglect (Capri et al., 2021; Jensen et al., 2023). Recent research indicates that such dynamics negatively impact family well-being and can lead to greater difficulties in resolving familial conflicts (Gong et al., 2022; Matthes et al., 2021).

The partial confirmation of Hypothesis 2 indicates that negative consequences of smartphone use in the family context may arise not merely from attitudes but through specific behaviors. This emphasizes the need for preventive interventions that target both perceptions and situational triggers of smartphone use in the family context. Such preventive interventions should include education for parents on establishing rules and boundaries for smartphone use but also should focus on recognizing and managing situational triggers for smartphone use (e.g., watching TV, or other activities where parents are not fully engaged with adolescents). In such non-structured situations, adolescents are more likely to use their smartphones, which can lead to greater consequences of smartphone use due to divided attention and immersive use, which may lead to higher communication misunderstandings between parents and adolescents.

When interpreting adolescents' behaviors related to digital technology use, it also seems important to consider pa-

rental practices, specifically parents' attitudes toward smartphone use in close interactions and their actual behaviors related to smartphone use. According to the fundamental premise of Social Learning Theory (Bandura, 1969), children learn by observing the behavior of people in their environment, their models, who are usually parents. If parents frequently use smartphones while with their adolescents in indirect interactions (e.g., driving, watching TV, and similar situations), it is very likely that adolescents adopt a similar behavioral pattern in interactions with their parents and in other social relationships. In other words, if some behavioral patterns usually occur in the family context, it has the potential to become a norm that adolescents may easily internalize. Previous research aligns with this explanation, indicating the importance of parental attitudes towards smartphone use (Almatin et al., 2023) as well as their own behaviors according to smartphone use (Kim et al., 2021; Son et al., 2021) in shaping adolescents' perceptions of smartphone use. More precisely, if parents have positive attitudes towards digital technology use, they can foster an environment in which the use of digital devices is encouraged (Almatin et al., 2023). What is more, adolescents of parents who have developed some patterns of problematic smartphone use can expose their adolescents to technology use from an early age, which may contribute to the development of problematic smartphone use in adolescents (Capri et al., 2021; Kim et al., 2021; Son et al., 2021). To sum up, parents may be unaware of their own behaviors regarding smartphone use, which often shape adolescents' behaviors and perceptions. Therefore, it would be useful to provide adolescents and parents with more educational content about the potential effects of their own behaviors related to smartphone use in family context. Easily acceptable intervention programs, online platforms, and applications addressing parental smartphone use in the family context may be helpful (Matthes et al., 2021).

Limitations and Contributions

Although this research contributes to a better understanding of adolescents' behavior in the family and digital context, certain limitations are present. Firstly, the response rate for participation was rather low, and this means that some groups of parents and adolescents might be underrepresented (e.g., parents and adolescents from lower SES families). The study sample consisted of voluntary participants, potentially resulting in sample bias and affecting the generalizability of the findings in this research. To address this, we recommend validating the findings across culturally and demographically diverse samples of adolescents from various family backgrounds, especially because there is evidence that low-income families may use smartphones more prominently due to limited access to other forms of social engagement or educational content (Gu, 2021; Lee et al., 2021). Furthermore, older adolescents in this study tend to drop out of the research. This partial mismatch could bias our results if the dropout is related to other factors related to smartphone use.

We conducted sensitivity analyses on the available cases, which help but cannot entirely remove this concern. Future research should plan stronger retention procedures and, where feasible, apply full-information estimation and additional robustness checks to account for selective attrition. Another potential limitation is that the study relied solely on adolescents' reports. In future research, we suggest including parent reports as well and examining parents' perspectives on technology use during face-to-face interactions with their adolescents. Furthermore, this study focused on the cognitive consequences of smartphone use in family interactions. Future studies should also investigate emotional and social consequences, both of attitudes toward smartphone use and of the behavior itself.

Beyond its limitations, the study contributes by emphasizing cognitive dimensions of smartphone use, particularly adolescents' acceptability of smartphone use, which invites new lines of inquiry into how beliefs shape behavior in family settings. Within this research, the importance of parental behavioral patterns when it comes to understanding adolescents' digital technology use is also emphasized. Accordingly, to better understand behavior related to smartphone use in social relationships, especially in the parent-child relationship, it would be useful to also examine parental attitudes and smartphone usage patterns as potential predictors of adolescents' smartphone use. Furthermore, it seems important to consider social and emotional factors that determine individual behavior, not just cognitive ones, to better understand behavior in the digital context. Therefore, it is suggested that future research should include socio-emotional factors related to smartphone use in social relationships (such as motivation for smartphone use, boredom) in the model (Figure 1), to gain a better understanding of the behavior being studied. As smartphones have become ubiquitous, what used to be an occasional interruption has become a socially accepted routine (Stockdale et al., 2018). This shift raises questions about long-term effects on family interaction and emphasizes why clear boundaries for digital technology use are necessary to keep family relationships healthy. For these reasons, further longitudinal investigations are not only appropriate but necessary.

Conclusions

The results of this study show that the more adolescents consider smartphone use in family interactions acceptable, the more frequently they will use smartphones in both direct and indirect family interactions. Furthermore, the more adolescents perceive smartphone use in family interactions as acceptable, the more negative consequences of smartphone use they will experience when using smartphones in indirect family interactions. These findings mostly apply to adolescents from middle- to upper-socioeconomic backgrounds. Results of this research highlight the need to provide education for parents and adolescents on healthy technology use habits related specifically to smartphone use, which might

have an important role in mitigating the negative consequences of digital technology use in close family relationships. More precisely, this research highlights the importance of family rules and boundaries when it comes to digital technology use. Schools and pediatric services could incorporate short guidance modules for parents and adolescents on managing shared-attention situations at home.

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Complementary information

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