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MEASURING TECHNOLOGY INTERFERENCE IN PARENT–CHILD RELATIONSHIP: THE POLISH VERSION OF THE DISRUPT SCALE

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The Distraction in Social Relations and Use of Parent Technology questionnaire (DISRUPT) is a short 4-item measure by McDaniel (2021) used to assess technology interference during the parent–child common time. The paper describes the development of the Polish version of the DISRUPT. The study sample consisted of 649 participants aged 18–35 (M_{age} = 30.23, SD = 3.87), divided randomly into two groups: one for EFA and the other for CFA. EFA using the maximum likelihood method revealed a unidimensional structure of the tool; the single-factor model was also well-fitted in CFA. High reliability (Ω = .90) and construct validity were obtained. The Polish questionnaire version is a promising tool for screening parental digital behaviors.

Keywords: technoference; problematic phone use; phone distraction; questionnaire adaptation; parent–child relationship.

More than 6.5 billion people have mobile phones worldwide, and the next billion are predicted to acquire them in the next five years (Ericsson, 2022). In 2020, 91% of households in the European Union had Internet access (Petrosyan, 2021), most individuals use the Internet at least once a week, and 80% declare using it every day (European Commission, 2021). A growing body of research is now documenting

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the technology impact on individual development and family life. Smartphones are mainly used for communication (Ataş & Çelik, 2019), transactions, entertainment, obtaining and managing information (OFCOM, 2016). Previous research underlined the role of smartphones in building social bonds, enabling users to establish new and maintain ongoing relationships, exchange knowledge or share personal news (McDaniel et al., 2012, Shen et al., 2017). Being online is also a form of shaping the digital self of both parents and children (Blum-Ross & Livingstone, 2017). Some studies suggest that nearly a quarter of children were "digitally born" before their birth date (Business Wire, 2010).

Based on the visible influence of technology on family functioning, researchers seem to be focusing on both predictors and consequences of this growing phenomenon. In terms of individual characteristics, high neuroticism and low conscientiousness are associated with increased time spent on sending text messages (Butt & Phillips, 2008) or playing online multiplayer games (Peters & Malesky, 2008). Overemotional behaviors, impulsivity and escaping tendencies helping to relieve appearing tension over the Internet may impel neurotics to engage in different smartphone activities (Amiel & Sargent, 2004; Smetaniuk, 2014). Similar effects of the above-mentioned personality traits on smartphone/Internet use disorder were also confirmed in the meta-analysis by Marengo et al (2021). However, the mediating role of other variables, e.g. mind-wandering, should also be noticed (Müller et al., 2021). Since curiosity, sociability, and need for contact with other people stimulates using smartphones or social media platforms, problematic mobile phone use (PMPU) seems also to be associated with extraversion and openness to experience (Smetaniuk, 2014; Takao, 2014). Some studies point out the role of other intra- and interpersonal factors, such as low self-esteem (Bianchi & Phillips, 2005), sense of loneliness (Bhardwaj & Ahok, 2015; Mahapatra, 2019), high anxiety (Enez Darcin et al., 2016), and need for social approval (Takao et al., 2009) in the development of PMPU.

Parents often benefit from smartphones and computers at different stages of family life: mobile apps lead them through pregnancy and help them settle into a new reality, for instance, by providing organization tips and following a baby's daily routines. Social media or online forums provide support (Ammari & Schoenebeck, 2015), especially for families with health problems (Canário et al., 2022). However, most of the studies highlight negative consequences of technology abuse, such as difficulties in realizing the main family functions (Pari Ccama, 2019) or cohesion disturbances (Carvalho et al., 2015). Adding to that, some research suggests the structure of the family bonds is prone to dilute due to the technology impact, i.e., there is the disappearance of direct face-to-face interactions, and parents and children lose the physical space to share everyday activities (Pari Ccama, 2019).

The boundaries of the family system and the environment tend to change. There is a greater flow of information across them; thus, family members are more exposed (Carvalho et al., 2015). Regarding psychosocial functioning, the problematic use of the Internet and mobile devices may also lead to social dissatisfaction (Misra et al., 2014), interpersonal conflicts, anxiety, depression (Coyne et al., 2019) and deterioration of somatic health (Toh et al., 2017). Literature analysis shows that there are some inconsistent findings related to the impact of technology on families, e.g., referring to changes in the duration of the commonly spent time (Chesley & Fox, 2012; Mauritzson-Sandberg & Nordmark, 2004) or the quality of family communication (Huisman et al., 2012; Senyürekl & Detzner, 2009).

Parental Distraction with Technology

Seventy-five percent of parents admit to using their phones at least three times a day while caring for their children (Ante-Contreras, 2016). Some reports suggest smartphone intrusion may be noticed while supervising swimming children (Simon et al., 2003) or driving together in the car (Roney et al., 2013). Ventura and Teitelbaum (2017), in a qualitative analysis of mothers' and infants' feeding patterns discovered that during 26% of feedings caregivers reported simultaneously undertaking different technological activities, i.e. watching TV, using mobile devices or a computer (Wondafrash et al., 2012).

As evidence shows, mobile devices distract parents, limit their vigilance and attention and lower responsiveness (Blackman, 2015; Kushlev, 2015). Thus, their children may feel neglected and behave more hazardously (Radesky et al., 2014). The observation of caregivers' behaviours in the playground (Bury et al., 2020) revealed that child supervision, as well as the common parent–child interplay, decreased, and the risk of injury increased when parental phone usage was higher; however, similarly to the previous findings (Lemish et al., 2019), the relationship may differ depending on the parental smartphone activity (e.g., scrolling, texting, using a camera). Additionally, studies with mothers of infants showed that technological distraction may be related to a laissez-faire feeding style, characterised by parental low involvement and structure as well as lack of additional feeding-related effort in demanding situations (e.g., child's undernutrition) (Wondafrash et al., 2012). Simultanously, considering caregiver response to the child's misbehaviour, Radesky et al. (2014) pointed out that high parents' absorbance in mobile devices may be connected to more punitive reactions.

Parental technoference affects children's mental and somatic functioning. The study by Reed et al. (2017) proved worse child language development due to fewer

parent–child non-verbal and verbal interactions while using a phone (Radesky et al., 2015). In line with that, Davidovitch et al. (2018) reported that more parents using their mobiles during arranged medical assessments had children with language and motor delays. However, the results are not conclusive. For instance, some studies suggest that active co-using of mobile devices may positively impact an infant's vocabulary (Corkin et al., 2021). Regarding children's emotional and behavioural problems, maternal technoference was a significant predictor of child internalizing and internalizing behaviours (McDaniel & Radesky, 2018). Moreover, parental phubbing and technoference may impact adolescent children's smartphone addiction (Hong et al., 2019; Qiao & Liu, 2020) and be related to lower perceived maternal emotional support (Meeus et al., 2021).

Technoference may have far-reaching effects not only on children. According to McDaniel and Coyne (2016), mothers experiencing technology interference may have lower life satisfaction and suffer from higher depressive symptoms. Additionally, data from heterosexual and homosexual couples provide an in-depth insight into the technoference consequences. Technology interference was a significant predictor of interpersonal conflict as well as conflict over technology use, which may both decrease relationship and coparenting quality (McDaniel et al., 2018). The study by McDaniel and Drouin (2019) also provided partial support for the associations with less positive direct interactions and more negative mood.

Parental technoference tend to increase mostly due to social changes, demanding e.g. installation of different child-related applications or using social network sites. Some researchers (Hertlein & Blumer, 2013; Rudi et al., 2015; Tee et al., 2009) underline also the role of technology in the family communication process. Gibson and Hanson (2013) identified two key aspects of mothers' mobile usage: seeking for different types of support and reclaiming own identity. Adding to that McDaniel (2019) revealed that monotony and routine, especially shortly after the childbirth, may contribute to an increase in phone use for entertainment purposes. Based on the previous studies (Gibson & Hanson, 2013; Ranson, 2015), despite the negative consequences, phone or Internet usage may be sometimes treated as a factor helping to deal with new role requirements and enabling to form and maintain social bonds.

The Present Study

While researchers have demonstrated the importance of technoference in general, more remains to be understood about parental technoference and ways to measure it. According to previous studies, basic tools for assessing various aspects of technoference (e.g. phubbing, social media sites usage etc.) were developed

(Błachnio et al., 2020, Karadağ et al., 2015; McDaniel & Coyne, 2016; McDaniel & Radesky, 2018; Ventura, 2020; Young, 1998), mainly enabling to measure the form of distraction or time and intensity of usage. Two of them were designed to assess technoference in the parent-child relationship, i.e. the TDIS-PC (McDaniel & Radesky, 2018) and the DISRUPT scale (McDaniel, 2021). The first one aims at reporting the frequency of the different devices (e.g., mobile phone, tablet, gaming console) intrusions in a conversation or an activity caregivers are involved in with children. The second one, though shorter, is more comprehensive and refers to such components as loss of control over the behaviour or cognitive salience. It enables to assess parental perception of the technoference in different family situations, not as TDIS-PC, the frequency of various devices intrusions. None of the measures was so far available in Poland. The verification of the psychometric properties of TDIS-PC did not lead to satisfactory results so far and is therefore still ongoing (Szymańska, 2022).

To address the gap in the literature, the present study aimed to (a) verify the DISRUPT questionnaire factor structure in a Polish sample and (b) assess the psychometric properties of the measure.

To examine the structure of the tool, both explanatory and confirmatory factor analyses were performed on the data emanating from the two separate subsamples. Based on the preceding reports by McDaniel (2021) the unidimensional model was expected to be obtained. To verify construct validity correlations between the DISRUPT questionnaire, various personality and Internet/mobile phone usage related variables were calculated. Based on the previous research, the positive association between the DISRUPT results and phubbing (Chotpitayasunondh, 2018) as well as problematic phone and Internet usage were predicted (McDaniel, 2021; Taufik et al., 2021). Regarding personality traits, extraversion (Smetaniuk, 2014) was anticipated to be positively related to technoference. Negative correlations were supposed to be found with emotional stability (McDaniel et al., 2018), agreeableness (Toda et al., 2016), conscientiousness (Lachmann et al., 2017; Philips, 2018) and intellect (Barr et al., 2015).

METHOD

Participants and Procedure

A total of 649 adults (325 women and 324 men) participated in the study. Participants were recruited via a commercial Nationwide Research Panel. The purposive

sampling method was applied based on three inclusion criteria: (1) age between 18 and 35 years, (2) declaration of having and using a smartphone, and (3) having at least one child. The participants' mean age was 30.23 (*SD* = 3.87). They lived in rural (26%) and urban areas (36% in small and 38% in big cities). The majority had secondary (39%) or higher education (48%). Regarding marital status, 7% declared being single, 23% were in an informal romantic relationship, and 70% were married. More than a half (54%) had a one child, 36% two children, and 10% three or more. The age of the children differed from less than a year (18%) to 16–18 years (0.5%).

Participants were invited to complete an online survey. After providing the informed consent, they filled in a sociodemographic form and four questionnaires assessing personality traits and different aspects of mobile device usage. All procedures in the study were in accordance with the 1964 Helsinki Declaration and its later amendments.

Measures

Distraction in Social Relations and Use of Parent Technology (DISRUPT)

The DISRUPT (McDaniel, 2021) is a short unidimensional questionnaire measuring parental problematic phone use while spending time with their own children. It consists of four items. Respondents assess the level of agreement with the statements on a Likert-type scale, from 1 (*strongly disagree*) to 6 (*strongly agree*).

After gaining consent for the adaptation from the scale's author, two independent psychologists (specialised in clinical and family psychology), both fluent in English, translated the original tool into Polish, compared the consistency of the obtained initial versions and discussed them to form a preliminary version of the scale that was further used in the study. The parallel translation was chosen instead of the back translation to ensure accuracy and adequacy to Polish culture (Gudmundsson, 2009).

International Personality Item Pool-Big Five Markers-20 (IPIP-BFM-20)

IPIP-BFM-20 (Topolewska et al., 2014) is a short version of the Polish adaptation of Goldberg's personality scale IPIP-BFM-50 (Goldberg, 1999; Goldberg et al., 2006; Strus et al., 2014). It consists of 20 items grouped into five scales: extraversion, agreeableness, conscientiousness, emotional stability, and intellect. Participants indicate how aptly each item describes them using a 5-point Likert scale, from 1 (*very inaccurate*) to 5 (*very accurate*). Reliability in the study sample measured with McDonald's omega coefficient ranged from $\Omega = .60$ to $\Omega = .77$.

Internet Using Test (IUT)

IUT (Poprawa, 2012) is a self-administered tool to assess problematic Internet use. It comprises seven dimensions: (1) difficulty controlling the individual's activity on the Internet, (2) Internet obsession, (3) loss of satisfaction, and the deepening need to use the Internet, (4) growing damage and conflicts, (5) negligence of other activities and relationships in general, (6) compulsive escape from stress, and (7) defending the addiction. Respondents rate how often they act, think, or feel in a way mentioned in each item. Responses are measured on a 6-point scale, from 1 (*never*) to 6 (*always*). The scale has very good psychometric properties. Internal consistency in the present sample was between $\Omega = .83$ and $\Omega = .93$.

Phubbing Scale

Phubbing was measured with a Polish adaptation (Błachnio et al., 2021) of a scale designed by Karadağ et al. (2015). The version used in the study consists of 10 items assessing two aspects of phubbing, i.e. (a) communication disturbances and (b) phone obsession. McDonald's omega coefficients for subscales estimated in the sample were $\Omega = .93$ and $\Omega = .82$, respectively.

RESULTS

Factor Analysis

Subsample A was used to perform EFA. The Keiser–Meier–Olkin index (KMO = .82) and Bartlett's Test of Sphericity ($\chi^2[6] = 767.433$, $p < .001$) confirmed the data adequacy. Based on the eigenvalue and scree plot analysis (see Figure 1), the unidimensional structure of the DISRUPT questionnaire was revealed. Single factor solution accounted for 74.6% of total variance. None of the items was removed depending on the item–total correlations (range between .68 to .81; see Table 1).

Figure 1

Scree Plot

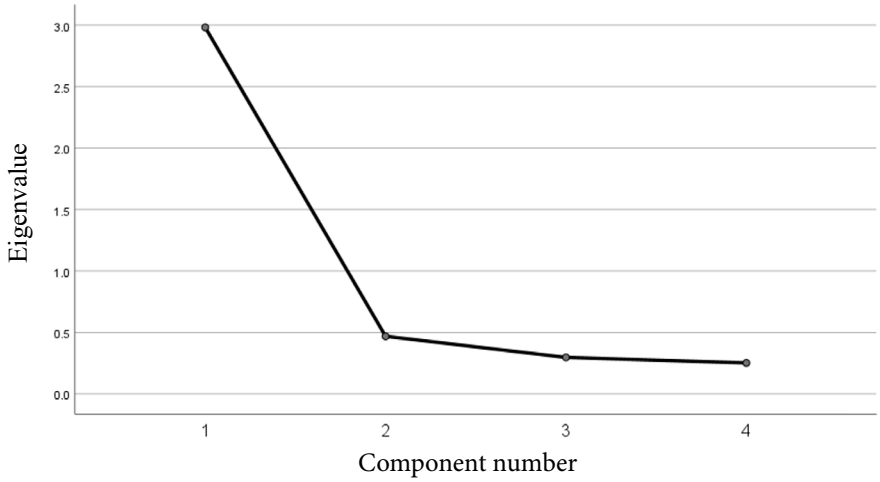

Table 1

Corrected Item–Total Correlations and Factor Loadings for the DISRUPT Items

Item	CIT	EFA factor loadings	CFA factor loadings
1. During time I spend with my child I find myself thinking about what I could be doing on or messages/notifications I might receive on my phone or mobile device. [Kiedy spędzam czas z dzieckiem przyłapuję się na tym, że zastanawiam się nad tym, co mógłbym robić na telefonie lub urządzeniu mobilnym lub myślę o wiadomościach/powiadomieniach, które mogę otrzymać na telefonie lub urządzeniu mobilnym]	.68	.73	.75
2. During time I spend with my child I find it difficult to stay away from checking my phone or mobile device. [Kiedy spędzam czas z dzieckiem trudno mi trzymać się z dala od sprawdzania telefonu lub urządzenia mobilnego]	.81	.88	.85
3. During time I spend with my child I feel like I use my phone or other mobile device too much. [Kiedy spędzam czas z dzieckiem czuję, że zbyt często używam telefonu lub innego urządzenia mobilnego]	.73	.80	.88
4. During time I spend with my child there are times that I could play with or interact with my child, but I am on my phone or mobile device instead. [Kiedy spędzam czas z dzieckiem czasami mógłbym bawić się lub wchodzić w interakcje z moim dzieckiem, ale zamiast tego korzystam z telefonu lub urządzenia mobilnego]	.78	.83	.88

Note. CIT = Corrected item–total correlation.

The results of the CFA conducted on a subsample B supported the single-factor model proposed by McDaniel (2021) and revealed previously in EFA. Good fit was achieved for all indices: χ^2/df ratio = 1.519, CFI = .99, TLI = .98, SRMR = .016 and RMSEA = .041 [.001, .128].

Psychometric Properties

In the current study significant correlations between the DISRUPT questionnaire, various personality and Internet/mobile phone usage measures were found. Higher mobile device interference in the parent–child relationship was related to a greater intensity of phubbing behaviors (r_s = .560 and .591). All personality traits were negatively associated with the results on the DISRUPT questionnaire. Table 2 illustrates the results of the analyses.

McDonald's omega coefficient was used to assess the reliability of the questionnaire (Dunn et al., 2013), proving a very high internal consistency (Ω = .90). Considering gender invariance, the Mann–Whitney *U* test indicated no differences between men and women regarding the results in the DISRUPT scale (H [1] = 50,328, p = .330).

DISCUSSION

Although much attention has been paid lately to the influence of technology on human life (Ataş & Çelik, 2019; McDaniel et al., 2012) and many self-reported measures have been developed to analyse new phenomena (Błachnio et al., 2021; Poprawa, 2012; Young, 1998) there is still a scarcity of tools enabling the assessment of technology interference in the parent–child relationship. In order to increase access to those already designed questionnaires, this study aimed to establish the factor structure of the Polish version of one of them, i.e. the DISRUPT questionnaire (McDaniel, 2021) and assess its psychometric properties.

EFA and item analysis were conducted to explore the nature of the questionnaire. The obtained results confirmed the scale's unidimensionality. Both eigenvalue and scree plot investigation indicated a single-factor structure, which explained almost 75% of the variance. Corrected item–total correlations were high and exceeded the recommended cut-off point (.03). Thus, all four items from the original version were retained. Validation of the model verified using CFA corroborated earlier results. All fit indices, i.e., CFI, TLI, SRMR and RMSEA, supported the one-factor solution.

Table 2

Reliability and Spearman Correlations Between DISRUPT and Scales Measuring Internet Usage

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. DISRUPT	–													
2. IPIP-BFM-20 Extraversion	-.092*	–												
3. IPIP-BFM-20 Agreeableness	-.152**	.316**	–											
4. IPIP-BFM-20 Conscientiousness	-.313**	.320**	.288**	–										
5. IPIP-BFM-20 Emotional Stability	-.161**	.350**	.277**	.338**	–									
6. IPIP-BFM-20 Intellect	-.181**	-.096*	-.065	-.105**	-.097*	–								
7. IUT Difficulties with control of the individual's activity on the Internet	.645**	.261**	.147**	.312**	.232**	-.305**	–							
8. IUT Internet obsession	.616**	.278**	.181**	.331**	.239**	-.322**	.873**	–						
9. IUT Loss of satisfaction and the deepening need to use the Internet	.600**	.257**	.160**	.327**	.237**	-.330**	.900**	.902**	–					
10. IUT Growing damage and conflicts	.627**	.278**	.168**	.339**	.213**	-.298**	.851**	.822**	.852**	–				
11. IUT Negligence of other activities and relationships in general	.566**	.241**	.232**	.318**	.199**	-.304**	.819**	.854**	.853**	.798**	–			
12. IUT Compulsive escape from stress	.609**	.276**	.187**	.313**	.230**	-.242**	.840**	.817**	.832**	.829**	.806**	–		
13. IUT Defense of the addiction	.556**	.252**	.180**	.312**	.199**	-.338**	.832**	.843**	.849**	.810**	.811**	.768**	–	
14. PH Communication disturbances	.560**	.189**	.187**	.325**	.153**	-.370**	.698**	.709**	.726**	.710**	.715**	.630**	.686**	–
15. PH Phone obsession	.591**	.229**	.204**	.291**	.217**	-.170**	.589**	.566**	.547**	.534**	.536**	.575**	.427**	.612**
M (*SD*)	13.12 (5.04)	12.54 (1.79)	12.39 (1.96)	12.03 (2.25)	12.59 (1.95)	7.51 (4.08)	11.73 (6.67)	6.95 (4.04)	7.59 (3.74)	7.21 (3.78)	8.23 (3.85)	7.04 (4.22)	10.33 (4.69)	13.81 (4.57)
McDonald's Ω	.90	.77	.66	.60	.64	.63	.91	.95	.83	.86	.88	.93	.93	.82

Note. $N = 649$. DISRUPT = Distraction in Social Relations and Use of Parent Technology; IPIP-BFM-20 = International Personality Item Pool-Big Five Markers-20; IUT = Internet Using Test; PH = Phubbing Scale. *$p < .05$, **$p < .01$.

The psychometric properties of the questionnaire were satisfactory. The reliability coefficient in the Polish version was very high similar to the original one (McDaniel, 2021). While validating the measure, positive associations were revealed between the results of the DISRUPT questionnaire and problematic Internet use, which is consistent with previous studies (McDaniel, 2021; Taufik et al., 2021). Parents, especially those with young children, experience higher levels of negative emotions, stress and fatigue in comparison with non-parents (Negraia & Augustine, 2020). Technology serves therefore as a source of relief, enabling them to escape from a tensed reality into the more relaxing environment, detaching from the mundane, difficult situations of everyday life. However, as showed in the DISRUPT adaptation study, technoference is also related to overusing technology leading to interpersonal conflicts in the family. Parents, who compulsively use smartphones or Internet may neglect their duties as well as show decreased level of involvement and social connection with their children (Kushlev & Dunn, 2019; McDaniel, 2019). Built upon the fact that some authors (McDaniel & Coyne, 2016; Sansevere & Ward, 2021) identify phubbing with technoference or treat it as one of its manifestations, the obtained high correlation of technology interference with phubbing seems to be fully justified. Moderate or low negative correlations were found for technoference and all measured personality traits, which is mostly in line with studies showing the relationship between problematic phone use and low agreeableness (Toda et al., 2016), high neuroticism (McDaniel et al., 2018) and low performance in cognitive tasks (Barr et al., 2015).

Contrary to the predictions, technology interference was related to introversion; yet the obtained effect was very low (r_s = .092). A host of studies highlighted the association between extraversion and problematic mobile phone use (PMPU), pointing out that extroverts enjoy social participation, make more calls or text messages (Butt & Phillips, 2008), engage in social media (Huang, 2019) and use smartphones mainly in social purposes (Hsiao, 2017). Simultaneously, other studies suggest no significant relationship between PMPU and extraversion (e.g., Cocoradá et al., 2018; Horwood & Anglim, 2018). A meta-analysis by Gao et al. (2022) indicated, however, that individuals with both high and low extraversion may experience PMPU, but the purposes of the mobile device usage may differ. The typical for introverts process (non-social) usage of a smartphone, i.e. searching information, reading news, watching videos (Abd Rahim et al., 2020), may increase after the child's birth and indicate intensified technoference. Due to the lack of consensus over the association between extraversion and technology interference, further research into this issue may be needed.

The current study provides an insight into parental mobile device usage and broadens the range of tools enabling its analysis (McDaniel, 2021; McDaniel et al.,

2018). Despite its strengths, it is not without limitations. Firstly, the adapted questionnaire is a screening technique developed to assess subjective parental beliefs and perceptions of the technoference, not the objective technology interference. So, it is recommended to analyze additional variables such as the actual time spent with a smartphone measured directly on the mobile device. Secondly, the study relied on the self-report questionnaires; therefore, the results may be prone to negative affectivity and social desirability bias (Razavi, 2001). Another limitation was that the sampling strategy and inclusion criteria did not allow for verifying the structure of the questionnaire on the older groups of parents. Although the chosen population is coherent in terms of the developmental tasks it faces (Havighurst, 1981) and has the highest smartphone penetration ratio (Deloitte, 2017), it may be considered for further research to validate the factor structure in a more diverse age group. Finally, one of the scales used for validation purposes, i.e., IPIP-BFM-20, has not shown a fully satisfactory internal consistency level, so results related to this measure should be interpreted with caution. Evaluating reliability using a test–retest method may also add to the questionnaire's psychometric properties.

Regarding the increase of the social requirements from mothers and fathers to acquire new technological skills and use various apps or online platforms, of central importance is to monitor the intensity of technoference in parent–child relationships. The proposed questionnaire is a promising, brief, valid and reliable method of assessing parental distraction by mobile devices during time spent with their children and may be considered a valuable tool for both research and diagnostic purposes.

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