

Parental Attitudes and Digital Parenting in the Early Years: Development and Validation of the PADTS Scale

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Parental Attitudes and Digital Parenting in the Early Years: Development and Validation of the PADTS Scale

Abstract

Background: This paper reports on the development and validation of the 15-item Parental Attitudes to Digital Technology Scale (PADTS), a brief, psychometrically validated measure assessing parents' beliefs, confidence, and concerns about their 0-3 year olds use of digital technologies. **Method:** Developed as part of (REMOVED) PADTS addresses a gap in existing research by focusing on children from birth to three years, a stage often overlooked in digital parenting literature. Co-developed with parents and early years experts, the scale was tested with a nationally balanced UK sample (N = 934). **Results:** Exploratory and confirmatory factor analyses supported a four-factor structure: Perceived Risks, Perceived Learning Benefits, Parental Confidence, and Technology-Related Anxiety. The PADTS showed strong model fit and measurement invariance across parent gender, ethnicity, and region, with some variation by child age. Correlational analyses indicated that benefit, perceptions and confidence were associated with supportive digital parenting, while anxiety was more weakly linked. **Conclusion:** PADTS shows potential as a practical tool for researchers, practitioners, and policy-makers, and may support a more nuanced understanding of how parental attitudes shape early digital experiences.

Introduction

Importance of Parental Attitudes Toward Digital Technology

Parental attitudes are central to shaping children's access to and use of digital technologies in the home. Positive parental attitudes are linked to higher ownership and use of digital devices by children, while negative attitudes often result in children's limited access or restricted use (Konca, 2022; Akgün 2023). Parental beliefs also shape engagement, where parents who value digital literacy tend to support more active and purposeful use of digital technologies (Dong et al., 2022; Lauricella et al., 2020). Digital engagement bolsters children's confidence and skills and encourages the development of safe and independent digital practices (Kumpulainen et al., 2020; Livingstone et al., 2015).

Factors Influencing Parental Attitudes

Parental attitudes toward digital technology are shaped by a complex set of factors (Johnson and Puplampu, 2008). Drawing upon Bronfenbrenner's bioecological systems theory (1994), Johnson and Puplampu (2008) propose the 'ecological techno-subsystem', which places digital media exposure within the child's microsystem. This framework, further refined by Johnson (2010) into the ecological techno-microsystem, encompasses the interplay between digital media, family contexts, and children's developmental trajectories.

At the microsystem level, studies illustrate the role played by family dynamics and child temperament. For example, Shin et al. (2021) found that toddlers' screen use was linked to maternal stress, with stress mediating the relationship between child temperament and screen time. Importantly, the nature of digital use, rather than the technology itself, shapes parental attitudes. O'Connor and Fotakopoulou (2016) found that parents were more accepting of devices when used to aid communication with family or for specific tasks such as taking photographs. These findings suggest that parental attitudes towards technology appear somewhat nuanced; often hinging on perceived functionality and context of use, rather than blanket approval or disapproval.

At the macrosystem level, cultural and national differences are shown to influence attitudes (Mallawaarachchi et al., 2022). These attitudes often vary between countries and are guided by broader educational values and policy contexts (Dardanou et al., 2020). In the Philippines, Dy et al., (2023) showed that whilst parents sometimes blamed devices for their children's challenging behaviours, they didn't necessarily limit their screen time exposure. Parental demographics such as parental education, age, and income have also been revealed to correlate with both attitudes and patterns of child screen use (Wiltshire et al., 2021; Zakaria et al., 2022). For example, Wiltshire et al. (2021) found that lower levels of parental education were associated with earlier infant screen exposure and a greater reliance on screens to manage daily routines. A recent RCT in India showed that early intervention in the form of parental education can help limit screen time in the first 2 years (Poonia, et al., 2024). However, Mekhael et al., (2024) revealed that despite parents having concerns about their children's screen time, digital devices are very much embedded in daily routines, seen as the social norm and thus are difficult to remove. Thus as Flewitt and Clark (2020) argue, very young children's home learning environments are digitally networked spaces with multiple external influences.

Ambivalence and Anxiety in Parental Attitudes

Many studies reveal a tension within the realm of parental attitudes, ranging from approval and valuing technology's potential to feeling anxious and fearing its risks. Murphy and Headley (2020) found that while parents of toddlers often saw benefits to tech (e.g., coordination, communication), they were simultaneously anxious about addiction, cost, and health. Available guidelines highlight a risk adverse approach towards digital technology. For example, the World Health Organisation guidelines (WHO, 2019) state that for 1-year-old children, sedentary screen time (such as watching TV or videos, playing computer games) is not recommended. For those aged 2 years, sedentary screen time should be no more than 1 hour; and that less is better. In a UK context the recently published DfE guidelines (DfE, 2025) incorporate the WHO Guidelines outlined above. However, as Heller (2021) points out, the majority of parents do not follow these guidelines, and many are not even aware that they exist. O'Connor and Fotakopoulou (2016) found that most parents reported lacking formal advice on safe screen time for toddlers, instead relying on instinct or conflicting input from peers and professionals. Palaiologou (2016) similarly highlighted how contradictory messages from educators left parents feeling uncertain and unsupported in their decisions. These mixed messages may result in parents overly restricting or avoiding digital devices entirely.

The Role of Parental Confidence

Parental self-efficacy plays a key role in shaping both attitudes and mediation strategies. Nicholas and Paatsch (2018) found that parents were far more confident using printed texts with their children than electronic formats, despite being operationally competent with tech. Neumann et al. (2020) argue that many parents feel confident in device operation but unsure how to select high-quality content or support balanced screen time. This gap between operational skills and educational competence can act as a barrier to effective digital engagement in the home.

Parental confidence also influences the consistency and quality of mediation. Parents who feel equipped to support digital activities are more likely to engage in co-use, suggest educational apps, or explain screen content—practices shown to benefit children's cognitive and language development (Kumpulainen et al., 2020; Papadakis et al., 2019). In contrast, low confidence may result in inconsistent limits, reliance on devices as a distraction, or missed opportunities to support digital play as learning resource. This is particularly salient for parents of children with additional needs. Apps et al. (2024) found that these parents often saw digital technology as beneficial for communication, regulation, or accessibility, but also reported heightened

concerns about online safety and content quality. These dual perspectives highlight the importance of tools that can capture the complex and multifaceted nature of parental attitudes.

Existing Measures of Parental Attitudes

A number of scales have been developed to assess parental attitudes and behaviours related to digital parenting, with varying constructs, populations, and focus. The Digital Parenting Attitude Scale (DPSAS), widely used in Turkish studies, includes constructs on promoting effective digital media use and protecting children from risks (Fidan and Olur, 2023; Altındağ Kumaş, Ö., and Sardohan Yildirim, 2024). Other established tools include the Parents' Attitudes Toward Children's Use of ICT Scale (PACU-ICT) (Gür and Türel, 2019), the Media and Technology Usage and Attitudes Scale (Rosen et al., 2013), and the Digital Parenting Awareness Scale (Manap and Durmus, 2020). However, many of these instruments are designed for older children, lack age specificity, or conflate general technology use with parenting concerns.

Some more recent efforts have addressed these limitations (Navarro et al., 2023 and Bulduk, 2025). For example, Bulduk et al. (2025) developed a Parental Knowledge-Attitude Scale specifically for parents of children aged 6 months to 6 years. However, this was not yet available during the design phase of PADTS. Moreover, most existing tools do not disaggregate attitudes into distinct cognitive, affective, and self-efficacy domains, limiting their explanatory power in intervention and applied contexts.

Thus, there remains a clear need for a psychometrically sound, conceptually clear, and age-appropriate measure of parental attitudes toward digital technology specifically designed for early childhood. The PADTS was designed to address this gap by capturing three core dimensions—Perceived Risks of Digital Technology, Parental Digital Confidence, and Technology-Related Anxiety—and by focusing specifically on parents of children aged from birth to three years. In doing so, it offers a theoretically grounded and practically useful tool for understanding how parental dispositions shape early digital experiences and, by extension, early educational opportunities.

Present Study

Based on the literature, there remains a clear need for a psychometrically sound, conceptually clear, and age-appropriate measure of parental attitudes toward digital technology specifically designed for early childhood. Firstly, most existing tools are developed for parents of older children or take a general approach to digital parenting, without addressing the unique concerns and uncertainties experienced by parents of children from birth to three years (e.g., Neumann et al., 2020; Livingstone & Zhang, 2021). Secondly, many scales do not distinguish between different psychological dimensions, such as cognitive beliefs, affective concerns, and parental self-efficacy—which are crucial for understanding and supporting digital parenting in applied contexts (Nicholas & Paatsch, 2018; Apps et al., 2024). Thirdly, only a small number of recent scales (e.g., Bulduk et al., 2025; Navarro et al., 2023) target the early years, and most of these were unavailable at the time of this study’s design. Moreover, some rely on single-factor models or lack clarity in item phrasing and factor structure.

The PADTS was designed to address this gap by capturing four core dimensions, Perceived Risks of Digital Technology, Perceived Learning Benefits, Parental Digital Confidence, and Technology-Related Anxiety, and by focusing specifically on parents of children aged from birth to three years. In doing so, it offers a theoretically grounded and practically useful tool for understanding how parental dispositions shape early digital experiences and, by extension, early educational opportunities.

While the primary aim of this study was scale development and validation, two theoretically informed expectations guided our validation analyses. First, it was anticipated that parental digital confidence would correlate more strongly with supportive digital parenting behaviours (e.g., co-play, scaffolding) than technology-related anxiety, consistent with previous evidence on the predictive power of self-efficacy beliefs. Second, it was expected that perceived learning benefits would be more salient among parents of older children, reflecting their greater exposure to direct child–technology interaction.

Development of the scale, sub scales and items

Scale development is a rigorous and developmental process (Badenes-Ribera et al., 2020). A literature review was conducted to determine the need for a new scale, what measures exist already and if the proposed measure was conceptually distinct (Zickar, 2020). The next step was to define the construct/s being measured, which then guided the item writing. In line with best practice, items were kept clear and simple (Haladyna and Rodriguez, 2013).

The draft items were presented to an interdisciplinary team of experts in both the target constructs and psychometric measure development. Items were reviewed for clarity, coherence, and conceptual relevance (Perez-Reves et al., 2023), with ambiguous, redundant, or misaligned items removed or revised. The refined item set was piloted with a diverse group of parents of children aged 0–3 years (72 partial responses, 45 complete responses) recruited through convenience sampling across the UK. In the pilot, three conceptual domains were tested separately using Principal Component Analysis (PCA): Attitudes/Wellbeing (including both risk- and benefit-framed items), Parental Confidence, and Parental Anxiety. Each domain showed a single clear factor with strong loadings ($> .73$), explaining between 62% and 68% of the variance. Sampling adequacy was high across all scales ($KMO = .767-.844$; Bartlett's $p < .001$). Expert review of the pilot results recommended two refinements: separating risk-framed and benefit-framed items in the Attitudes/Wellbeing scale to create distinct Attitudes/Wellbeing and Learning/Benefits subscales; and retaining Confidence and Anxiety as separate subscales to reflect their conceptual distinction.

A subsequent PCA of the four-factor structure confirmed strong internal coherence and sampling adequacy ($KMO = .767-.844$; Bartlett's $\chi^2(190) = 3437$, $p < .001$). All four factors exceeded the Kaiser criterion with eigenvalues > 1 and each explained between 62–68% of variance. Factor loadings were uniformly strong (lowest loading = $.67$), with no problematic cross-loadings. Qualitative feedback from 10 parents confirmed the questionnaire was accessible, clear, and comprehensive, supporting its use in the main survey (Table S1). All items were scored on a 5-point Likert scale from strongly disagree (1) to strongly agree (5). After reverse coding as appropriate, higher scores reflect more positive attitudes toward digital technology and child well-being and learning, greater confidence in supporting children's digital engagement, and higher levels of technology-related anxiety.

*****Table S1 here*****

Factor Structure and Scale Validation

The Parental Attitudes to Digital Technology Scale (PADTS) was validated using data from the Toddlers, Tech and Talk Phase 1 survey (for details of survey participant recruitment, administration and completion, see Winter et al., 2025). In total 1444 valid responses were

provided to the survey, and all subsequent analyses were conducted in SPSS V29 and Jamovi V2.4.11.

The survey data (N = 1,444) comprised both a panel survey (n = 934) and an open online survey (n = 510). Following an initial exploratory factor analysis (EFA) conducted on the full sample, subsequent reliability and validity testing focused on the panel sample, which was recruited using quota sampling to ensure equal representation across the four UK nations (England, Scotland, Wales, and Northern Ireland). Within the panel sample, 49.8% of children were reported as female, and 16.1% were from minority ethnic backgrounds. While the sample was well balanced geographically (26.5% England, 24.5% Scotland, 24.7% Wales, and 24.3% Northern Ireland), the age distribution was less even: 51.0% of children were aged 2–3 years, compared to 28.6% aged 1–2 years and 20.4% under one year (M = 2.31, SD = 0.79, range = 2). This age skew should be considered when interpreting results by developmental stage.

Exploratory Factor Analysis

A split-half approach was adopted, with exploratory factor analysis conducted on one half of the panel sample (n = 466). As it was anticipated that the factors (e.g., risk, confidence, anxiety) would be correlated, this was conducted using Maximum Likelihood extraction with oblimin rotation. Bartlett's test of sphericity was significant [$\chi^2(190, N = 466) = 3437, p < .001$], and KMO values ranged from .751 to .890, confirming sampling adequacy.

During model refinement, five negatively worded items using “I do not...” constructions were removed due to semantic ambiguity and potential method effects (see Table S1, Supplementary Material). These included two items from the Confidence subscale, two from Anxiety, and one from the Wellbeing domain. Although reverse-coded items are traditionally used to reduce acquiescence bias, evidence suggests they can introduce confusion and inflate method variance, particularly when surrounded by positively worded items (Suárez-Álvarez et al., 2018).

Importantly, this decision also reflected a theoretical distinction: that positive and negative attitudes toward children's digital device use are not opposites, but distinct constructs. For instance, a parent might simultaneously worry about screen time while also recognising the learning potential of digital apps. This multidimensional perspective aligns with contemporary digital parenting literature and the final four-factor model retained a balanced structure, with each domain comprising 3–5 items.

The resulting four-factor model (Table S2) comprised:

- Wellbeing Concerns (5 items)
- Perceived Learning Benefits (4 items)
- Parental Digital Confidence (3 items)
- Digital Technology-Related Anxiety (3 items)

Although one item, "Digital devices are damaging to children's learning", references learning directly, it was retained within Wellbeing Concerns factor for both empirical and theoretical reasons. Conceptually, the phrasing emphasizes harm and risk, framing learning in a deficit-focused way which aligns more closely with the tone and content of the other wellbeing-oriented items (e.g., mental health, physical harm).

*****Table S2 here*****

Confirmatory factor analysis

CFA confirmed the four-factor structure in both split and full samples (e.g., full sample: CFI = .948, RMSEA = .057; see Table S8 – S9 in Supplementary Material).

Model comparisons demonstrated that the revised 15-item four-factor model substantially outperformed both the original 20-item model and a single-factor baseline model. All factor loadings were significant and ranged from .465 to .913. Internal consistency was good across scales ($\alpha = .76-.85$), with Anxiety acceptable ($\alpha = .65$) given its brevity.

Associations with Parenting Behaviours and Device Use

Correlations between the four PADTS subscales and parenting behaviours (Tables S3 and S4) revealed expected and yet nuanced patterns.

Risks and Anxiety were strongly correlated but risk perceptions also correlated positively with confidence and benefits suggesting ambivalence is common. Confidence was moderately related to benefits but only weakly to anxiety, reinforcing its independence from worry.

In relation to device ownership and usage, parents who perceived more benefits and felt more confident were more likely to co-play with their child and have broader home access and usage

contexts. Risk perceptions also showed modest positive associations, while anxiety was only weakly related to usage or co-play, suggesting that worry does not predict behaviour directly.

In terms of parental support behaviours:

- Risks and benefits were both positively associated with scaffolding behaviours such as praising, suggesting games, and helping solve problems.
- Confidence showed smaller but consistent associations with active support (e.g., encouraging, demonstrating, praising).
- Anxiety again showed weak and inconsistent links with support, reinforcing its limited behavioural influence in this context.
- Together, these findings suggest that Risks, Benefits, and Confidence are particularly relevant for predicting parental involvement, while Anxiety may function more as an affective response than a behavioural driver.

*****Tables S3 and S4 here*****

Measurement Invariance Testing

Multi-group CFA assessed the PADTS structure across parent gender (Male/Female), ethnicity (White/BME), UK nation (England/Scotland/Wales/Northern Ireland), and child age group (0–1 year, 1–2 years, 2–3 years). The four-factor model demonstrated likely invariance across gender, ethnicity, and region ($\Delta\text{CFI} < .01$; see Table S11). However, metric non-invariance was observed across child age, with changes in CFI exceeding the accepted threshold ($\Delta\text{CFI} = .023$).

Examination of the measurement model revealed that items reflecting learning-related harms and benefits varied in strength across child age groups. The metric non-invariance observed across child age groups is theoretically consistent with known developmental and parenting differences during the early years. Parents of infants are likely to approach digital technology with more generalised concerns and uncertainties, whereas parents of toddlers may have more direct experience with their child's engagement and thus form more differentiated attitudes, particularly around learning benefits and potential harms. These shifts in perspective likely account for differences in factor loadings across age groups. Notably, the sample was skewed toward older children, with 51.0% aged 2–3 years, which may have further influenced the factor structure and inflated the salience of developmentally advanced attitudes. While this

limits strict comparability of scores between age groups, it also likely reflects meaningful variation in how parental attitudes evolve as children grow and gain independence.

Alternative model testing

Following the CFA and invariance testing of the retained four-factor model, an alternative three-factor version was also explored. This involved the exclusion of items from the wellbeing and confidence/anxiety subscales due to concerns around semantic ambiguity, as well as reverse-coded items from the attitudes to wellbeing and learning domains, which raised potential method artefact issues. The resulting nine-item model (see Tables S12 to S18 in Supplementary Material for full model testing details) demonstrated slightly superior fit ($CFI = .978$, $RMSEA = .051$) and greater measurement invariance across child age than the four-factor version. However, it omitted perceived learning benefits—a conceptually distinct and empirically supported dimension. Given the theoretical importance of distinguishing between risks and benefits in early-years digital parenting, the four-factor model was retained. Nonetheless, the three-factor version may offer a useful alternative for future research that prioritises brevity, stronger invariance properties, or large-scale population screening.

Discussion

This study developed and validated the Parental Attitudes to Digital Technology Scale (PADTS), a brief, conceptually grounded tool to assess how parents of children aged from birth to three years perceive and manage their children’s digital technology use. Using a UK-balanced panel sample, exploratory and confirmatory analyses supported a four-factor structure: Perceived Risks of Digital Technology, Perceived Learning Benefits, Parental Digital Confidence, and Technology-Related Anxiety (see Tables S5-11 in Supplementary Material for full model testing details).

EFA highlighted that negatively phrased, reverse-coded items introduced response artefacts, with such items clustering independently of conceptual domain. Five items using complex “I do not...” constructions were removed based on poor fit and a theoretical decision to treat positive and negative attitudes as co-existing, not opposite. The refined 15-item scale showed strong internal consistency across most subscales ($\alpha = .76-.85$), with acceptable reliability for the shorter Anxiety subscale ($\alpha = .65$).

CFA confirmed the four-factor model ($CFI = .948$, $RMSEA = .057$) and showed it outperformed both the original 20-item version and a one-factor baseline, providing a more interpretable and efficient measure. Correlations between PADTS scales revealed expected

patterns: risks and anxiety were strongly associated, while confidence and benefits also correlated positively. These findings reflect the ambivalence often seen in digital parenting; parents may simultaneously hold concerns and perceive value. Confidence was more strongly linked to positive beliefs than to anxiety, while anxiety showed weaker behavioural relevance.

Confidence and benefit perceptions were more predictive of parental behaviour, correlating with co-play, access to devices, and usage contexts. Risk attitudes showed modest associations; anxiety was least behaviourally predictive. Support behaviours, including scaffolding and co-engagement, were associated with confidence and both risk and benefit beliefs. Consistent with our hypothesis, confidence was more strongly associated with supportive digital parenting behaviours than anxiety. Importantly, and in line with our second expectation, anxiety showed no meaningful associations with actual parenting behaviours such as co-play or support strategies, highlighting a theoretically significant distinction between emotional concern and parental action. This suggests that while anxiety may reflect underlying worry or uncertainty, it does not translate directly into observable parenting practices, indicating the need for more nuanced approach to, and measurement of parental attitudes.

Multi-group CFA demonstrated invariance across gender, ethnicity, and UK region. However, metric non-invariance emerged across child age, particularly for learning-related items. These items loaded more strongly for parents of older children in the birth to three age range, suggesting attitudes may become more differentiated as children grow. This finding should be interpreted in the context of a skewed age distribution, with over half (51%) of the sample comprising children aged 2–3 years, which may have amplified the developmental salience of certain items. Although this limits the direct comparability of scores across age groups, it likely captures meaningful shifts in parental attitudes as children develop and engage more independently with digital devices. As such, the PADTS may be most appropriately used to examine patterns within age groups or track changes in attitudes over time, rather than to directly compare parents of children at different developmental stages.

Implications for Research and Practice

The PADTS provides a valuable tool for researchers and early years practitioners (including nursery staff, preschool teachers, childminders, early years teachers, and teaching assistants) aiming to understand and support digital engagement at home. It captures distinct domains, risks, benefits, confidence, and anxiety, that shape parenting strategies and media mediation.

The scale can be used to assess the impact of interventions (e.g., parenting workshops, school-home initiatives) and inform the design of digital resources. Its multidimensional structure offers greater insight than existing tools such as the PACU-ICT (Fidan and Olur, 2023) or the Parental Knowledge-Attitude Scale (Bulduk et al., 2025), particularly by separating cognitive, affective, and self-efficacy components. Robust psychometric validation and invariance testing strengthen its suitability for applied and research contexts.

In practical settings, PADTS may be used for brief screening in health visitor appointments, early childhood settings, or family support services to identify parents who are highly anxious, overly risk-focused, or lacking confidence in digital parenting. It could also inform tailored guidance or discussion points in antenatal or postnatal groups, as well as targeted messaging or resources to promote balanced, developmentally appropriate digital use in the home. The scale could support reflective practice among early years professionals or be embedded in digital literacy components of teacher training to improve understanding of parental perspectives.

Limitations and Future Directions

While the PADTS shows strong psychometric performance, the Anxiety subscale may benefit from future item refinement. Self-report data and the cross-sectional design also limit inference; longitudinal or observational validation would strengthen future applications of the measure. In addition, the sensitivity of the topic may introduce social desirability bias, whereby parents respond in line with perceived norms or expectations rather than reflecting their actual beliefs or practices. This should be considered when interpreting scores, particularly for items related to screen time, risks, and parental anxiety.

A shorter three-factor version showed slightly stronger fit and invariance but excluded learning benefits, a conceptually and empirically distinct domain. The four-factor model was therefore retained. However, the three-factor version may prove useful for rapid screening or large-scale use. Future research should test the PADTS in cross-cultural contexts, examine its predictive value for child outcomes, and explore how parental attitudes shift in response to policy and/or technological change.

Conclusion

The PADTS provides a concise, psychometrically robust measure of how parents of children from birth to age 3 years perceive and approach digital technology use. Its four-factor structure—covering risks, benefits, confidence, and anxiety—captures core psychological

orientations relevant to digital mediation, parenting support, and early learning environments. While further longitudinal validation is needed, the PADTS has the potential to provide a sound foundation for both academic research and applied practice in the early years digital landscape. Future work should explore cultural adaptation and validation of the PADTS across international contexts to ensure its relevance and utility in diverse family and policy environments.

Key points:

- Introduction of the Parental Attitudes to Digital Technology Scale (PADTS), a concise, conceptually grounded, and psychometrically validated tool designed for parents of children aged 0–3 years.
- Identification of four distinct factors underpinning parental attitudes: Perceived Risks of Digital Technology, Perceived Learning Benefits, Parental Digital Confidence, and Technology-Related Anxiety.
- Demonstration of strong model fit, internal reliability, and measurement invariance across parent gender, ethnicity, and UK region, with some age-related variation highlighting the developmental relevance of parental beliefs.
- The PADTS can assist early years practitioners, health visitors, and family support workers in identifying and addressing both concerns and strengths in parents' digital attitudes.
- The scale offers a reliable means of identifying parental support needs, informing the design of tailored, strengths-based resources and messaging that reflect diverse beliefs and family contexts.

AI Use Statement:

AI tools (ChatGPT by OpenAI) were used to support the editing and refinement of written content, including rephrasing for clarity, summarising reviewer-style feedback, and checking reference consistency. All analytical decisions, conceptual development, interpretation of findings, and final wording were made by the authors. The AI was not used to generate original research content, data analysis, or conclusions.

References

Akgün, F. (2023) 'Parents' attitudes and opinions towards their children's use of technology', *International Journal of Research in Education and Science*, 9(3), 597-622.

Altındağ Kumaş, Ö., and Sardohan Yildirim, A. E. (2024) 'Exploring digital parenting awareness, self-efficacy and attitudes in families with special needs children', *British Journal of Educational Technology*, 55, 2403–2418.

Apps, J., Webb, S. and Hutton, E. (2024) 'Parents' and carers' attitudes to the use of digital technology and its role in the care of children with complex needs', *British Journal of Occupational Therapy*, 87(7), 452-460.

Badenes-Ribera, L., Silver, N.C. and Pedroli, E. (2020) 'Scale development and score validation', *Frontiers in Psychology*, 11, 799.

Bronfenbrenner, U. (1994) 'Ecological models of human development', *International Encyclopaedia of Education*, 3(2), 37-43.

Bulduk, M., Can, V. and Tüfekci, F.G. (2025) 'Development of the parental knowledge-attitude scale for children's use of digital devices: a methodological study', *Journal of Health Sciences and Medicine*, 8(2), 241-248.

Carr, A. and Dempster, T. (2021) 'Parent-child interactions during joint engagement with touchscreen technology: A comparison of younger versus older toddlers', *Infant Behavior and Development*, 64, 101587.

Chaudron, S., Plowman, L., Beutel, M.E., Černikova, M., Navarette, V.D., Dreier, M., Fletcher-Watson, B., Heikkilä, A.S., Kontríková, V., Korkeamäki, R.L. and Livingstone, S. (2015) *Young Children (0-8) and Digital Technology-EU report*. Luxembourg: Publications Office of the European Union.

Dardanou, M., Unstad, T., Brito, R., Dias, P., Fotakopoulou, O., Sakata, Y. and O'Connor, J. (2020) 'Use of touchscreen technology by 0–3-year-old children: Parents' practices and perspectives in Norway, Portugal and Japan', *Journal of Early Childhood Literacy*, 20(3), 551-573.

Department for Education (2025) *Help for Early Years Providers. Health and Wellbeing: Internet Safety*. London: Department for Education. Available here <https://help-for-early-years-providers.education.gov.uk/health-and-wellbeing/internet-safety> [last accessed 03.06.25].

Dong, C., Cao, S. and Li, H. (2022) Profiles and predictors of young children's digital literacy

and multimodal practices in central China. *Early Education and Development*, 33(6), 1094-1115.

Dy, A.B.C., Dy, A.B.C. & Santos, S.K. (2023) 'Measuring effects of screen time on the development of children in the Philippines: a cross-sectional study'. *BMC Public Health* 23, 1261, <https://doi.org/10.1186/s12889-023-16188-4>.

Fidan, N.K. and Olur, B. (2023) 'Examining the relationship between parents' digital parenting self-efficacy and digital parenting attitudes', *Education and Information Technologies*, 28(11), 15189-15204.

Flewitt, R.S. and Clark, A. (2020) 'Porous boundaries: reconceptualising the home literacy environment as a digitally networked space for 0-3-year-olds', *Journal of Early Childhood Literacy*, 20(3): 447–471.

Flewitt, R., El Gemayel, S., Arnott, L., Gillen, J., Karen, W., Goodall, J., Daizell, A., Liu, M., Savadova, S. and Timmins, S. (2024) *Toddlers, Tech and Talk: 0-3-year-old Children's Language and Literacy Learning at Home in a Post-Digital Age*. Manchester: MMU. <https://e-space.mmu.ac.uk/636881/1/TODDLERS%2C%20TECH%20AND%20TALK%20Summary%20Report%20.pdf>.

Gür, D. and Türel, Y.K. (2022) 'Parenting in the digital age: attitudes, controls and limitations regarding children's use of ICT', *Computers and Education*, 183, 104504.

Haladyna, T. M., and Rodriguez, M. C. (2013) *Developing and Validating Test Items*. New York: Taylor and Francis.

Heller, N. A (2021) 'Infant media use: a harm reduction approach', *Infant Behavior and Development*, 64, 101610.

İnan-Kaya, U. G., Mutlu-Bayraktar, D. and Yılmaz, Ö. (2018) 'Digital parenting: perceptions on digital risks', *Kalem Uluslararası Eğitim ve İnsan Bilimleri Dergisi*, 8(1), 131-157.

Johnson, G.M. (2010) 'Internet use and child development: Validation of the ecological technosubsystem', *Journal of Educational Technology and Society*, 13(1), 176-185.

Johnson, G. and Puplampu, K. (2008) 'Internet use during childhood and the ecological technosubsystem', *Canadian Journal of Learning and Technology/La revue canadienne de l'apprentissage et de la technologie*, 34(1).

Konca, A.S. (2022) 'Digital technology usage of young children: Screen time and families',

Early Childhood Education Journal, 50(7), 1097-1108.

Kumpulainen, K. and Gillen, J. (2019) Young children's digital literacy practices in the home: Past, present and future research directions. In O. Erstad, R. Flewitt, B Kümmerling-Meibauer, Í. S Pereira (eds.) *The Routledge Handbook of Digital Literacies in Early Childhood* (pp. 95-108). London: Routledge.

Kumpulainen, K., Sairanen, H. and Nordström, A. (2020) 'Young children's digital literacy practices in the sociocultural contexts of their homes', *Journal of Early Childhood Literacy*, 20(3), 472-499.

Lauricella, A.R., Herdzina, J. and Robb, M. (2020) 'Early childhood educators' teaching of digital citizenship competencies', *Computers and Education*, 158, 103989.

Livingstone, S.M. and Blum-Ross, A. (2020) *Parenting for a Digital Future: How Hopes and Fears about Technology Shape Children's Lives*. Oxford: Oxford University Press.

Livingstone, S. and Zhang, D. (2021) *How and Why Parents Support their Child's Learning Online. Parenting for a Digital Future: Survey Report*, 5. London: London School of Economics.

Livingstone, S., Mascheroni, G., Dreier, M., Chaudron, S. and Lagae, K. (2015) *How parents of young children manage digital devices at home: The role of income, education and parental style*. London: EU Kids Online, London School of Economics.

Mallawaarachchi, S.R., Hooley, M., Sutherland-Smith, W. and Horwood, S. (2022) "'You're damned if you do, you're damned if you don't": a qualitative exploration of parent motives for provision of mobile screen devices in early childhood', *BMC Public Health*, 22(1), 2011.

Manap, A. and Durmuş, E. (2020) 'Development of a digital parental awareness scale', *Inonu University Journal of the Faculty of Education (INUJFE)*, 21(2).

Mekhail, K.T., Blom, L. & Rydström, LL. Young children's screen habits and first-time parents' reflections on screen use in socioeconomically disadvantaged Swedish settings: a mixed methods study. *BMC Public Health* 24, 2027 (2024). <https://doi.org/10.1186/s12889-024-19557-9>.

Murphy, S. and Headley, M. (2020) 'The role of digital technology in teen mothers' and their children's literacy', *Journal of Early Childhood Literacy*, 20(4), 755-782.

Navarro, J.L., Fletcher, A. and Jensen, M. (2023) 'A bifactor model of US parents' attitudes

- regarding mediation for the digital age', *Journal of Children and Media*, 17(1), 17-36.
- Neumann, M.M., Merchant, G. and Burnett, C. (2020) 'Young children and tablets: the views of parents and teachers', *Early Child Development and Care*, 190(11), 1750-1761.
- Nicholas, M. and Paatsch, L. (2018) 'Mothers' views on shared reading with their two-year olds using printed and electronic texts: purpose, confidence and practice', *Journal of Early Childhood Literacy*, 21(1), 3-26.
- O'Connor, J. and Fotakopoulou, O. (2016) 'A threat to childhood innocence or the future of learning? parents' perspectives on the use of touch-screen technology by 0–3 year-olds in the UK', *Contemporary Issues in Early Childhood*, 17(2), 35-247.
- Palaiologou, I. (2016) 'Children under five and digital technologies: implications for early years pedagogy', *European Early Childhood Education Research Journal*, 24(1), 5-24.
- Papadakis, S., Zaranis, N. and Kalogiannakis, M. (2019) 'Parental involvement and attitudes towards young Greek children's mobile usage', *International Journal of Child-Computer Interaction*, 22, 100144.
- Pérez-Rivas, F. J., Jiménez-González, J., Bayón Cabeza, M., Belmonte Cortés, S., de Diego Díaz-Plaza, M., Domínguez-Bidagor, J., García-García, D., Gómez Puente, J., & Gómez-Gascón, T. (2023). Design and Content Validation using Expert Opinions of an Instrument Assessing the Lifestyle of Adults: The 'PONTE A 100' Questionnaire. *Healthcare (Basel, Switzerland)*, 11(14), 2038. <https://doi.org/10.3390/healthcare11142038>.
- Poonia, Y., Khalil, S., Meena, P. *et al.* Parental Education for Limiting Screen Time in Early Childhood: A Randomized Controlled Trial. *Indian Pediatr* **61**, 32–38 (2024). <https://doi.org/10.1007/s13312-024-3084-5>.
- Poveda, D., Matsumoto, M., Sundin, E., Sandberg, H., Aliagas, C. and Gillen, J. (2020) 'Space and practices: engagement of children under 3 with tablets and televisions in homes in Spain, Sweden and England', *Journal of Early Childhood Literacy*, 20(3), 500-523.
- Rosen, L.D., Whaling, K., Carrier, L.M., Cheever, N.A. and Rokkum, J. (2013) 'The media and technology usage and attitudes scale: An empirical investigation', *Computers in human behavior*, 29(6), 2501-2511.
- Shin, E., Choi, K., Resor, J. and Smith, C.L. (2021) 'Why do parents use screen media with toddlers? the role of child temperament and parenting stress in early screen use', *Infant Behavior and Development*, 64, 101595.

Suárez Álvarez, J., Pedrosa, I., Lozano, L. M., García Cueto, E., Cuesta Izquierdo, M., and Muñoz Fernández, J. (2018) 'Using reversed items in Likert scales: a questionable practice', *Psicothema*, 30.

Wiltshire, C.A., Troller-Renfree, S.V., Giebler, M.A. and Noble, K.G. (2021) 'Associations among average parental educational attainment, maternal stress, and infant screen exposure at 6 months of age', *Infant Behavior and Development*, 65, 101644.

Winter, K., Flewitt, R., El Gemayel, S., Bunting, L., Arnott, L., Connolly, P., Dalziell, A., Gillen, J., Goodall, J., Liu, M.C. and McLaughlin, K. (2025) The rights of very young children in the digital environment of the family home: findings from a UK survey of children 0–36 months and their parents. *Children and Society*, 0, 1-17.

World Health Organization. (2019) *Guidelines on Physical Activity, Sedentary Behaviour and Sleep for Children Under 5 Years of Age*. World Health Organization. <https://iris.who.int/handle/10665/311664>. License: CC BY-NC-SA 3.0 IGO.

Zakaria, W.N.F.W., Omar, S.K., Aziz, A.I. and Said, A. (2022) 'Parents' attitudes towards digital technology use in early childhood', *Social Sciences*, 12(10), 2531-2548.

Zickar, M. J. (2020). Measurement development and evaluation. *Annual Review of Organizational Psychology and Organizational Behavior*, 7, 213–232.

