Article

Development and Psychometric Evaluation of the IDMUQ: A Short Measure to Assess Increased Digital Media Use in Preschool Children

Lutz Wartberg [1,*], Hannah Schmidt [2], Ingo Menrath [2], Stefanie Witt [3] and Silke Pawils [3]

1 Department of Psychology, Faculty of Human Sciences, MSH Medical School Hamburg, 20457 Hamburg, Germany
2 Department of Paediatrics and Adolescent Medicine, University of Lübeck, 23562 Lübeck, Germany
3 Institute of Medical Psychology, University Medical Center Hamburg-Eppendorf, 20251 Hamburg, Germany
* Correspondence: lutz.wartberg@medicalschool-hamburg.de

Abstract: Background: Today, the use of digital media is already present at an early stage in the lives of children. Even preschool children can already develop increased digital media use (IDMU). Empirical findings indicate associations of IDMU with several problems in psychosocial development. Therefore, it seems important to identify IDMU early, but there are very few specific approaches for preschool children. The aim of the present survey was to evaluate a newly developed brief screening instrument (based on DSM-5 criteria) named the IDMUQ (an abbreviation for "Increased Digital Media Use Questionnaire"). Methods: We investigated two samples, consisting of 341 parents and of 809 parents, with the IDMUQ, the Short CIUS, and the Parenting Stress Index. Data on screen time and sociodemographic aspects were also collected. We conducted an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) as well as reliability and correlation analyses. Results: The findings of both the EFA and the CFA support a one-dimensional structure for the IDMUQ. The reliability coefficients (Cronbach's alpha values) were 0.74 and 0.86. We observed first indications of criterion validity for the IDMUQ as well as correlations between parenting stress and IDMU. Conclusions: The results indicate that the IDMUQ, with its four items, is a promising screening tool to measure IDMU in preschool children.

Keywords: psychometric properties; screening; questionnaire; DSM-5; media use; gaming disorder; Internet addiction; stress; children; parents

1. Introduction

Today, the use of digital media is already present at an early stage in the lives of children (e.g., Huber et al. 2018). According to their parents, toddlers in Germany (where the present study was conducted) watch television for the first time on average at the age of 2.3 years, with the majority of programs watched online, via media libraries, apps, streaming or video portals (Kieninger et al. 2021). At an average of 3.3 years, toddlers play video games for the first time (Kieninger et al. 2021). Across all gaming options (computer, console, tablet, and smartphone), 19% of children aged two to five years played digital games at least once a week in 2023 (Rathgeb 2024). A total of 22% of the 2- to 5-year-olds used a smartphone at least once a week, compared to 18% in 2020 (Rathgeb 2024). This use of digital devices in early childhood is referred to as "digital experience" in the international literature (Huber et al. 2018). While digital experience can promote learning and development in childhood, the appropriate age and the most suitable form of media use are matters of social and scientific debate.

Regarding those questions, there are recommendations for children's usage times of digital devices, for example, from the World Health Organization (WHO 2019). The WHO (2019) suggests no sedentary screen time (as by watching TV or videos or playing

computer games) for infants (under 2 years). For toddlers aged 2 years as well as for children aged 3 to 4 years, the daily "...sedentary screen time should be no more than 1 hour; less is better" (WHO 2019). Recently, in Germany, an official "guideline for the prevention of dysregulated screen media use in childhood and adolescence" written by the German Society for Pediatrics and Adolescent Medicine e.V. (DGKJ 2023) was published. The DGKJ (2023) recommends keeping "...children under the age of 3 away from any passive and active use of screen media" and allowing children aged 3 to 6 years to use screen media for a maximum of 30 minutes on individual days of the week in the presence of their parents (DGKJ 2023). Comparable suggestions are provided by other experts and institutions, such as the German Federal Centre for Health Education (2019); however, these recommendations have typically not been systematically scientifically tested.

The use of digital media is already highly relevant in this age group because, according to a current review by Wu et al. (2023), it seems to lead to changes in the child's brain. According to Wu et al. (2023), the "...findings jointly indicate that early digital experience can positively and negatively shape children's brain function, with more negative than positive effects" (p. 30). In another recently published review article, Wang et al. (2023) reported effects of digital overuse or problematic use of digital media in preschool children. While terms such as "problematic Internet use" or "problematic gaming" are frequently used already for adolescents in the scientific literature (e.g., Wartberg et al. 2021), they appear rather difficult for preschool children, as they presuppose free choice for or against digital media use, which is often not yet given in this age group (e.g., because parents usually regulate media use and approve access to the digital devices). For preschool children, instead of "problematic digital media use", descriptions such as "increased digital media use" seem more appropriate and according to Werling et al. (2022); for increased media use, it is not the intensity (i.e., amount of time) that is most important, but the problems associated with this behavior (e.g., more conflicts with the parents or emotion regulation through digital media use). In their scoping review, Wang et al. (2023) differentiated between effects in four different areas: (I) physical health, (II) psychosocial development, (III) problematic behaviors, and (VI) cognitive development. In the (I) physical health area, for example, adiposity (e.g., Collings et al. 2018) and reduced physical activity (e.g., Sijtsma et al. 2015) were found to be associated with increased digital media use in preschool children. In the (II) psychosocial development area, for instance, Zhao et al. (2018) reported lower psychosocial well-being related to increased digital media use (labelled as "excessive screen exposure" by these authors). Concerning (III) problematic behaviors, for example, Lin et al. (2020) observed that toddlers with increased digital media use "...were more likely to have emotional problems, anxious/depressive symptoms, somatic complaints, social withdrawal symptoms, attention problems, and aggressive behaviors..." (p. 2). Regarding (VI) cognitive development, studies have shown more heterogeneous findings, for example, with regard to language development. For instance, Hutton et al. (2020) found that screen-based media use was related to lower language and literacy skills, while Lin et al. (2020) observed no language delay in preschool children.

In summary, the available findings tend to show that increased digital media use in preschool children is associated with poorer physical health, more problems in psychosocial development, and more internalizing and externalizing problems. Concerning cognitive development, the published results are more heterogeneous. In view of these empirical findings and the effects on child development, it seems important to be able to identify increased digital media use at an early stage. To date, however, there are very few specific approaches for preschool children.

For the broader age group of 0- to 18-year-olds, Kardefelt-Winther (2017) reported further findings in his review on the impacts of time spent using digital technology. According to Kardefelt-Winther (2017) the impact of digital technology is "...largely inconclusive..." concerning physical activity (p. 3) but seems to be beneficial for children's social relationships" (p. 3). Furthermore, Kardefelt-Winther (2017) emphasized that most of the available

findings were based on cross-sectional studies, "...which means that they cannot establish what is cause and effect" (p. 14).

Basically, for all age groups, problematic use of video games (called "Internet gaming disorder") in the past year was included as a research diagnosis in the appendix of the DSM-5 (American Psychiatric Association 2013). Furthermore, the ICD-11 incorporates a comparable diagnosis named "gaming disorder" under the new category "Disorders due to addictive behaviors", alongside pathological gambling ("gambling disorder") (WHO 2020). The DSM-5 criteria for Internet gaming disorder are (A) mental preoccupation, (B) withdrawal symptoms, (C) development of tolerance, (D) loss of control, (E) loss of interest in other activities, (F) continuation despite psychosocial consequences, (G) deception of others, (H) dysfunctional coping, and (I) risks or losses (e.g., Wartberg et al. 2023). The ICD-11 criteria for gaming disorder are impaired control; increasing priority, to the extent that gaming takes precedence over other life interests and daily activities; and the continuation or escalation of gaming despite the occurrence of negative consequences (WHO 2020). In addition, the behavior must result in marked distress or a significant impairment in personal, family, social, educational, occupational, or other important areas of functioning (WHO 2020). These criteria relate exclusively to the use of video games and do not encompass other forms of digital media use (such as video portals).

As previously mentioned, these diagnostic criteria apply to all age groups, i.e., for children as well as for adolescents and adults. However, there are several difficulties in utilizing this complete set of DSM-5 or ICD-11 criteria, especially in diagnostics for younger children of preschool age. Most preschool children do not have their own digital devices such as smartphones or game consoles (e.g., Kieninger et al. 2021). Typically, devices that are available in the household are used by preschool children for certain limited time periods, as permitted by their parents. However, the diagnostic criteria mentioned above often presuppose self-directed use of digital media, such as video games. In the past, extended media usage times (e.g., exceeding the recommendations of the WHO) were often used as a diagnostic approach to detect increased digital media use in preschool children (see for example the listing in tabular form in Wu et al. 2023).

The first questionnaires are now available to alternatively assess increased digital media use (e.g., the ScreenQ by Hutton et al. 2020) or their potential effects (e.g., the MBQ-C for movement behaviors, Trost et al. 2024), but a short, very time-efficient screening instrument is still lacking. The aim of the present survey was to evaluate a brief, newly developed instrument that is mainly based on a parental rating of the age-appropriate criteria of the DSM-5 to explore increased digital media use in preschool children. The new screening tool has been named the IDMUQ (an abbreviation for "Increased Digital Media Use Questionnaire"). The IDMUQ is intended to serve as a very short screening instrument for example for pediatricians and psychologists. We examined the following research questions:

Research Question 1: What is the factor structure of the IDMUQ?
Research Question 2: What is the reliability of the IDMUQ?
Research Question 3: Is there empirical evidence for the validity of the IDMUQ?

2. Materials and Methods

2.1. Procedure

In the present study, we had investigated two different samples of parents. The first sample was recruited during a pediatric check-up in 19 pediatric and adolescent practices (referred to as sample PP in the following) in two federal states in Germany between September 2020 and June 2022. The second sample was recruited in 81 day-care centers (sample DC) in two German federal states between January and October 2021. The inclusion criteria for data collection in both samples were that the respondent was a parent and, as a participant in the survey, had sufficient language skills to answer the standardized questionnaire. Informed consent was collected in a tablet-based format in sample PP and a paper-based format in sample DC. The Psychological Ethics Committee at the Centre

for Psychosocial Medicine at the University Medical Center Hamburg-Eppendorf (ethical approval code: LPEK-0117) and the Ethics Committee of the University of Lübeck (ethical approval code: 20-310) approved this study.

2.2. Measures

To survey increased digital media use in preschool children, we developed the IDMUQ as a new, short measuring tool. The IDMUQ is based on a parental rating and consists of four items with a five-level response format (0 = "never", 1 = "seldom", 2 = "sometimes", 3 = "often", 4 = "very often"). Three of the four IDMUQ items are based on DSM-5 criteria for recording Internet gaming disorder in all age groups. The corresponding DSM-5 criteria refer to three aspects: development of tolerance, withdrawal symptoms, and dysfunctional coping (American Psychiatric Association 2013). In addition, the fourth question surveys parent-child conflicts regarding the digital media use of the child. Interpersonal conflicts are included in theoretical models of the development of addiction or addictive behavior, e.g., in Griffiths' components model of addiction (Griffiths 2005). Three out of four item formulations were already used in the past as part of the Parental version of the Young Diagnostic Questionnaire (PYDQ, Wartberg et al. 2016), an instrument to record parents' evaluation of their child's problematic Internet use (e.g., Chemnad et al. 2023). The wording of all four questions of the IDMUQ was adapted for parental assessments of digital media use of preschool children, and the response format was changed (compared to the PYDQ). An IDMUQ sum value (range: 0 to 16) can be calculated for the four questions, and a higher sum indicates a higher level of increased digital media use of the child (according to her/his parent). The findings of the psychometric evaluation of the IDMUQ (e.g., reliability coefficients) are presented in detail in the results section of this manuscript. Furthermore, the average daily digital media screen time for the child (according to the parent) was recorded as a usual measure to assess increased use.

In addition, self-assessed parental problematic Internet use was explored with the Short Compulsive Internet Use Scale (Short CIUS, Besser et al. 2017). The Short CIUS is an abbreviated version of the widely used Compulsive Internet Use Scale (Meerkerk et al. 2009), which has shown good psychometric parameters in its German translation (e.g., Wartberg et al. 2014). The Short CIUS comprises five questions with a five-level response format (0 = "never", 1 = "seldom", 2 = "sometimes", 3 = "often", 4 = "very often"). A total score can be determined by summing the answers to the five Short CIUS items (range: 0 to 20). A higher score indicates more pronounced problematic Internet use by the parent. The reliability coefficients (Cronbach's alpha values) of the Short CIUS were 0.70 (in sample PP) and 0.78 (in sample DC).

Furthermore, self-assessed stress in parenting children was explored with the German version ("Eltern-Belastungs-Inventar", EBI, Tröster 2010) of the established Parenting Stress Index (PSI). The EBI consists of 48 items with a five-level response format (1 = "does not apply at all", 2 = "tends not to apply", 3 = "not sure", 4 = "tends to apply", 5 = "applies exactly"). Twelve scales can be formed from the 48 questions. Each scale of the EBI comprises four items. Five of these scales ("hyperactivity/distractibility", "mood", "acceptability", "demand", and "adaptability") survey sources of parental stress based on the child's behavior (Tröster 2010). These five scales of the EBI are as follows: (I) hyperactivity/distractibility measures an overactive and attention-disordered behavior of the child, (II) mood records a negative emotional state of the child, (III) acceptability describes the discrepancy between parental expectations and the child's behavior or characteristics, (IV) demand examines the direct stress placed on the parent by the child, and (V) adaptability captures the child's (lack of) ability to adapt to changes in (everyday) life (Tröster 2010). The other seven scales [(parental) "attachment", "social isolation", (doubts about) "parental competence", "depression", "health", "personal restriction", and "partner relationship"] investigate impairments in parental areas of functioning (Tröster 2010). These seven scales of the EBI are as follows: (VI) attachment surveys the willingness to empathize with the child and to perceive and meet their needs, (VII) social isolation measures limited availability of social support,

(VIII) parental competence records the parent's doubts about their ability to cope with the tasks involved in raising and caring for their child, (IX) depression captures depressive cognitions and emotions experienced by the parent, (X) health examines limitations in the parent's physical and mental capacity, (XI) personal restriction investigates restrictions on personal lifestyle due to the obligations associated with the role of parent, and (XII) partner relationship collects the changes in the partnership due to parenthood. In each scale of the EBI, a higher value indicates more pronounced parental strain. The reliability coefficients (Cronbach's alpha values) in sample DC were as follows: (I) hyperactivity/distractibility: 0.72; (II) mood: 0.81; (III) acceptability: 0.52; (IV) demand: 0.76; (V) adaptability: 0.78; (VI) attachment: 0.71; (VII) social isolation: 0.70; (VIII) parental competence: 0.80; (IX) depression: 0.75; (X) health: 0.73; (XI) personal restriction: 0.83; and (XII) partner relationship: 0.75 (the EBI was not utilized in sample PP). Additionally, information was collected on sociodemographic aspects. Furthermore, self-perceived socioeconomic status (SES) was assessed (but in only in sample DC).

2.3. Sample Description

Sample PP comprised 341 parents, and sample DC consisted of another 809 parents. The mean age of sample PP was 35.89 years (SD = 5.21 years; the parents were aged between 21 to 59 years). The average age of sample DC was 36.90 years (SD = 4.87 years; range: 20 to 53 years). Sample PP comprised 85.9% mothers, 13.2% fathers, and 0.9% other persons. In sample DC, 81.4% of the questionnaires were completed by mothers, 12.5% by fathers, 5.9% jointly by mothers and fathers, and 0.3% by other persons.

In sample PP, 42.2% of the children were female and 57.8% male. In sample DC, 47.1% of the children were girls and 52.9% boys. The mean age of the children in sample PP was 3.77 years (SD = 1.06 years), and in sample DC, the mean age was 44.76 months (SD = 13.68 months). In sample DC, the SES of the parents was 6.90 (SD = 1.57) out of 10.

2.4. Statistical Analyses

Mean values, standard deviations, and frequencies were calculated to describe sample PP and sample DC. To explore the psychometric properties of the IDMUQ, reliability and correlation analyses were also computed in both samples. In sample PP, Bartlett's test of sphericity, the Kaiser–Meyer–Olkin test of sampling adequacy, and an exploratory factor analysis or EFA (principal component analysis) were conducted. In sample DC, a confirmatory factor analysis or CFA was calculated, using the maximum likelihood (ML) estimation procedure. To assess the global goodness of-fit of the CFA model, the normed χ^2 index, the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), the comparative fit index (CFI), and the Tucker–Lewis index (TLI) were explored. Additionally, standardized factor loadings were investigated as local parameters of model fit in the CFA. Most of the calculations described above were conducted with SPSS (version 27.0, IBM, 2020, New York, NY, USA), whereas the confirmatory factor analysis was performed with Mplus (version 8.10, Muthén and Muthén 2017).

3. Results

3.1. Descriptive Statistics for the IDMUQ

The average total score on the IDMUQ was 5.97 points (SD = 3.22; range: 0 to 16 points) in sample PP and 5.28 points (SD = 3.62; range was also 0 to 16 points) in sample DC.

3.2. Factor Structure of the IDMUQ (Research Question 1)

In sample PP, the requirements for exploratory factor analysis (EFA) were examined. We observed a statistically significant result for Bartlett's test of sphericity ($p < 0.001$), and the value for the Kaiser–Meyer–Olkin test of sampling adequacy (KMO) was 0.74 [according to Backhaus et al. (2021), the KMO value should be at least 0.50]. The anti-image correlation matrix is presented in Table 1. These results show that the data are suitable for a principal component analysis (e.g., Beavers et al. 2013). Considering the eigenvalues

(Kaiser criterion method) as well as Cattell's scree plot and the percent of variance extracted, a single-factor solution for the IDMUQ was retained. This single factor explained 56.94% of the variance and had an eigenvalue of 2.28 (the next three eigenvalues were 0.76, 0.57, and 0.39). The factor loadings of the four items varied between 0.60 and 0.84 on the factor (see Table 2 for the wording of the items and the loadings).

As results of the confirmatory factor analysis (CFA) in sample DC, we obtained values of 0.363 ($\chi^2 = 0.725$, df = 2, $p = 0.696$) for the normed χ^2 index, 0.000 for the RMSEA (90% confidence interval: 0.000 to 0.054), 0.003 for the SRMR, and 1.000 each for the CFI and the TLI. These observed values for the global goodness of fit (the RMSEA, the SRMR, the CFI, and the TLI), reached the cut-off values for a good model fit suggested by Hu and Bentler (1999, RMSEA $\leq$ 0.06, SRMR $\leq$ 0.08, CFI $\geq$ 0.95, and TLI $\geq$ 0.95). The standardized factor loadings (local parameters of the model fit) ranged between 0.63 and 0.86 (see also Table 2). Thus, the values found in the calculated CFA confirm the findings of the EFA concerning the single-factor structure of the instrument. To summarize, both the results of EFA and CFA support a one-dimensional structure of the IDMUQ.

Table 1. Anti-image correlation matrix for sample PP.

Item	1	2	3	4
(1) IDMUQ Item 1	0.77			
(2) IDMUQ Item 2	−0.35	0.69		
(3) IDMUQ Item 3	−0.14	−0.16	0.85	
(4) IDMUQ Item 4	−0.17	−0.44	−0.10	0.73

Table 2. Items and factor loadings for the IDMUQ.

Item Number	Wording	German Wording	Factor Loadings in Sample PP [a]	Factor Loadings in Sample DC [b]
	Here are some questions about your child's current media use. This concerns your child's use of all digital media (online services, television, video games etc.).	Jetzt folgen einige Fragen zur aktuellen Mediennutzung Ihres Kindes. Dabei geht es um die Nutzung aller digitaler Medien (Online-Angebote, Fernsehen, Computerspiele etc.) durch Ihr Kind.		
IDMUQ Item 1	Do you have the feeling that your child wants to spend more and more time using digital media in order to be satisfied?	Haben Sie das Gefühl, dass Ihr Kind zunehmend mehr Zeit mit der Nutzung digitaler Medien verbringen möchte, um zufrieden zu sein?	0.77	0.82
IDMUQ Item 2	Does your child feel restless, moody, depressed or irritable when you try to reduce their digital media use?	Fühlt sich Ihr Kind ruhelos, launisch, niedergeschlagen oder gereizt, wenn Sie versuchen, die Nutzung digitaler Medien zu vermindern?	0.84	0.86
IDMUQ Item 3	Does your child demand the use of digital media to put an end to a bad mood (e.g., dejection, anger)?	Fordert Ihr Kind die Nutzung digitaler Medien ein, um schlechte Stimmung (z.B. Niedergeschlagenheit, Ärger) zu beenden?	0.60	0.63
IDMUQ Item 4	Do conflicts exist between you and your child about the use of digital media?	Gibt es Konflikte zwischen Ihnen und Ihrem Kind wegen der Nutzung digitaler Medien?	0.79	0.81

Note. [a] results of the exploratory factor analysis (EFA); [b] = results of the confirmatory factor analysis (CFA).

3.3. Reliability of the IDMUQ (Research Question 2)

In sample PP, we observed a reliability coefficient (Cronbach's alpha) of 0.74. In sample DC, Cronbach's alpha was 0.86. In summary, based on the empirical findings, the internal consistency of the IDMUQ can be described as sufficient to good (e.g., Danner 2015).

3.4. Criterion Validity of the IDMUQ (Research Question 3)

In both samples, we found statistically significant correlations between the total value of the IDMUQ and the digital media screen time of the child (sample PP: r = 0.16, *p* = 0.004 and sample DC: r = 0.27, *p* < 0.001). The correlation coefficients between the sum value of the IDMUQ and parental problematic Internet use were 0.34 (*p* < 0.001, sample PP) and 0.28 (*p* < 0.001, sample DC). These empirical results can be interpreted as first indications of criterion validity for the IDMUQ.

3.5. Further Correlations with Other Measures

Further, we observed statistically significant correlations between the total value of the IDMUQ and hyperactivity/distractibility (r = 0.26, *p* < 0.001), mood (r = 0.33, *p* < 0.001), acceptability (r = 0.26, *p* < 0.001), demand (r = 0.28, *p* < 0.001), adaptability (r = 0.36, *p* < 0.001), attachment (r = 0.20, *p* < 0.001), social isolation (r = 0.25, *p* < 0.001), parental competence (r = 0.25, *p* < 0.001), depression (r = 0.24, *p* < 0.001), health (r = 0.26, *p* < 0.001), personal restriction (r = 0.24, *p* < 0.001), and partner relationship (r = 0.19, *p* < 0.001). In summary, increased digital media use in preschool children was consistently associated with more problems in parenting.

4. Discussion

The aim of the present study was to investigate the psychometric properties of the IDMUQ, a new instrument to measure increased digital media use in preschool children. Today, children are already gaining digital experience (e.g., Huber et al. 2018) at preschool age and can learn how to use digital media appropriately early in their lives. However, it is also conceivable that preschool children will develop increased digital media use, and it cannot be ruled out that the foundation for problematic use in the sense of a gaming disorder (WHO 2020) may be laid at this time. That makes it all the more relevant to be able to detect potentially problematic trajectories of digital media use at an early stage, because according to the current review by Wang et al. (2023), these are associated with poorer physical health, more problems in psychosocial development, and more internalizing and externalizing problems. In the past, the recommendations of the WHO (2019) concerning screen time were often used to determine increased digital media use in this age group.

The approach chosen here was to utilize only the most suitable criteria for preschool children for recording Internet gaming disorder from the DSM-5 (American Psychiatric Association 2013) and to adapt them linguistically general for digital media use so that a parent assessment can be collected. In our estimation, the other diagnostic criteria of the DSM-5 and ICD-11 for recording gaming disorder (WHO 2020) presuppose self-determined use, which is usually not the case in this age group, as parents primarily grant or limit access times to digital media for preschool children. In the past, other authors have already proposed diagnostic criteria that go beyond the recording of pure screen usage times. For example, in 2020 Hutton and colleagues suggested an interesting instrument called ScreenQ consisting of 15 Items. As far as we know, however, there was no screening instrument available based on an established classification system (DSM-5) and comparable to the IDMUQ, which, with its four items, can be used in an extremely time-efficient manner in routine pediatric and psychological care.

The empirical test showed promising psychometric properties for the IDMUQ in two different samples of parents. Both in the exploratory factor analysis in one sample and in the confirmatory factor analysis in another sample, a one-dimensional factor structure was found for the new instrument. Thus, one-dimensionality can be assumed for the IDMUQ. According to Danner (2015), the reliability coefficients in the two samples (0.74 and 0.86) are estimated to be between sufficient and good. First indications of criterion validity were observed for the IDMUQ (statistically significant associations with the screen time of the children and with parental problematic Internet use). Positive relationships between parents' and children's problematic use of digital media or Internet applications have already been shown empirically in several investigations (see e.g., Lam and Wong 2015),

albeit for older children and adolescents. Of course, further psychometric tests are necessary for the IDMUQ, but the initial empirical results speak in favor of the further use of the new instrument.

The present survey has several limitations. The data were collected in pediatric and adolescent practices as well as day-care centers. Therefore, parents who did not visit a pediatric and adolescent practices or have their child cared for in day-care centers during the data collection period could not be reached. The surveys were conducted in two out of 16 German federal states. It cannot be ruled out that data collection in all German federal states (e.g., an investigation of a representative sample of parents) would have led to different results. Accordingly, it is unclear to what extent the reported findings can be generalized. The IDMUQ has thus far only been utilized in Germany, and psychometric evaluations of translations of the instrument in other countries are pending. A cut-off value for the IDMUQ has not yet been determined, as the psychometric quality (as reported in detail in this manuscript) should be determined first. A cut-off value for the IDMUQ cannot simply be determined by using another measuring instrument in parallel (as there is currently no gold standard for surveying increased digital media use in children). An alternative solution for determining a cut-off value could be a latent profile analysis; this approach has already been used in the form of a latent class analysis for parent assessments of their children's problematic Internet use (Wartberg et al. 2017). Thus far, only cross-sectional data on the IDMUQ has been collected, such that no causal conclusions can be drawn. It is very likely that various other aspects have a relevant influence on increased digital media use in preschool children, such as content, social and cultural environment (e.g., Kardefelt-Winther 2017), or self-regulation, which have not all been surveyed but should be taken into account in the future. According to Chaudron et al. (2018), parental characteristics also play an important role in the digital media use of their preschool children, including both the parents' general attitudes towards digital technologies, but fathers, for example, often teach their children a different way of dealing with digital media than mothers do. These parental factors should be given greater consideration in the future.

5. Conclusions

Despite the above-mentioned limitations, the findings of the present survey indicate that the IDMUQ, with its four items, is a promising new measuring tool. If the observed psychometric properties for the IDMUQ can be empirically confirmed in further studies, this would provide an instrument that would allow extremely time-efficient screening for increased digital media use in preschool children (e.g., in early care centers or pediatric practices), requiring just a few minutes to complete. Parents may also be concerned about the digital media use of their preschool child, and the IDMUQ could provide an initial classification or severity assessment. If there are indications in the screening that the children are already using digital media excessively in their first years of life, early intervention could be made (for example, through a psychoeducational talk by a pediatrician or a psychologist, by giving the parents a brochure, or by referring them to information services on the Internet). As the parents have a major influence on digital media usage by preschool children (as described above), it is easier to initiate changes in this area in this age group than, for example, in teenagers. Since the parents are usually linked to pediatric and adolescent practices for many years, ongoing monitoring of the child's digital media use could continue to take place at follow-up examinations with little effort. If there is a greater need in the future, the parents could be referred to further services, such as counseling centers or outpatient psychotherapy. Due to its brevity, the IDMUQ could be applied in national population studies in which digital media use needs to be economically measured at an early stage.

Author Contributions: Conceptualization, L.W.; methodology, L.W.; software, L.W.; validation, L.W.; formal analysis, L.W.; investigation, H.S., I.M., S.W. and S.P.; resources, S.P.; data curation, H.S. and S.P.; writing—original draft preparation, L.W.; writing—review and editing, H.S., I.M., S.W. and S.P.;

References

American Psychiatric Association. 2013. *Diagnostic and Statistical Manual of Mental Disorders, DSM-5*, 5th ed. Washington, DC: American Psychiatric Publishing.

Backhaus, Klaus, Bernd Erichson, Sonja Gensler, Rolf Weiber, and Thomas Weiber. 2021. *Multivariate Analysemethoden. Eine anwendungsorientierte Einführung [Multivariate Analysis Methods. An Application-Oriented Introduction]*, 16th ed. Wiesbaden: Springer.

Beavers, Amy S., John W. Lounsbury, Jennifer K. Richards, Schuyler W. Huck, Gary J. Skolits, and Shelley L. Esquivel. 2013. Practical considerations for using exploratory factor analysis in educational research. *Practical Assessment, Research, and Evaluation* 18: 6. [CrossRef]

Besser, Bettina, Hans-Jürgen Rumpf, Anja Bischof, Gert-Jan Meerkerk, Susumu Higuchi, and Gallus Bischof. 2017. Internet-related disorders: Development of the short compulsive internet use scale. *Cyberpsychology, Behavior, and Social Networking* 20: 709–17. [CrossRef]

Chaudron, Stephane, Rosanna Di Gioia, and Monica Gemo. 2018. *Young Children (0–8) and Digital Technology—A Qualitative Study across Europe*. Luxembourg: Publications Office of the European Union. [CrossRef]

Chemnad, Khansa, Sameha Alshakhsi, Sanaa Al-Harahsheh, Azza O. Abdelmoneium, Maryam S. Al-Khalaf, Ahmed Baghdady, and Raian Ali. 2023. Is it contagious? Does parents' Internet addiction impact their adolescents' Internet addiction? *Social Science Computer Review* 41: 1691–711. [CrossRef]

Collings, Paul J., Brian Kelly, Jane West, and John Wright. 2018. Associations of TV viewing duration, meals and snacks eaten when watching TV, and a TV in the bedroom with child adiposity. *Obesity* 26: 1619–28. [CrossRef]

Danner, Daniel. 2015. *Reliabilität—Die Genauigkeit Einer Messung [Reliability—The Accuracy of a Measurement]*. Mannheim: GESIS-Leibniz-Institut für Sozialwissenschaften. [CrossRef]

Deutsche Gesellschaft für Kinder- und Jugendmedizin e.V. (DGKJ). 2023. *Leitlinie zur Prävention dysregulierten Bildschirmmediengebrauchs in Kindheit und Jugend [Guideline for the Prevention of Dysregulated Screen Media Use in Childhood and Adolescence]*. AWMF Registry No. 027-075. Available online: https://register.awmf.org/de/leitlinien/detail/027-075 (accessed on 21 July 2024).

German Federal Centre for Health Education. 2019. *Digitale Medien mit Augenmaß nutzen [Using Digital Media with a Sense of Proportion]*. Cologne: German Federal Centre for Health Education.

Griffiths, Mark. 2005. A 'components' model of addiction within a biopsychosocial framework. *Journal of Substance Use* 10: 191–97. [CrossRef]

Hu, Li-tze, and Peter M. Bentler. 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal* 6: 1–55. [CrossRef]

Huber, Brittany, Kate Highfield, and Jordy Kaufman. 2018. Detailing the digital experience: Parent reports of children's media use in the home learning environment. *British Journal of Educational Technology* 49: 821–33. [CrossRef]

Hutton, John S., Guixia Huang, Rashmi D. Sahay, Thomas DeWitt, and Richard F. Ittenbach. 2020. A novel, composite measure of screen-based media use in young children (ScreenQ) and associations with parenting practices and cognitive abilities. *Pediatric Research* 87: 1211–18. [CrossRef]

Kardefelt-Winther, Daniel. 2017. *How Does the Time Children Spend Using Digital Technology Impact Their Mental Well-Being, Social Relationships and Physical Activity? An Evidence-Focused Literature Review*. Innocenti Discussion Paper 2017-02. Florence: UNICEF Office of Research—Innocenti.

Kieninger, Julia, Sabine Feierabend, Thomas Rathgeb, Hediye Kheredmand, and Stephan Glöckler. 2021. *miniKIM-Studie 2020: Kleinkinder und Medien—Basisuntersuchung zum Medienumgang von Kleinkindern in Deutschland [miniKIM study 2020: Toddlers and Media—Basic Study on Media Use by Young Children in Germany]*. Stuttgart: Medienpädagogischer Forschungsverbund Südwest.

Lam, Lawrence T., and Emmy M. Y. Wong. 2015. Stress moderates the relationship between problematic Internet use by parents and problematic Internet use by adolescents. *Journal of Adolescent Health* 56: 300–6. [CrossRef]

Lin, Han-Pin, Kuan-Lin Chen, Willy Chou, Kuo-Shu Yuan, Shih-Yin Yen, Yu-Shao Chen, and Julie Chi Chow. 2020. Prolonged touch screen device usage is associated with emotional and behavioral problems, but not language delay, in toddlers. *Infant Behavior and Development* 58: 101424. [CrossRef]

Meerkerk, Gert-Jan, Regina Van Den Eijnden, Ad A. Vermulst, and Henk F. Garretsen. 2009. The Compulsive Internet Use Scale (CIUS): Some Psychometric Properties. *Cyberpsychology & Behavior* 12: 1–6. [CrossRef]

Muthén, Linda K., and Bengt O. Muthén. 2017. *Mplus User's Guide*, 8th ed. Los Angeles: Muthén & Muthén.

Rathgeb, Thomas. 2024. Erste Ergebnisse der miniKIM- Studie 2023: Kleinkinder und Medien—Basisuntersuchung zum Medienumgang von Kleinkindern in Deutschland [First results of the miniKIM study 2023: Toddlers and media—Basic study on media use by young children in Germany]. Paper presented at Fachkongress Frühkindliche Medienbildung [Early Childhood Media Education Congress], Berlin, Germany, April 26.

Sijtsma, Anna, Marjory Koller, Pieter J. J. Sauer, and Eva Corpeleijn. 2015. Television, sleep, outdoor play and BMI in young children: The GECKO Drenthe cohort. *European Journal of Pediatrics* 174: 631–39. [CrossRef]

Trost, Stewart G., Caroline O. Terranova, Denise S. K. Brookes, Li Kheng Chai, and Rebecca A. Byrne. 2024. Reliability and validity of rapid assessment tools for measuring 24-hour movement behaviours in children aged 0–5 years: The Movement Behaviour Questionnaire Baby (MBQ-B) and child (MBQ-C). *International Journal of Behavioral Nutrition and Physical Activity* 21: 43. [CrossRef]

Tröster, Heinrich. 2010. *Eltern-Belastungs-Inventar—EBI. Deutsche Version des Parenting Stress Index (PSI) von R. R. Abidin [Eltern-Belastungs-Inventar—EBI. German Version of the Parenting Stress Index (PSI) by R. R. Abidin]*. Goettingen: Hogrefe.

Wang, Chenggong, Haoyue Qian, Hui Li, and Dandan Wu. 2023. The status quo, contributors, consequences and models of digital overuse/problematic use in preschoolers: A scoping review. *Frontiers in Psychology* 14: 1049102. [CrossRef]

Wartberg, Lutz, Carolin Spindler, Sophia Berber, Katrin Potzel, and Rudolf Kammerl. 2023. A Four-Item Questionnaire to Measure Problematic Social Media Use: The Social Media Disorder Test. *Behavioral Sciences* 13: 980. [CrossRef] [PubMed]

Wartberg, Lutz, Kay-Uwe Petersen, Rudolf Kammerl, Moritz Rosenkranz, and Rainer Thomasius. 2014. Psychometric validation of a German version of the compulsive Internet use scale. *Cyberpsychology, Behavior, and Social Networking* 17: 99–103. [CrossRef] [PubMed]

Wartberg, Lutz, Levente Kriston, Katharina Kegel, and Rainer Thomasius. 2016. Adaptation and psychometric evaluation of the Young Diagnostic Questionnaire (YDQ) for parental assessment of adolescent problematic Internet use. *Journal of Behavioral Addictions* 5: 311–17. [CrossRef] [PubMed]

Wartberg, Lutz, Levente Kriston, Katharina Kegel, Sonja Bröning, and Rainer Thomasius. 2017. Adolescent problematic Internet use: Is a parental rating suitable to estimate prevalence and identify familial correlates? *Computers in Human Behavior* 67: 233–39. [CrossRef]

Wartberg, Lutz, Matthias Zieglmeier, and Rudolf Kammerl. 2021. An empirical exploration of longitudinal predictors for problematic Internet use and problematic gaming behavior. *Psychological Reports* 124: 543–54. [CrossRef]

Werling, Anna Maria, Sajiv Kuzhippallil, Sophie Emery, Susanne Walitza, and Renate Drechsler. 2022. Problematic use of digital media in children and adolescents with a diagnosis of attention-deficit/hyperactivity disorder compared to controls. A meta-analysis. *Journal of Behavioral Addictions* 11: 305–25. [CrossRef]

World Health Organization (WHO). 2019. *Guidelines on Physical Activity, Sedentary Behaviour and Sleep for Children under 5 Years of Age*. Geneva: World Health Organization.

World Health Organization (WHO). 2020. Addictive Behaviours: Gaming Disorder. Available online: https://www.who.int/news-room/questions-and-answers/item/addictive-behaviours-gaming-disorder (accessed on 21 July 2024).

Wu, Dandan, Xinyi Dong, Danqing Liu, and Hui Li. 2023. How Early Digital Experience Shapes Young Brains During 0–12 Years: A Scoping Review. *Early Education and Development* 35: 1395–431. [CrossRef]

Zhao, Jin, Zhang, Yunting Zhang, Fan Jiang, Patrick Ip, Frederick Ka Wing Ho, Yuning Zhang, and Hong Huang. 2018. Excessive screen time and psychosocial well-being: The mediating role of body mass index, sleep duration, and parent-child interaction. *The Journal of Pediatrics* 202: 157–62. [CrossRef] [PubMed]