

Digital Media Use in 0–5-Year-Old Children in Switzerland

Jalisse Schmid^{1,2*}, Eva Unternaehrer^{†2*}, Eleonora Benecchi³, Jael Bernath⁴,
Margarete Bolten⁵, Carine Burkhardt Bossi⁶, Karina Iskrzycki⁶, Petra Mazzoni³, Olivier
Steiner⁷, Fabio Sticca⁸⁺, and Nevena Dimitrova¹⁺

¹ University of Applied Sciences and Arts Western Switzerland, Faculty of Social Work,
Lausanne, Switzerland (HETSL | HES-SO)

² Child and Adolescent Psychiatric Research Department, University Psychiatric
Clinics Basel (UPK), University of Basel, Basel, Switzerland

³ Institute of Media and Journalism, Università della Svizzera italiana (USI), Lugano,
Switzerland

⁴ Zurich University of Applied Sciences (ZHAW), Zurich, Switzerland

⁵ Luzerner Psychiatrie AG, Clinic for Child and Adolescent Psychiatry and Children's
Hospital of Central Switzerland (KidZ), Luzern, Switzerland

⁶ University of Teacher Education Thurgau (PHTG), Thurgau, Switzerland

⁷ University of Applied Sciences and Arts Northwestern Switzerland (FHNW), Muttens,
Switzerland

⁸ University of Teacher Education in Special Needs (HfH), Zurich, Switzerland

*shared first authorship

+shared last authorship

[†]Corresponding Author:

Eva Unternaehrer
Child and Adolescent Psychiatric Research Department
University Psychiatric Clinics Basel (UPK)
Wilhelm Klein-Strasse 27
4002 Basel, Switzerland
eva.unternaehrer@unibas.ch

Digital Media Use in 0–5-Year-Old Children in Switzerland

Abstract

This study aimed to characterize digital media (DM) use in Swiss children aged 0 to 5 years, focusing on child access to different types of digital devices, duration of use, as well as the content and context of screen use.

A sample of 4'173 parents living in Switzerland with at least one child aged 0 to 5 years ($M = 38.4$ months, $SD=17.2$ months) completed a cross-sectional online survey between February 2023 and May 2024. To reach a socio-economically diverse sample, we also collaborated with family support organizations and a panel platform. The survey encompassed demographics, accessibility of DM devices, duration of DM activities, content characteristics, and contextual circumstances of DM use.

Results suggest that on average, children aged 0 to 5 spent 71.5 ($SD = 75.7$) minutes daily with DM, with higher use reported as the child gets older. Approximately half of the duration of DM use consisted of non-screen-based activities, such as listening to audio. Regarding the type of devices, handheld devices such as smartphones and tablets were most dominant, while TV use was comparably limited. Parents reported prioritizing age-appropriate and entertaining content, with common motivations for child screen use including educational purposes, having time for oneself or other tasks, and calming the child.

Findings allow to compare DM use of Swiss preschoolers relative to results from other countries, highlighting that preschooler's DM use in Switzerland generally follows official recommendations.

Keywords: childhood, digital media, preschoolers, screen use, Switzerland, toddlers

Introduction

The advent of digital technology has transformed the way in which children interact with the world. Indeed, the prevalence of digital media (DM) usage among young children is a topic of growing concern in families and early childhood professionals. Thus, it is essential to understand how children under the age of five engage with DM. Research efforts in many countries have yielded data on the prevalence of DM use in young children but, to date, such data is lacking for Switzerland. However, understanding how preschoolers use DM is crucial for establishing baseline knowledge needed for understanding developmental contexts, shaping parental guidance, addressing equity issues, and tailoring interventions.

Because DM use among young children is a complex and multifaceted phenomenon (Reid Chassiakos et al., 2016), it is crucial to research conceptual models that can depict the complexity of family DM dynamics. The Dynamic, Relational, Ecological Approach to Media Effects Research (DREAMER) framework highlights a new approach to explore the family media ecology as dynamic interactions between context, content, and relational factors shaping the experiences of children's media consumption (Barr et al., 2024). Thus, we not only assessed duration of screen-based and non-screen-based DM activities, but also accessibility to different digital devices in the household, characteristics of the content (e.g., age-appropriateness), and the context of child DM use (e.g., parental motivations).

Devices

Across most occidental countries, young children have access to a wide range of different DM devices. In the United States, 96% of families with children aged 0 to 8 years own a smartphone and 75% have a tablet (40% of two-year olds children own their own tablet) (Mann et al., 2025). Similarly, in the UK, 98% of families own at least one smartphone, 92% own a (Smart) TV, 82% a laptop, and 81% a tablet (41% of 0-36 months old children have their own tablet) (Flewitt et al., 2024). Comparable trends are observed in continental Europe. In France and Germany, over 90% of households with young children own a smartphone or TV (IPSOS, 2022; Paulus et al., 2024). These statistics demonstrate the almost universal access to DM from a very early age.

Duration of Digital Media Use

To date, one of the most salient measures of DM use is daily DM duration. US children younger than two years spend on average 49 minutes per day on screen-based DM media, while their two-to-four-year-old peers spend 2h08 hours (Mann et al., 2025). Considerably lower durations are reported in European countries: German infants under one year spend seven minutes on screens on average, one-to-two-year-olds spend 14 minutes, two-to-three-year-olds spend 24 minutes, and three-to-four-year olds spend 30 minutes (Paulus et al., 2024). In the French-speaking part of Switzerland zero-to-three-year-olds have an average of 26 minutes of daily screentime (Gillioz, E. et al., 2024).

These findings highlight between-country disparities that might be attributed to cultural variations in attitudes towards DM use in early childhood or the inconsistent ways in which DM duration is defined and measured (Barr et al., 2020). For instance, while some studies focus exclusively on DM use directly by the child (Geurts et al., 2022; Sivrikova et al., 2020), others adopt a broader scope that includes both active use and passive exposure to DM (Gillioz et al., 2024; Latomme et al., 2018) or both screen-based versus non-screen based activities (Paulus et al., 2024). Although assessing daily durations seems pragmatic, it does not account for the multifaceted characteristics of DM use (Barr et al., 2024).

Content of Digital Media

Overall, parents prioritize age-appropriate digital content, with tools and programs tailored to developmental needs (Flewitt et al., 2024; IPSOS, 2022; Paulus et al., 2024; Rideout & Robb, 2020). For instance in the UK, 77% of parents acknowledge the educational value of digital devices (Flewitt et al., 2024). In Germany, much of the content of children's DM activities focuses on music and audiobooks designed for young children's developmental stages (Paulus et al., 2024). Meanwhile, in the USA, video content dominates, with 73% of all screen time devoted to video-streaming platforms (Rideout & Robb, 2020). Content promoting prosocial and problem-solving content is more prevalent in the UK and U.S. than in France and Germany (Flewitt et al., 2024; IPSOS, 2022; Mann et al., 2025; Paulus et al., 2024).

Context of Digital Media Use

DM “context” encompasses a broad range of contextual characteristics that are situated on the familial (e.g., relationship quality or socio-economic situation), and even higher societal levels (e.g., social norms regarding media use). Thereby, parental motivations for child DM use and accompaniment might be particularly relevant. Regarding parental motivations for child DM use, parents primarily indicate letting children use digital devices during transitional moments, such as car rides or meal preparation, to entertain their children, or to keep children calm (Flewitt et al., 2024; IPSOS, 2022; Paulus et al., 2024). While 60% of US parents report daily screen use for entertainment, 50% also recognizing its educational benefits (Rideout & Robb, 2020). Parental accompaniment during media use is common among younger children but declines with age (Flewitt et al., 2024; IPSOS, 2022). The nature of the interaction during joint media engagement varies. In the UK, 53% of parents actively name objects or explain screen content to reinforce learning (Flewitt et al., 2024). In the USA, parents of younger children frequently guide viewing (Rideout & Robb, 2020). In contrast, parental interaction during screen time is minimal in Germany, as screens are predominantly used to calm or occupy children (Paulus et al., 2024).

The Present Study

Because the early use of DM has raised concerns among early childhood professionals, we first need to understand how preschoolers use DM. While other countries have made efforts to measure DM use in early childhood, there has not been a systematic investigation in Switzerland, leaving policymakers dependent on data from other countries. Thus, the aim of this study was to gather data on characteristics of DM use among children aged 0-5 years in Switzerland.

Methods

Sample

A total of 4,173 parents of children aged 0–5 years participated (see Table 1 for demographics). Inclusion criteria were: (1) having a child aged 0–71 months, (2) index

parent being 16–65 years old, (3) residing in Switzerland according to postal code, (4) providing any data on child digital device present or used, and (5) understanding German, French, Italian, or English. Exclusion criteria included: (1) not consenting to participate, (2) giving multiple implausible responses (e.g., partner age older than 90 years, inappropriate open text answers), or (3) suspected duplicate participation. If parents had multiple children in the target age range, they reported on the oldest. See Figure 1 for the participant flowchart.

Table 1

Sociodemographic Information of Sample (N = 4173). Values are expressed as percentages within the geographical location subsample, unless otherwise specified.

Variable	Geographical Location in Switzerland			
	German n=2370	French n=1430	Italian n=373	Total N=4173
First language child ¹				
Swiss German	78.0	3.8	2.1	45.8
German	14.6	2.7	0.8	9.3
French	3.6	87.4	1.6	32.2
Italian	3.1	5.3	94.9	12.1
Romansh	0.4	0.0	0.3	0.3
English	2.1	3.5	1.6	2.5
Other	14.1	13.6	6.7	13.2
Child Gender (n=21 missing)				
Male/Man	52.4	51.0	48.8	51.6
Female/Woman	46.8	48.3	50.9	47.7
Diverse ²	0.3	0.2	0.3	0.3
Prefer not to say	0.5	0.5	0.0	0.4
Parent Gender (n=12 missing)				
Male/Man	18.2	17.4	13.7	17.5
Female/Woman	81.2	81.8	85.3	81.8
Diverse ²	0.1	0.2	0.8	0.2
Prefer not to say	0.5	0.6	0.3	0.5
Child Age (n=2 missing)				
Child Age (Mean ± SD months)	38.9 ± 17.2	38.5 ± 16.9	34.8 ± 18.5	38.4 ± 17.2
<1 year (n=298)	6.7	6.2	13.9	7.1
1-2 years (n=610)	14.3	15.0	15.3	14.6
2-3 years (n=818)	19.5	19.7	19.8	19.6
3-4 years (n=960)	23.4	22.9	20.9	23.0
4-5 years (n=901)	22.1	21.9	17.2	21.6
5-6 years (n=584)	14.0	14.3	12.9	14.0
Parental Age (n=4 missing)				
Parent Age (Mean ± SD years)	36.5 ± 4.8	36 ± 5.1	36.4 ± 5.6	36.3 ± 5
Number of Siblings				
No sibling	43.9	46.2	51.5	45.4
One sibling	43.8	40.9	36.7	42.2
Two siblings	9.9	10.6	11.0	10.2
Three or more siblings	2.4	2.4	0.8	2.3
Parent nationality				
Non-Swiss	20.7	28.4	26.3	23.8
Swiss	79.3	71.6	73.7	76.2
Parent Language				
Swiss German	69.0	3.3	2.9	40.6

Digital Media Use in Swiss Preschoolers

German	16.5	1.8	0.8	10.1
French	3.6	79.6	1.3	29.5
Italian	3.0	5.7	91.4	11.8
English	1.6	1.7	1.1	1.6
Romansh	0.5	0.0	0.0	0.3
Parental Education				
Unknown/missing	0.5	0.4	1.1	0.9
Less than primary school degree	0.7	0.5	1.1	0.6
Primary school degree	2.6	1.7	1.9	2.2
Secondary school degree	17.6	17.1	20.1	17.6
Matura degree ³	20.1	16.5	18.2	18.6
College degree ⁴	23.7	22.8	22.3	23.1
Bachelor's degree ⁵	26.5	32.6	25.2	28.4
Master degree ⁶	7.2	7.9	8.8	7.6
PhD degree	1.1	0.6	1.3	0.9
Parent Employment				
Not employed ⁷	9.7	6.6	17.2	9.3
Unskilled. Salesman ⁸	6.2	4.8	5.6	5.7
Educator, nurse ⁹	25.1	34.5	34.6	29.2
Psychologist, technician ¹⁰	33.0	32.2	19.6	31.5
Senior executive, large business ¹¹	12.8	14.7	6.7	12.9
Unknown	13.2	7.1	16.4	11.4
Parent Work Percentage (n=111 missing)				
no%	9.2	7.1	14.5	8.9
0-49%	20.8	6.8	9.2	14.9
50-100%	70.0	86.2	76.3	76.1
Perception of Financial Situation				
Far below average	3.5	4.2	3.8	3.7
Somewhat below average	10.3	10.7	15.3	10.9
Average	36.0	35.1	48.8	36.8
Somewhat above average	43.7	42.7	25.7	41.7
Far above average	4.8	4.8	3.2	4.6
I prefer not to say/unknown	1.8	2.6	3.2	2.2
Current Partner Status (n=11 missing)				
Biological parent	95.1	92.5	94.9	94.2
Not biological parent	1.5	2.0	2.1	1.7
No partner	3.4	5.5	2.9	4.1

Note: ¹Multiple answers were possible; ²Diverse = non-binary, third gender, gender-fluid, two-spirit, something else; ³Baccalaureate schools, Specialised Baccalaureate, Upper secondary specialised schools, Vocational education and training, Vocational education and training (Apprenticeship), FVB, Federal Vet Diploma; ⁴College of Higher Education Diploma, Universities of Applied Sciences, Universities of Teacher Education, Universities incl. Federal Institutes of Technology; ⁵Bachelor's Degree, College of Higher Education Diploma, Federal Diploma of Higher Education; ⁶Master, Advanced Federal Diploma of Higher Education; ⁷stay-at-home parent, disability insurance, unemployed, temporary, on paid/unpaid leave); ⁸unskilled worker, salesmen/saleswomen, secretary, agricultural worker, service worker, laborer, machine operator and semi-skilled worker, secondary or vocational school student; ⁹educator, nurse, police officer, office and sales worker, primary and secondary school teachers, technician, semi-professional, skilled worker, small business owner (less than CHF 50,000), artisan, sharecropper, foremen, farm manager, small farmer, etc.; ¹⁰psychologist, technician, ETS engineer, physician assistant, manager, minor professional, tertiary educator (university, vocational education), administrator, medium-sized business owner, senior administration, technician, semi-professional, etc.; ¹¹senior executive, large business owner, major professional, liberal profession, physician in private practice, lawyer in private practice, university professor.

Participants were recruited through a combined offline and online strategy to ensure broad outreach across all Swiss cantons. Recruitment materials were available in German, French, Italian, and English. Offline recruitment included mailing printed

flyers to daycare centers, early childhood organizations, municipalities, midwives, and pediatric offices for display. To reach parents with lower educational attainment (a proxy for socio-economic status; (Davis-Kean et al., 2021; Singh et al., 2024), partnerships were established with organizations supporting disadvantaged families, and a Swiss survey company was commissioned. Online recruitment complemented these efforts through targeted emails to daycare directors and early childhood organizations, as well as outreach via Facebook, Instagram, and blogs. Figure 1 provides details on recruitment strategies and exclusions.

- Figure 1: Flowchart of Participants Included for Analysis

Among all families, 85.3% lived in two-parent households, 4.2% in single-parent households, and 17.5% in other arrangements (unknown: 1.2%). Child supervision outside the family was reported by 87.2% of respondents. These children attended daycare (56.3%), kindergarten (18.4%), or were cared for by a nanny/manny (3%). Other supervision sources included relatives (37.1%), day parents (4.9%), or school daycare (8.1%). Regarding health, 2.3% of children had a physical illness (e.g., neurodermatitis), and another 2.3% had developmental delays, most commonly language delays or autism spectrum disorder.

Procedure

SWIPE survey: Most data (89.0%) were collected through an online survey hosted by Qualtrics XM (survey available at <https://osf.io/zwj84>). Parents who were interested in participating in the study accessed the online survey via a link displayed on recruitment materials. Data were collected between February 1, 2023, and May 31, 2024. A welcome page provided the aims of the study, explained what participation in the study consisted of, that the study could be completed anonymously, and gave contact information of the study personnel. Informed consent was requested to proceed to the survey. The first part of the *SWIPE survey* consisted of a core questionnaire that collected demographic information and child DM usage for all participants. The second part was one randomly selected spin-off questionnaire that was assigned to each participant. These spin-off questionnaires were developed to

address specific research questions defined by the SWIPE consortium members (vocabulary skills, non-digital activities, mental wellbeing of the child and/or parent, parental phubbing, parental internet addiction, fandom, parental attitudes towards DM use in the daycare setting, and parental mediation of child DM use). This article presents descriptive data collected from the core questionnaire. Completion of the survey took about 30 minutes, depending on spin-off module.

The study was approved by the Cantonal Ethics Committee Zurich (statement of non-responsibility). Participants were offered to sign up for a lottery to win one of 30 CHF 100 gift vouchers using a second form hosted on a separate Qualtrics XM account.

Short SWIPE survey: To reach more parents with lower educational attainment or low socioeconomic backgrounds, we developed a short version of the SWIPE survey (survey available at <https://osf.io/zwj84>), focusing on the core questionnaire while excluding additional modules. Some questions were simplified from a Likert scale to a yes/no format to encourage participation. This version was translated into the 10 most spoken languages in Switzerland and took approximately 15–20 minutes to complete. It accounted for 11% of the total data collected. Recruitment for the short SWIPE survey followed three channels: 1) Partner Organizations: Early childhood professionals from organizations supporting disadvantaged families conducted paper-pencil interviews with parents during home visits. Completed surveys were then sent to the SWIPE team for data entry; 2) Link Institute: A private Swiss survey company contacted parents via phone and provided a dedicated Qualtrics link; and 3) Online Distribution: Digital flyers with a survey link were shared through various Swiss organizations. Details on data collection sites are provided in Figure 1.

Measures

The core questionnaire included a total of 48 questions divided into two sections: demographic information and child DM use (accessibility of devices, duration, content, and context). The survey was inspired by previous work and was designed by the study personnel to reach the broad aims of this study.

Demographic Information: The survey included 30 questions covering: the responding parent (age, gender, number of children, language, nationality, education,

employment status, work percentage, home office use, weekly working hours at home, and partnership status), the child's other parent (identified by the respondent as the biological parent, current partner, stepparent, or no one), the family (household structure, postal code, financial situation, and household members), and the child (age (in months), gender, siblings, external supervision, height, weight, physical health, developmental or behavioral difficulties, and mother tongue).

Devices: Parents were provided with a list of digital devices and asked to indicate whether each device was present in their household and whether it had been used at least once by their child, giving them also an option to indicate other devices not listed.

Duration: Parents reported their child's engagement in digital media (DM) activities and estimated the average daily time (in minutes) spent on these activities during a typical weekend day. Activities included watching full or short movies, using different app categories, and listening to audio. Responses ranged from 0 to 300 minutes. Parents then indicated whether their child spent more, less, or the same amount of time on DM during weekdays. If they reported a difference, they provided weekday estimates as well. The average daily duration was calculated using the formula: $(\text{weekend} * 2 + \text{weekday} * 5) / 7$. Values for screentime exceeding 480 minutes/day (>8 hours) or cases where parents set maximum screen time to the maximum 300min/day more than three times were considered implausible and set missing (criteria determined during data preprocessing but before data analysis).

Content: Various key aspects of DM content used by the child were also assessed, including age-appropriateness, educational value, entertainment quality, emotional themes, and emotion regulation, prosocial behavior such as helping and collaboration, aggression, problem-solving, cognitive engagement (e.g., making the child think about things), immersive qualities (e.g., drawing all of the child's attention or making them forget everything else), addictive tendencies (e.g., making the child want to continue indefinitely), and language exposure (e.g., content in a language different from the one spoken at home or the child's first language). The answers were given on a 5-point Likert Scale ranging from "never" to "always" or as "yes" versus "no" answer (short SWIPE).

Context: The context of child DM use was assessed with a set of questions including parental reasons for child DM use, the time of day that children use DM (during morning, lunch, or bedtime routine, etc.), whether parents accompany the child

during DM use, the nature of interaction with the child during co-viewing, and the child's behavior during DM use. For the question on parental reasons, we applied a 5-point Likert Scale ranging from "never" to "always" or as "yes" versus "no" answer (short SWIPE). For the remaining questions in this block, parents checked a box if they agreed to the statement.

Data Analysis

The study used a cross-sectional design to characterize screen time use and digital device activities among Swiss preschoolers. Data were processed and descriptively analyzed using R version 4.4.0 (2024-04-24) (R Core Team, 2024) and Rstudio version 2024.04.0. Data preprocessing included packages "haven" (Wickham et al., 2023), "tidyverse" (Wickham et al., 2019), and "summarytools" (Comtois, 2022). Graphical illustrations were created using ggplot2 version 3.5.1 (Wickham Hadley, 2016). ChatGPT-4 was used to redefine and optimize R codes. All materials from data collection and analysis used in this study have been published on the open science framework <https://osf.io/zwj84>).

Results

Accessibility of Digital Devices

Figure 2 presents the percentage of participants who reported devices being present in their household (panel A) and devices being used by their child at least once (panel B) sorted by average frequency; for detailed percentages see Table 1S from the supplementary material). On average across all age groups, in each household 4.80 different kinds of digital devices were present ($SD=2.43$), and each child had used 2.81 different kinds of digital devices at least once ($SD=1.79$). Across all age groups, the most used digital devices by children were smartphones, streaming devices, cable TV, and tablets.

- Figure 2: Percentage of Participants Reporting Devices Being Present in Household (Panel A) vs. Having Been Used by the Child at Least Once (Panel B) Within Each Age Group.

Duration of Digital Media Use

Figure 3 illustrates the average daily time (in minutes) that children in each age group spent with digital media activities (in pink) and screen-based activities (in purple). All DM activities include both screen-based and non-screen based DM activities: watching full movies, watching short movies, watching music videos, looking at digital picture books, making homemade videos, using learning apps, using entertainment apps, being read to by a digital voice from a digital book, being creative on a screen, taking pictures with a digital device, having video calls, listening to music, listening to the radio, listening to audio stories, and other DM activities (e.g., using a Fitbit wristband). Screen-based DM activities included only DM involving a digital screen: watching full movies, watching short movies, watching music videos, looking at digital picture books, making homemade videos, using learning apps, using entertainment apps, being read to by a digital voice from a digital book, being creative on a screen, taking pictures with a digital device, and having video calls.

- Figure 3: Average Daily Durations (in Minutes) That Children Across Each Age Group Spent for Digital Media Activities (in Pink) and for Screen-Based Activities (in Purple). Dots show individual data points, boxes correspond to interquartile range, and lines within the boxplots to medians.

For daily durations of DM activities provided for weekdays, weekend days, and the overall average across both weekdays and weekend days, separately for all children and for those who are digital media users, see Table 2S. On average, children who use DM spent 82.0 ± 75.6 minutes per day across all DM activities. The total time those children spent on screen-based media was 47.1 ± 55.4 minutes, compared to 58.5 ± 63.6 minutes spent on non-screen-based activities (i.e. listening), resulting in 55.4% of DM time dedicated to non-screen activities. Across all age groups, the three most frequent DM activities for children were listening to listening to music (23.4 min/day) and audio stories (14.4 min/day), or watching short movies (16.5 min/day).

Table 3S shows the daily duration of DM activities for each age group along with the percentage of children doing the respective activity. This data provides valuable insights into how young children spend their time with DM, but needs to be interpreted carefully. Notably, some DM activities show remarkably high daily durations for children under the age of two. For instance, some 0-to-1-year-olds

reportedly spend an average of almost 90 minutes per day on creative screen activities. However, this estimate is based on just 3.8% of the subsample of 0-to-1-year-olds ($n=300$), meaning only 12 children. This result highlights the need for caution when interpreting mean durations for subsamples that do an activity while ignoring those who do not. Importantly, the most widely used DM activities among children under the age three include listening to music or radio, making video calls, and watching homemade videos. For children between three and six years of age, the most widely DM activities are watching short movies, listening to music, making video calls, and listening to audio stories.

Regarding adherence to WHO recommendations (no sedentary screentime until age 2 years, then no more than 1 hour per day), we found that 43.4% of 0-year-olds had at least some screentime, for 1-year-olds it was 68.5% who did not adhere to the 0 minutes per day. For the older children, 18.1% of 2-year-olds, 20.1% of 3 year olds, 23.2% of four year olds and 26.2% of 5 year olds exceeded the recommended limit of no more than 60 minutes of screentime per day. In total, 30% of children did exceed WHO daily screentime recommendation for their age group. In the group younger than 3 years, it was 59.7% that exceeded guideline screen time.

Content Characteristics

Parents reported on the nature of the screen-based media content their children use. Because the SWIPE sample and Short SWIPE sample provided their answers using different answer formats (5-point Likert Scale versus yes-no answer), the data of the two surveys are depicted separately in Figure 4 (short SWIPE on the left side and SWIPE on the right side) and Table 4S.

Parents from both the SWIPE and Short SWIPE samples identified age-appropriateness and entertainment as the two most prominent content characteristics. Additionally, parents in the Short SWIPE sample emphasized learning as a key aspect, whereas parents in the SWIPE sample highlighted the content's ability to fully capture their child's attention.

- Figure 4. Content Characteristics of Screen-Based Media Used by Children. The left side of the figure shows the proportion of parents from the Short SWIPE survey who responded with "Yes" to the statement ($n=459$), while the right side

presents the distribution of response types among parents from the SWIPE survey (n=3714).

Context Characteristics

Variables regarding the context in which young children use screens included parental motivations for providing children with access to screens, whether the child is being alone or accompanied during screen use and if accompanied, what happens during co-viewing of screens, as well as the time of the day when screens are mostly used.

Regarding parental motivations for allowing their children to use screen-based media (Figure 5 and Table 5S), parents from both the SWIPE and Short SWIPE samples provided similar answers, again using two different answer formats (5-point Likerts versus yes-no). They primarily cite learning new things, giving parents time for housework or a moment of peace, and preparing their child for the digital future. Notably, a frequently mentioned reason was also using screens to help calm the child. A large portion of respondents indicated “other” reasons for their child’s screen use. Analysis of those responses revealed that among the most frequent reasons were distracting and supporting the child during challenging situations (medical procedures, getting haircuts, when children are unwell or too tired to play actively, as well as long car rides, plane trips, or waiting times) and communicating and connecting with family (contact through apps like WhatsApp, looking at family pictures and videos).

- Figure 5: Reasons of Their Child’s Screen-Based Media Use. The left side of the figure shows the proportion of parents from the Short SWIPE survey who responded with “Yes” to each statement (n=459), while the right side presents the distribution of response types among parents from the SWIPE survey (n=3714).

In terms of co-viewing, findings reveal that when children – across all age groups – use screen-based media, they are usually being accompanied by a parent (83.7%), by a sibling (27.1%) or by someone else (most frequently a grand-parent, 5.8%). Importantly, 16.9% of participants indicated that their child is usually alone when using screens. For this question, multiple answers were possible. We also asked parents what the accompanying person does when co-viewing with the child and found

that a high portion of them actively interact with the child about the screen-based experience (Figure 6).

- Figure 6: Interaction While Co-Viewing Screen-Based Media with the Child.

Our last effort to characterize the context of screen use of young children focused on an analysis of the time of the day screens are used. We found that screen-based media is mostly used during the afternoon (60.5%), followed by the morning (24.9%) and by the time before going to bed (22%). Parents less frequently indicated screen use upon awakening (6.6%), at breakfast (2.9%), lunch (7.8%), or dinner (6.1%).

Discussion

This study examined DM use in a large sample of Swiss children aged 0-5 years, focusing on the types of digital devices available and used by children, the duration of child DM use, as well as the content and context of child screen use.

We first asked about the types of digital devices that young Swiss children have access to. Findings indicate that children across all age groups are mostly exposed to smartphones, cable TV, streaming devices and tablets. This reflects the increasing prevalence of portable and easily accessible technologies in modern households. It is noteworthy that, across all age groups, smartphones were the most used digital device by children in our sample. This finding aligns with a possible shift toward interactive and portable devices (Mann et al., 2025; OFCOM, 2024).

Duration

First, similar to existing literature on the *duration of DM use* among Swiss preschoolers (IPSOS, 2022; Mann et al., 2025; Paulus et al., 2024), durations of DM use increase with age. One possibility for higher DM use in older children might be that, as children grow, their ability to interact with screens improves (Barr & Linebarger, 2016). For instance, by 2-3 years of age, many toddlers develop fine motor skills (e.g., swiping, tapping), cognitive skills (e.g., understanding basic cause-and-effect

relationships) and become more competent to handle screens (Madigan et al., 2019), which enables them to engage with screens more independently. Finally, there probably also is more DM content for older children on the market.

Second, DM duration is higher on weekend days compared to weekdays. This finding is not surprising because routines might be more relaxed during weekends, with more opportunities for screen-based entertainment (Sigmundová & Sigmund, 2021).

Third, compared to children from the US (Mann et al., 2025), Swiss preschoolers use screen-based media for shorter durations, similar to their European peers (Gillioz, E. et al., 2024; Paulus et al., 2024). This finding confirms regional differences in screentime, with North American young children using screens for longer durations than European young children (Chong et al., 2024). This regional disparity might be related to stricter public screentime guidelines for young children and less screen-time friendly attitudes and social norms in European countries compared to the US (McArthur et al., 2022).

Fourth, the main guidelines from the World Health Organization (WHO, 2019) and the American Academy of Pediatrics (AAP Council on Communications and Media et al., 2016) recommend avoiding screen time for children younger than 2 years (except for video chatting), and limiting screen use to 1 hour per day for children aged 2 to 6 years. Overall, our findings indicate that while approximately three quarters of children aged 2 to 5 years in our sample adhere to screen time recommendations, only about 59.7% of children under 2 years meet these guidelines. Specifically, 0-to-2-year-olds in our study use screen-based DM for approximately 20 minutes per day. One possible explanation for this non-compliance with screen time recommendations is that the first two years of life can be particularly challenging for parents. For instance, a lack of childcare options (only 37% of Swiss preschoolers attend daycare (Federal Statistical Office, 2022)) may lead parents to rely on digital media to occupy their children (Kabali et al., 2015). Additionally, it is possible that parents of very young children are less informed about screentime guidelines and potential effects on child development (Gillioz et al., 2022).

Last, given that child screen use has been consistently linked to socio-economic status (Anand & Krosnick, 2005; Calvert et al., 2005; Goh et al., 2016), it is possible that children from disadvantaged backgrounds are more likely to not comply with official recommendations of screen duration. A preliminary analysis of our data

indicates that compliance with screen-time recommendations according to the WHO tends to increase with parental education level (data not shown). This finding suggests that families from socio-economically disadvantaged backgrounds could benefit not only from more targeted screen-use prevention efforts but also from family-centered policies that provide free, age-appropriate activities, safe and accessible playgrounds, and expanded access to childcare.

Content

Our findings indicate that children spend about half of their DM time with non-screen-based activities, such as listening to music or audio stories. This finding highlights the importance of clearly distinguishing between screen-based and non-screen-based DM use. This distinction is essential given the sensationalism with which popular news media discusses children's high durations of DM engagement, thus promoting a "moral panic" around child screen use (Radesky & Hiniker, 2022). While using screens - especially by very young children - is not recommended by experts (AAP Council on Communications and Media et al., 2016), the literature indicates that listening activities promote child development in many ways (Jalongo, 2010).

In terms of screen-based media, we found that Swiss preschoolers most often watch full movies, use creativity apps, read a picture book on a screen, or watch short movies. An important aspect is also the characteristics of the specific content. More than half of the parents indicated content being age-appropriate, being about fun, and drawing all the child's attention. The latter finding points out the engaging nature of screen media, which could be both, a positive or negative aspect. In positive terms, immersed children are less likely to be distracted and are more likely to remember and learn (Barr et al., 2024). In negative terms, the engaging nature of screens may lead to challenges in getting some children off their devices with potential conflicts with caretakers (Law et al., 2023). It is noteworthy that content characteristics like promoting collaboration, emotional regulation, and problem-solving were less frequently reported. This might highlight a gap in using screen-based DM to foster interpersonal skills and critical thinking.

Context

The last key aspect that we explored was related to the context in which screens are being used by Swiss preschoolers. Importantly, the main reasons for children's screen use include learning opportunities, allowing parents to complete household tasks or have a moment of peace, and preparation for the digital future. These findings suggest that screens serve a dual purpose for parents, functioning both as educational tools and as a practical means of freeing time resources (IPSOS, 2022; Rideout & Robb, 2020). However, we also found a high prevalence for the reason "to calm down the child", which suggests that parents may use screens as a coping mechanism, which could lead to an over-reliance on screen use. This, in turn, may displace key opportunities for young children to learn how to self-regulate their emotions.

Our findings also indicate that most of the children are being accompanied by someone when they are using screens; however, 17% of children use screens alone. This is important because children who actively co-view with another person usually benefit from the added social interaction and conversations. Notably, active co-viewing can buffer the negative effect of screen time on important developmental outcomes (Dore et al., 2020; Madigan et al., 2019; Sundqvist et al., 2021).

Lastly, children predominantly engaged with screen media in the afternoon, followed by somewhat lower usage observed in the morning. Notably, only a minority of participants report screen use during meals—a positive finding, as mealtimes are valuable opportunities for parent-child interaction and building healthy eating habits. It is alarming, however, that 22% of children used screens before going to bed, given that screen use before bedtime suppresses melatonin, thus delaying sleep onset and reducing sleep quality (Lee et al., 2018), as well as increases cognitive arousal, making it more difficult for children to fall asleep (Hartstein et al., 2024).

Strengths and Limitations

This study helps to fill an important gap in the literature by providing the first findings on DM use by young Swiss children. Relying on the comprehensive DREAMER framework for assessing DM (Barr et al., 2024), this study investigated key aspects related to DM use by young children such as duration, content and context. Furthermore, we examined a large sample of Swiss young children spanning all language regions within Switzerland (Swiss-German, Swiss-French, Swiss-Italian and

Romansh). We also tried to include at-risk families, resulting in a diverse economically more representative sample. Specifically, relying on parental education as a proxy for socio-economic status (Davis-Kean et al., 2021), the sample included 58% of parents with tertiary education, a percentage that is similar to the 53% reported in the general population of parents with children aged 0 to 5 in Switzerland (Swiss Federal Statistical Office, 2024).

Nevertheless, several limitations should be considered. This survey study relied on self-report measures on screen time duration instead of objective measures, such as passive sensing apps or time diaries (Barr et al., 2020). Therefore, parents may have underreported their children's DM use due to social desirability bias, which could have influenced the accuracy of the self-reported data on DM use. Additionally, 81% of respondents were female, indicating a substantial overrepresentation of mothers. Such disparities could influence the generalizability of our findings, particularly in areas where educational background or gender may play a role in DM use and parenting practices. Future research should aim to replicate these results with more objective assessment tools to improve the reliability and validity of the findings.

Conclusion

This is the first extensive dataset on DM use during early childhood. The findings not only advance scientific knowledge about this important topic, but also provide practical insights for families and practitioners, ultimately supporting evidence-based guidance for healthy digital media use during early childhood.

Data availability statement

All materials used to collect and analyze data are available at: <https://osf.io/zwj84/>.

Funding information

This study was financially supported by: Federal Social Insurance Office (BSV), Foundation Action Innocence, Haute école de travail social et de la santé Lausanne, HES-SO (HETSL), and Pädagogische Hochschule Thurgau (PHTG).

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' contributions

JS: writing – original draft (lead); methodology (supporting); formal analysis (lead). EU: conceptualization (lead), methodology (lead), formal analysis (lead), review and editing (lead). FS: conceptualization (lead), formal analysis (supporting), review and editing (supporting). ND: conceptualization (lead); review and editing (lead). Other Authors: conceptualization (supporting); review and editing (supporting).

Supplementary material (Tables 1S, 2S, 3S, 4S, and 5S)

References

- AAP Council on Communications and Media, Hill, D., Ameenuddin, N., Reid Chassiakos, Y., Cross, C., Hutchinson, J., Levine, A., Boyd, R., Mendelson, R., Moreno, M., & Swanson, W. S. (2016). Media and Young Minds. *Pediatrics*, 138(5), e20162591. <https://doi.org/10.1542/peds.2016-2591>
- Anand, S., & Krosnick, J. A. (2005). Demographic Predictors of Media Use Among Infants, Toddlers, and Preschoolers. *American Behavioral Scientist*, 48(5), 539–561. <https://doi.org/10.1177/0002764204271512>
- Barr, R., Kirkorian, H., Coyne, S., & Radesky, J. (2024). *Early Childhood and Digital Media* (1st ed.). Cambridge University Press. <https://doi.org/10.1017/9781108885751>
- Barr, R., Kirkorian, H., Radesky, J., Coyne, S., Nichols, D., Blanchfield, O., Rusnak, S., Stockdale, L., Ribner, A., Durnez, J., Epstein, M., Heimann, M., Koch, F.-S., Sundqvist, A., Birberg-Thornberg, U., Konrad, C., Slussareff, M., Bus, A., Bellagamba, F., & Fitzpatrick, C. (2020). Beyond Screen Time: A Synergistic Approach to a More Comprehensive Assessment of Family Media Exposure During Early Childhood. *Frontiers in Psychology*, 11, 1283. <https://doi.org/10.3389/fpsyg.2020.01283>
- Barr, R., & Linebarger, D. N. (2016). *Media Exposure During Infancy and Early Childhood: The Effects of Content and Context on Learning and Development*. Springer. <https://link.springer.com/book/10.1007/978-3-319-45102-2>
- Calvert, S. L., Rideout, V. J., Woolard, J. L., Barr, R. F., & Strouse, G. A. (2005). Age, Ethnicity, and Socioeconomic Patterns in Early Computer Use: A National Survey. *American Behavioral Scientist*, 48(5), 590–607. <https://doi.org/10.1177/0002764204271508>

- Chong, K. H., Suesse, T., Cross, P. L., Ryan, S. T., Aadland, E., Aoko, O., Byambaa, A., Carson, V., Chaput, J.-P., Christian, H., Cliff, D. P., De Craemer, M., De Lucena Martins, C. M., Delisle Nyström, C., Draper, C. E., El Hamdouchi, A., Florindo, A. A., Guan, H., Ha, A. S., ... Okely, A. D. (2024). Pooled Analysis of Physical Activity, Sedentary Behavior, and Sleep Among Children From 33 Countries. *JAMA Pediatrics*, 178(11), 1199. <https://doi.org/10.1001/jamapediatrics.2024.3330>
- Comtois, D. (2022). *Tools to Quickly and Neatly Summarize Data [R package summarytools]* (Version 1.0.1) [R]. <https://www.semanticscholar.org/paper/Tools-to-Quickly-and-Neatly-Summarize-Data-%5BR-Comtois/b3221febe9ae549c6366f9c1f3779f5f87503aa9>
- Davis-Kean, P. E., Tighe, L. A., & Waters, N. E. (2021). The Role of Parent Educational Attainment in Parenting and Children's Development. *Current Directions in Psychological Science*, 30(2), 186–192. <https://doi.org/10.1177/0963721421993116>
- Dore, R. A., Logan, J., Lin, T.-J., Purtell, K. M., & Justice, L. (2020). Characteristics of Children's Media Use and Gains in Language and Literacy Skills. *Frontiers in Psychology*, 11, 2224. <https://doi.org/10.3389/fpsyg.2020.02224>
- Federal Statistical Office. (2022). *Accueil extrafamilial des enfants*. <https://www.bfs.admin.ch/content/bfs/fr/home/statistiques/population/familles/accueil-extra-familial-enfants.html>
- Flewitt, R., El Gemayel, S., Arnott, L., Gillen, J., Goodall, J., Winter, K., Dalziell, A., Liu, M., Savadova, S., Timmins, S., & UKRI Education And Social Research Council. (2024). *Toddlers, Tech and Talk: Very young children's language and literacy learning at*

home in a post-digital age. Summary Report. Manchester Metropolitan University.

<https://doi.org/10.23634/MMU.00636881>

Geurts, S. M., Koning, I. M., Vossen, H., & Van Den Eijnden, R. J. J. M. (2022). A Qualitative Study on Children's Digital Media Use and Parents' Self-interest. *Journal of Child and Family Studies*, 31(7), 2015–2026. <https://doi.org/10.1007/s10826-021-02074-3>

Gillioz, E., Bellucci, T., Borghini, A., Gentaz, E., & Lejeune, F. (2022). Les écrans et les jeunes enfants (0-3 ans) dans un contexte de pandémie de COVID-19: Une enquête en ligne conduite auprès de 486 parents. *A.N.A.E.*, 178. https://www.actioninnocence.org/wp-content/uploads/2022/07/ANAE_Enquête.épidémio.pdf

Gillioz, E., Bellucci, T., Lejeune, F., & Gentaz, E. (2024). L'exposition aux écrans des enfants de moins de trois ans en Suisse romande, à la suite de la pandémie du COVID-19. *A.N.A.E.*, 191, 249–358.

Goh, S. N., Teh, L. H., Tay, W. R., Anantharaman, S., Dam, R. M. V., Tan, C. S., Chua, H. L., Wong, P. G., & Müller-Riemenschneider, F. (2016). Sociodemographic, home environment and parental influences on total and device-specific screen viewing in children aged 2 years and below: An observational study. *BMJ Open*, 6(1), e009113. <https://doi.org/10.1136/bmjopen-2015-009113>

Hartstein, L. E., Mathew, G. M., Reichenberger, D. A., Rodriguez, I., Allen, N., Chang, A.-M., Chaput, J.-P., Christakis, D. A., Garrison, M., Gooley, J. J., Koos, J. A., Van Den Bulck, J., Woods, H., Zeitzer, J. M., Dzierzewski, J. M., & Hale, L. (2024). The impact of screen use on sleep health across the lifespan: A National Sleep Foundation

consensus statement. *Sleep Health*, 10(4), 373–384.

<https://doi.org/10.1016/j.sleh.2024.05.001>

IPSOS. (2022). *Parents, enfants et numérique*. OPEN, UNAF, with support from Google.

[https://www.open-asso.org/wp-](https://www.open-asso.org/wp-content/uploads/2022/02/Etude_OPEN_UNAF_IPSOS_Parents_enfants_numerique.pdf)

[content/uploads/2022/02/Etude_OPEN_UNAF_IPSOS_Parents_enfants_numerique.pdf](https://www.open-asso.org/wp-content/uploads/2022/02/Etude_OPEN_UNAF_IPSOS_Parents_enfants_numerique.pdf).

Jalongo, M. R. (2010). Listening in Early Childhood: An Interdisciplinary Review of the

Literature. *International Journal of Listening*, 24(1), 1–18.

<https://doi.org/10.1080/10904010903466279>

Kabali, H. K., Irigoyen, M. M., Nunez-Davis, R., Budacki, J. G., Mohanty, S. H., Leister, K.

P., & Bonner, R. L. (2015). Exposure and Use of Mobile Media Devices by Young Children. *Pediatrics*, 136(6), 1044–1050. <https://doi.org/10.1542/peds.2015-2151>

Latomme, J., Van Stappen, V., Cardon, G., Morgan, P. J., Lateva, M., Chakarova, N., Kivelä,

J., Lindström, J., Androutsos, O., González-Gil, E. M., De Miguel-Etayo, P., Nánási,

A., Kolozsvári, L. R., Manios, Y., & De Craemer, M. (2018). The Association between Children's and Parents' Co-TV Viewing and Their Total Screen Time in Six European

Countries: Cross-Sectional Data from the Feel4diabetes-Study. *International Journal of Environmental Research and Public Health*, 15(11), 2599.

<https://doi.org/10.3390/ijerph15112599>

Law, E. C., Han, M. X., Lai, Z., Lim, S., Ong, Z. Y., Ng, V., Gabard-Durnam, L. J., Wilkinson,

C. L., Levin, A. R., Rifkin-Graboi, A., Daniel, L. M., Gluckman, P. D., Chong, Y. S., Meaney, M. J., & Nelson, C. A. (2023). Associations Between Infant Screen Use,

Electroencephalography Markers, and Cognitive Outcomes. *JAMA Pediatrics*, 177(3), 311–318. <https://doi.org/10.1001/jamapediatrics.2022.5674>

- Lee, S., Matsumori, K., Nishimura, K., Nishimura, Y., Ikeda, Y., Eto, T., & Higuchi, S. (2018). Melatonin suppression and sleepiness in children exposed to blue-enriched white LED lighting at night. *Physiological Reports*, 6(24).
<https://doi.org/10.14814/phy2.13942>
- Madigan, S., Browne, D., Racine, N., Mori, C., & Tough, S. (2019). Association Between Screen Time and Children's Performance on a Developmental Screening Test. *JAMA Pediatrics*, 173(3), 244. <https://doi.org/10.1001/jamapediatrics.2018.5056>
- Mann, S., Calvin, A., Lenhart, A., & Robb, M. B. (2025). *The Common Sense census: Media use by kids zero to eight, 2025*. Common Sense Media.
<https://www.rfsafe.com/wp-content/uploads/2025/02/The-Common-Sense-Census-Media-Use-by-Kids-Zero-to-Eight-PDF.pdf>
- McArthur, B. A., Volkova, V., Tomopoulos, S., & Madigan, S. (2022). Global Prevalence of Meeting Screen Time Guidelines Among Children 5 Years and Younger: A Systematic Review and Meta-analysis. *JAMA Pediatrics*, 176(4), 373.
<https://doi.org/10.1001/jamapediatrics.2021.6386>
- OFCOM. (2024). *Children and Parents: Media Use and Attitudes Report*. OFCOM.
<https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/media-literacy-research/children/children-media-use-and-attitudes-2024/childrens-media-literacy-report-2024.pdf?v=368229>
- Paulus, F. W., Joas, J., Friedmann, A., Fuschlberger, T., Möhler, E., & Mall, V. (2024). Familial context influences media usage in 0-to 4-year old children. *Frontiers in Public Health*, 11, 1256287.

- R Core Team. (2024). *R: A Language and Environment for Statistical Computing* (Version 4.2.2) [Computer software]. R Foundation for Statistical Computing. <https://www.R-project.org>
- Radesky, J., & Hiniker, A. (2022). From moral panic to systemic change: Making child-centered design the default. *International Journal of Child-Computer Interaction*, 31, 100351. <https://doi.org/10.1016/j.ijcci.2021.100351>
- Reid Chassiakos, Y., Radesky, J., Christakis, D., Moreno, M. A., Cross, C., Council on Communications and Media, Hill, D., Ameenuddin, N., Hutchinson, J., Levine, A., Boyd, R., Mendelson, R., & Swanson, W. S. (2016). Children and Adolescents and Digital Media. *Pediatrics*, 138(5), e20162593. <https://doi.org/10.1542/peds.2016-2593>
- Rideout, V., & Robb, M. B. (2017). The Common Sense census: Media use by kids age zero to eight. *San Francisco, CA: Common Sense Media*, 263, 283.
- Rideout, V., & Robb, M. B. (2020). The Common Sense census: Media use by kids age zero to eight. *San Francisco, CA: Common Sense Media*, 263, 283.
- Sigmundová, D., & Sigmund, E. (2021). Weekday-Weekend Sedentary Behavior and Recreational Screen Time Patterns in Families with Preschoolers, Schoolchildren, and Adolescents: Cross-Sectional Three Cohort Study. *International Journal of Environmental Research and Public Health*, 18(9), 4532. <https://doi.org/10.3390/ijerph18094532>
- Singh, L., Barokova, M. D., Baumgartner, H. A., Lopera-Perez, D. C., Omane, P. O., Sheskin, M., Yuen, F. L., Wu, Y., Alcock, K. J., Altmann, E. C., Bazhydai, M., Carstensen, A., Chan, K. C. J., Chuan-Peng, H., Dal Ben, R., Franchin, L., Kosie, J. E., Lew-Williams, C., Okocha, A., ... Frank, M. C. (2024). A unified approach to

- demographic data collection for research with young children across diverse cultures. *Developmental Psychology*, 60(2), 211–227.
<https://doi.org/10.1037/dev0001623>
- Sivrikova, N. V., Ptashko, T. G., Perebeynos, A. E., Chernikova, E. G., Gilyazeva, N. V., & Vasilyeva, V. S. (2020). Parental reports on digital devices use in infancy and early childhood. *Education and Information Technologies*, 25(5), 3957–3973.
<https://doi.org/10.1007/s10639-020-10145-z>
- Sundqvist, A., Koch, F.-S., Birberg Thornberg, U., Barr, R., & Heimann, M. (2021). Growing Up in a Digital World – Digital Media and the Association With the Child’s Language Development at Two Years of Age. *Frontiers in Psychology*, 12, 569920.
<https://doi.org/10.3389/fpsyg.2021.569920>
- Swiss Federal Statistical Office (OFS). (2024). *Enquête suisse sur la population active (ESPA)*.
- WHO. (2019). *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*. World Health Organization.
<https://apps.who.int/iris/handle/10665/311664>
- Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., Kuhn, M., Pedersen, T., Miller, E., Bache, S., Müller, K., Ooms, J., Robinson, D., Seidel, D., Spinu, V., ... Yutani, H. (2019). Welcome to the Tidyverse. *Journal of Open Source Software*, 4(43), 1686.
<https://doi.org/10.21105/joss.01686>
- Wickham, H., Miller, E., & Smith, D. (2023). *haven: Import and Export “SPSS”, “Stata” and “SAS” Files*. (Version 2.5.4) [R]. <https://CRAN.R-project.org/package=haven>

Wickham Hadley. (2016). *ggplot2: Elegant Graphics for Data Analysis* [Computer software]. Springer-Verlag. <https://ggplot2.tidyverse.org/book/>