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ORIGINAL ARTICLE

Contributions of Screen Use on Early Language and Development Milestones in Argentinean Toddlers from Different Socioeconomic Contexts

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Abstract

The objective of the following research was to describe the use of digital media (i.e., TV, background TV, cell phone, PC, and Tablet), presence of the adults during this activity, and its association with language, motor, and language developmental milestones and SES in the first years of life. Participants were 114 primary caregivers of toddlers between 12 and 36 months ($M = 27.48$ months, SD = 7.31, female = 58, low SES = 56). Parental reports of infant media use, motor and language development milestones, the Inventory of Skills Development (CDI), and the INDEC Scale (for SES) were used. The results showed that, on average, toddlers engaged for 1 h per day with TV and were passive recipients of background TV for 2 h a day, which was the most used screen. In addition, parents tend to share TV with toddlers. Language positively related with child Tablet use, book use, and TV shared with an adult, and there were negative associations with children's cell phone and PC use alone and with an adult. For SES, having at least one basic need unsatisfied or less parental educational and occupancy was related with more background TV and use, less time sharing this type of media with toddlers, and less use and quantity of books at home. In general, there were no relations between digital media use and developmental milestones. This indicates that the excessive use of screens could relate to some early language skills, although it is necessary to investigate the context in which they are used.

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Introduction

The use of digital devices has increased considerably in recent decades, especially during the early childhood period, being in average of 1 h per day, independently of the country (Grané, 2021; Madigan et al., 2020; Medawar et al., 2023). In this sense, digital media has become ubiquitous in families' daily routines (Madigan et al., 2020; Sas & Estrada, 2021), with digital content becoming more frequent and immersed in everyday life (Sas & Estrada, 2021; Simaes et al., 2022; Teichert, 2017). Given the widespread presence of digital media, it may come as no surprise that it has been identified as an influential factor not only in the education of children, but also in their development (Navarro et al., 2017; Gago Galvagno et al., 2021; Medawar et al., 2023). This is especially important to consider during the first few years of life, when children are showing rapid development in foundational abilities like language and motor skills (Bruner, 1975, 1982). However, work suggests that digital media's impact is nuanced, with possible relationships between the use of screens and early communication influenced by the importance of adult-infant interaction when sharing the use of technological devices and the family socioeconomic environment (Aguilar-Farias et al., 2021; Çelik et al., 2021; Madigan et al., 2019, 2020). Further, complex and sometimes even contradictory findings across studies are further limited in the populations examined, which are primarily focused on European and North American countries with WEIRD samples (Bedford et al., 2016, Madigan et al., 2019; Tabullo & Gago-Galvagno, 2022). The purpose of the present study was to examine the media usage in a sample of Argentinian toddlers from 12 to 36 months and its relation to language and developmental milestones while considering social vulnerability and adult-infant interaction.

Digital Media and Development During the First Years

Developmental milestones in early childhood refer to foundational acquisitions. These are explained as the progress of each infant in different areas (e.g., motor, linguistic) and describe observable behaviors in the daily life of a child (Pauen et al., 2012). During development, the acquisition of the different milestones is not carried out in a rigid way. On the contrary, there is a wide variation in the time that each new skill is achieved that is impacted by the genetic and the social environment (Navarro et al., 2017; Bedford et al., 2016). Language milestones (e.g., both verbal and nonverbal communication) can be one of the most important early developments for parents, and consist of first words (usually spoken at the end of the first year of life, Cohen & Billard, 2018; Lahrouchi & Kern, 2018) and a linguistic explosion around 2 years of age, by the combination of different words and use of sentences (Bates & Carnevale, 1993; Hirsh-Pasek et al., 2015). Also, there are important fine and gross motor skill developmental milestones, such as pincer grasp or start walking, respectively. Examining the acquisition of both motor and language developmental

milestones are essential because they are associated with greater achievements in early cognitive skills and later academic performance, and their delay could be related to the presence of developmental disorders (Arnett et al., 2020; Murray et al., 2007; Taanila et al., 2005).

Research examining how media consumption relates to early developmental milestones and language development suggests that the relationship is complex. There is a set of studies that seem to suggest that media usage does not have an impact on motor milestones. For example, Schwarzer et al. (2021) conducted research to assess screen use and development in children ages 2–5 and found that more screen time was not associated with motor development. Bedford et al. (2016) also found no associations between screen time and gross motor development in infants aged 19 to 36 months. They did, however, find a relationship with fine motor skills, but they were positively related. The authors interpreted these results to suggest that the use of screens could promote fine motor skills due to the movements that it inherently requires, and due to the accompaniment of adults when using them in this age range. However, this null or even positive relationship between media use and motor milestones is not universally demonstrated as Madigan et al. (2019), who found negative effects of screen use on motor development milestones between 24 and 60 months. Madigan and colleagues suggested that these findings could be due to the displacement hypothesis suggesting that when young children are observing screens, they may be missing important opportunities to practice and master interpersonal, motor, and communication skills.

Regarding more cognitive milestones and abilities, there is a set of studies that seems to suggest that media consumption negatively relates to cognitive abilities in the first few years of life, especially related to language. For instance, although Schwarzer et al. (2021) did not find a link to motor behavior, they did find that screen time was associated with lower scores on cognition, language, and socioemotional skills. Medawar et al. (2023) also found in a study with 439 mothers of Argentine children between 18 and 42 months that more time with screens related to lower vocabulary scores for infants under 36 months and background TV had a negative impact on the use of sentences (see also Valdivia Álvarez et al., 2014 demonstrating that children aged 1 to 5 years who were exposed to more hours of TV had lower scores on language tests). However, their work also suggested differential associations dependent on the type of digital device. More specifically, high television use was significantly associated with lower cognition and language, while high smartphone, PC, or Tablet use did not show significant associations in cognition, language, and socioemotional skills. They also mentioned that as children grow, the use of devices increases (Medawar et al., 2023).

These caveats and differential findings across media usages relate to another view of the relationship between media usage and cognitive and linguistic development—that there are possible negative relationships between media consumption and early language development, but the relationships may be small and dependent on other factors. For instance, in a meta-analysis that analyzed the relationships between language and amount of screen time, Madigan et al. (2020) found general negative associations in all studies between screen time and language, but the effect sizes were small. The authors interpreted this considering the large number of modulators

found when using the screen (i.e., type of content, presence of adults during the activity, quality of interactions). The same findings were found in the review by Karani et al. (2022) and Kostyrka-Allchorne et al. (2017), being that although most of the studies showed a negative relationship between early language and media consumption, many findings were mixed (i.e., positive or neutral) with a potentially multifactorial relationship between screen time, infant age, language development, and parent/caregiver involvement.

In fact, there are several studies that fail to show a relationship between media usage and cognitive milestones and language development. For example, Gago Galvagno et al. (2021) found that in free play sessions with infants aged 9 to 13 months, there was no relationship between infant nonverbal behavior and different types of screens (though the use of books at home was associated with a greater number of nonverbal behaviors). Examining this relationship further, Tabullo and Gago-Galvagno (2021) found that with infants from 12 to 40 months, for children with a greater the number of books in the home, the shared use of a PCs together with the influx of reading by the family related to a greater amount of vocabulary and use of sentences, without obtaining significant relationships with the rest of the devices after controlling for sociodemographic variables (e.g., SES). This work seems to suggest that adult participation in the use of screens may be an important factor to consider when examining the relationship to developmental milestones and language use. Further, SES may be another important factor to consider as adult participation and media consumptions may also be related to sociodemographic variables. Even though important differences can be found in the acquisition of technological resources in homes with higher and lower resources, almost all families usually have a television at home and own a smartphone (Aguilar-Farias et al., 2021; Sas & Estrada, 2021). However, it has been shown that SES variables such as the educational level of mothers and fathers may relate to how often this media is used, with a decrease in screen use as parent's education increases. In turn, as the economic situation of families improves, the time children use screens per week is reduced, but it is not always statistically significant (Aguilar-Farias et al., 2021; Çelik et al., 2021; Tandon et al., 2012).

Present Study

There is a clear need for better evidence to support psychologists and educators in understanding the role and use of screens during early childhood from different SES backgrounds. This research is important at a theoretical, practical, and social level and can lead to a better understanding of how digital media, so present in the daily lives of most children today, relate to development. The objectives of the following research were to (a) describe the hours of daily use of digital media by toddlers from 12 to 36 months; (b) relate the time of use of screens with the acquisition of milestones and language; (c) associate digital media use, adult participation, and social vulnerability variables (i.e., educational level, occupational level, overcrowding); and (d) evaluate the contribution of adult participation in the use of screens on milestones and language over and above SES factors. Although results are mixed

(e.g., Bedford et al., 2016; Madigan et al., 2019, 2020; Tabullo & Gago-Galvagno, 2022), we expected to find use of screens early in this age range, a negative correlation between time of use of screens with language measures (i.e., lexical density and use of sentences) and acquisition of developmental milestones, a greater amount of screen use time and less adult presence during infant use of screens in families of low SES, and a positive contribution of adult participation on milestones and language.

Method

Participants

The participants in this study were 185 primary caregivers of toddlers from 12 to 36 months of age from Argentina. This age range was selected because infants begin to utter their first words at the first year of age, and up to 36 because they already use sentences and it is the age limit for preschool (Bruner, 1975; Resches et al., 2021). Toddlers were excluded from the final sample if they were outside the age range of the study (i.e., $n = 22$ older than 36 and $n = 14$ younger than 12 months), premature ($n = 25$), or had a diagnosis of developmental disorder ($n = 10$). The final sample consisted of 114 primary caregivers of children from 12 to 36 months ($M = 27.48$ months, SD = 7.31, female = 58, low SES = 56).

The type of sampling was non-probabilistic, intentional, and snowballing. For caregivers, 88.3% were from Argentina and the rest were from other Latin-American countries; all children were from Argentina. Of the total number of caregivers who completed the survey, the majority ($n = 120$) were mothers of the toddlers. Caregivers had an average level of tertiary education school and were operators (handwork).

Measurements

Social Economic Level Scale (INDEC, 2018) The NES was used to assess the family socioeconomic level and classify the participants as having their basic needs satisfied (SBN) or unsatisfied (UBN). A dyad was classified as UBN if they met at least one of the following criteria: they lived in a precarious settlement ("shantytown"), the house had no bathroom, the house had no access to drinking water, it was overcrowded (more than 3 people per room), the family did not have 3 or 4 meals a day, elementary school-aged children in the household were not attending school, or the parents in the house did not have a primary school education. Also, the NES scale defines social vulnerability as a multidimensional variable, including (1) educational level (1, incomplete primary school to 10, complete postgraduate), (2) occupational level (1 unemployed, 2 housekeeper, 3 not qualified, 4 operator, 5 employee, 6 technician, 7 professional), and (3) overcrowding (between 0 and 9 points according to the number of people per room). Parent occupation and education mean was calculated taking into account the average score for these two variables.

Questionnaire on the Use of ad hoc Screens Information was collected on what type of screens and devices the toddlers were using. These included Tablet, PC, Internet, TV, background TV, cell phones, and books. We also asked how many minutes per day toddlers were exposed to these devices in a typical day and the frequency that adults share these devices with infants ("How often does an adult in the family accompany the infant while watching TV/use PC/Cell phone/Tablet/Internet?", 1 never to 5 always). Families that did not have this type of device at home or that toddlers did not use it were not included in analyses.

Developmental Milestones (Bedford et al., 2016) To assess developmental milestones, critical milestones from motor (i.e., fine and gross motor skills) and language domains were chosen. The seven questions were as follows: "At what age did the infant…" and data from different milestones were used. For example, "Sat without support" and "Walked independently," "Picked up a small object with a clamp, that is, with his thumb and forefinger," "Stacked at least three small blocks or other small objects," "Said his first word," "Said two or more words together," and "Made a whole sentence, meaningful." To reply, the caregiver had to indicate their response on a Likert scale, with age ranges (0 between 0 and 5 months, 1 between 6 and 11 months, 2 between 12 and 18 months, 3 between 19 and 25 months, 4 between 26 and 36 months, 5 still not performed). Variables of motor and language developmental milestones were generated by the average of each development milestone, with higher scores relating to later acquisition of milestones. Cronbach alpha was 0.64 for motor milestones and 0.81 for language milestones.

Communicative Development Inventory Form II (Resches et al., 2021) This questionnaire evaluates the development of language in children through the reporting of a significant caregiver. It is made up of two inventories. Part 1 (CDI 1) measures children's use of words. It includes a vocabulary list of 23 semantic categories with a total of 699 words. Part 2 (CDI 2) inquiries about the way in which the infant uses language, specifically about the evocation of past and future events, places, or people that are not present, detaching language from its immediate context (symbolic competence). Five questions were asked with 3 options each (0 not yet, 1 sometimes, 2 many times), scoring a total on a scale of 0 to 10 points. For this sample, a Cronbach's alpha of 0.96 was obtained for CDI 1 and of 0.84 for CDI 2.

Procedure

Participants completed a Google Form that was shared on Facebook, Instagram, and WhatsApp. It could be completed from a cell phone, Tablet, or PC. For families from low-SES backgrounds, the questionnaire was taken in person by pencil and paper, by recruiting the sample in educative institutions ubicated in shantytowns of Buenos Aires.

Before beginning the evaluation, all participants completed an informed consent. None received financial compensation, and all completed the scales individually. General objectives of the study were reported, and participants were invited

to participate anonymously, confidentially, and voluntarily to avoid bias in their answers.

All questionnaires were administered in the same order: first, the social economic level scale (NES) was administered, then the questionnaire on developmental milestones, the questionnaire on the use of touch screens, and finally the CDI. The data was collected from June 11 to November 18, 2021.

Data Analysis

SPSS software version 26 was used. First, a pre-processing of the data was carried out to evaluate the presence of outliers in the sample. No outliers were found. The distribution of the variables was examined using the Shapiro–Wilk test and the homogeneity of variances with the Levene test. Although most of our variables met the homogeneity of variance assumption, most were not normally distributed so non-parametric tests were used.

First, descriptive statistics were calculated. Then, language variables, developmental milestones, sociodemographic variables, and use of media were correlated using partial Spearman Rho test, controlling for child age. Device use was compared according to socioeconomic level using Mann–Whitney *U* tests. Finally, a multiple linear regression test was carried out, inserting the variables of socioeconomic status and media use as input and those of milestones and language as outcomes. To obtain higher reliability of the results, to correct for normality deviations of the sample distribution and differences between group sizes, and also to present a 95% confidence interval for the differences between the means, bootstrapping was implemented as part of regression analyses. Bootstrapping specifications were (a) sampling method—simple, (b) number of samples—1000, (c) CI level—95%, and (d) CI type—bias-corrected and accelerated (BCa).

Results

Description of Variables

Table 1 summarizes the main descriptive statistics. On average, the amount of TV use was more than an hour per day, and background TV more than 2 h, but both variables showed floor effect reflective of lower scores indicating lack of use (symmetry > 1.60, West et al., 1995). TV was the most widely used device, and only 4.4% of all toddlers did not use it ($n = 5$). For the rest of the media, on average, toddlers used them less than an hour per day with most of them hardly used (i.e., Tablet and PC).

For sharing media with an adult, on average, when parents reported to use a device (see number of participants in Table 1), they shared it most of the time, except for PC.

Table 1 Descriptive statistics of measure variables

Variables	*M* (SD)	Min	Max	*n*
Sociodemographic data				
Child age (months)	27.48 (7.31)	12	36	114
Mother education	6.04 (2.18)	3	10	114
Father education	5.17 (2.06)	2	10	114
Mother occupation	3.64 (1.65)	1	6	114
Father occupation	4.02 (1.64)	1	6	114
Language variables				
Child lexical density	264.09 (225.27)	0	683	114
Child sentence use	5.61 (3.27)	0	10	114
Milestone variables				
Motor skill milestones	8.09 (2.41)	0	14	114
Language milestones	7.16 (3.21)	0	14	114
Media exposure (min)				
Child TV use	74.39 (82.90)	0	420	114
Background TV exposure	153.22 (161.62)	0	780	114
Child cell phone use	32.93 (62.21)	0	360	114
Child PC use	2.39 (13.91)	0	120	114
Child Tablet use	1.34 (6.22)	0	30	114
Child Internet use	36.75 (67.90)	0	360	114
Child books use	17.45 (21.98)	0	120	114
Number of books	1.87 (0.97)	1	4	114
Screen share with adult				
Share TV	4.00 (0.86)	2	5	109
Share cell phone	4.10 (1.08)	1	5	73
Share PC	2.73 (1.83)	1	6	15
Share Tablet	3.40 (1.84)	1	5	10
Share Internet	4.05 (1.01)	1	5	59

M mean, *SD* standard deviation, *Min* minimum, *Max* maximum, *TV* television, *PC* personal computer

Associations Between Language and Milestones with Socioeconomic Variables and Screen Use

Language Variables Results are summarized in Table 2. For language measured with the CDI, lexical density and sentence use were positively associated with parents' education and occupation, child Tablet and book use, and TV share with an adult (.19 < rho < .39). Higher parent education and occupation were related to children spending more time with the Tablet and books. In addition, more time adults share TV with toddlers was related to higher vocabulary and sentence. There were also negative associations suggesting that more time spent with PCs (shared with an adult or alone) and cell phone was related to lower lexical density and sentence use (− .23 < rho < − .77). On average, effect sizes were low to high.

Table 2 Associations between child language variables, milestone variables, socioeconomic variables and media exposure, and share with an adult

Measures	1	2	3	4	5	6	7	8	9	10
1. Child lexical density	-	.58**	.17	−.29**	.36**	.31**	.06	.34**	−.06	−.08
2. Child sentence use		-	.16	−.25	.38**	.25**	.21*	.39**	−.03	.01
3. Motor skill milestones			-	.54**	.12	.05	.06	−.04	.11	.02
4. Language milestones				-	−.20*	−.30**	−.02	.16	.06	−.13
5. Mother education					-	.62**	.45**	.37**	−.20	−.21*
6. Father education						-	.15	.48**	−.16	−.26*
7. Mother occupation							-	.32**	.04	.02
8. Father occupation								-	−.08	−.26*
9. Child TV use									-	.34**
10. Background TV										-
11. Child cell phone use										
12. Child PC use										
13. Child Tablet use										
14. Child Internet use										
15. Child book use										
16. Share TV										
17. Share cell phone										
18. Share PC										
19. Share Tablet										
20. Share Internet										

Measures	11	12	13	14	15	16	17	18	19	20
1. Child lexical density	−.23**	−.24**	.25**	−.11	.19*	.20*	.06	−.77**	−.20	−.06
2. Child sentence use	−.15	−.14	.19*	.03	.15	.14	.12	−.56**	.06	−.06
3. Motor skill milestones	−.17	−.14	.05	.02	.01	.01	.17	.01	.57	.05

Table 2 (continued)

Measures	11	12	13	14	15	16	17	18	19	20
4. Language milestones	−.10	.03	.06	.08	.06	.05	.01	−.28	.46	.05
5. Mother education	−.18	−.16	.21*	−.01	.25*	.10	.06	.03	.43	−.09
6. Father education	−.16	.04	−.01	−.09	.30**	.05	.11	−.32	.06	−.22
7. Mother occupation	.09	−.15	.17	.27	.19	.21*	.14	.25	.30	.32*
8. Father occupation	−.17	.01	.10	.03	.21*	.14	−.02	−.20	−−.26**	−.16
9. Child TV use	.06	−.10	.06	.26*	−.06	−.16	−.25	−.25	.25	.06
10. Background TV	.17	.19	−.17	.43**	−.04	−.10	−.07	.46	.04	.14
11. Child cell phone use	-	.06	−.15	.57**	.01	.02	.12	.32	−.21	.17
12. Child PC use		-	−.04	.19	−.09	−.06	−.08	.40	.20	.07
13. Child Tablet use			-	−.02	.10	.26**	−.07	−.08	.59	.15
14. Child Internet use				-	.14	.01	−.11	-.01	−.23	.22
15. Child book use					-	.08	.17	−.17	.41	.07
16. Share TV						-	.30*	−.10	.34	.36**
17. Share cell phone							-	.43	.76	.54**
18. Share PC								-	.98*	.72*
19. Share Tablet									-	.98**
20. Share Internet										-

Child use: child media exposure in minutes, Share: screen share with an adult

TV television, *PC* personal computer

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

Development Milestones Only language milestones were negatively associated with parent's educational level ($-.20 < \text{rho} < -.30$), being that the higher the educational level of the parents, the earlier the developmental milestones were acquired. No general associations were found between each screen usage with motor developmental milestones ($p > .05$). On average, effect sizes were low.

Associations Between Socioeconomic Variables and Screen Use

Most of the variables on media exposure were not related to parent education and occupation. Negative relations were found between parent's education and occupation with background TV demonstrating that higher parent education and occupation was related to less background TV exposure ($-.21 < \text{rho} < -.26$). The opposite was found regarding book use, with higher parent education and occupation related to more time children spent using books ($.21 < \text{rho} < .30$). Finally, a few other independent positive associations were found between socioeconomic variables and screen use (see Table 2). On average, effect sizes were low.

Differences in Screen Use Between Satisfied and Unsatisfied Basic Needs Groups

The UBN group showed significantly more toddler TV use compared with the SBN group ($U = 225.50$, $p = .001$, $r\ Rosenthal = .37$). SBN group showed significantly more toddler book use ($U = 822.00$, $p = .001$, $r\ Rosenthal = .36$), number of books at home ($U = 822.00$, $p = .001$, $r\ Rosenthal = .36$), and shared TV with the toddler ($U = 1028.50$, $p = .003$, $r\ Rosenthal = .29$). On average, effect sizes were low to moderate.

These results showed that having at least one UBN was related to more TV use, less time sharing this type of media with toddlers, and less use and quantity of books at home.

Regression of Child Language Variables

Given that motor milestone skills were not associated with media use, we focused on further examining how media use related to language variables via two multiple regressions performed on lexical density and sentence use with socioeconomic variables, screen and books use as predictors. Screen share with an adult was not incorporated because of the small sample size for these variables. Composite score of the sum of education and occupation level was created to alleviate concerns with multicollinearity.

In step 1, child age, gender, socioeconomic variables, and attend to daycare were included and step 2 added media usage. Table 3 summarizes the results of the regressions in step 2. For both dependent variables, the general model was significant and demonstrated a significant R^2 change with the addition of media usage variables over and above SES. Tolerance (0.471–0.900) and FIV (1.106–1.990) values indicated that, for both models, multicollinearity was not a concern.

Table 3 Hierarchical linear regression models of child language variable scores ($n = 114$; number of bootstrap samples = 1,000***)

Language variables	Child lexical density						Child sentence use				
Step 2		$R^2 = 0.329$ Adj $R^2 = 0.276$ $\Delta R^2 = 0.061$** $F = 6.215$**					$R^2 = 0.219$ Adj $R^2 = 0.187$ $\Delta R^2 = 0.019$** $F = 2.766$**			
Predictor	β	SE	CI 95% BCa		T	β	SE	CI 95% BCa		T
			LL	UL				LL	UL	
Child age (months)	0.406	2.056	5.857	13.781	4.730**	0.258	0.032	0.019	0.160	2.855**
Child gender	0.222	37.125	23.496	166.618	2.645**	0.166	0.562	.024	2.095	1.849
Parents' education	0.260	2.748	5.549	11.026	3.089**	0.015	0.088	−.171	.178	0.140
Parents' occupation	0.028	7.845	−13.173	17.033	0.300	0.214	0.120	−.004	.512	2.046*
Daycare assistance	0.001	26.580	−64.838	58.770	0.007	−0.006	0.407	−.861	.754	−0.065
Child cell phone use	−0.010	0.325	−.612	.753	−.125	0.035	0.005	−.009	.018	0.383
Child PC use	−0.132	1.215	−5.456	−0.09	−1.869*	−0.105	0.011	−.074	.004	−1.153
Tablet use	0.142	2.664	−.542	11.002	1.456	0.175	0.042	.029	.127	1.880
Book use	−0.002	0.467	−1.426	2.240	−.027	−0.092	0.007	−.034	.013	−1.031

Child use: child media exposure in minutes. Beta coefficients are standardized

TV television, *PC* personal computer, *LL* lower limit, *UL* upper limit

*$p < 0.05$; **$p < 0.01$. ***Bootstrap specifications: (a) sampling method—simple; (b) number of samples—1000; (c) CI level—95%; and (d) CI type—bias-corrected and accelerated (BCa)

For lexical density, the regression accounted for 49% of the variance and the addition of media usages resulted in an R^2 change of 7.2% (see Table 3). Independence of error assumption was met (Durbin-Watson = 1.901). Parents' education positively predicted lexical density, and only child PC use negatively predicted lexical density, being that more time children spent using PC, less vocabulary was reported by parents. No results were found regarding other media ($p > 0.05$).

For sentence use, the regression accounted for 34% of the variance and the addition of media usages resulted in an R^2 change of 2.1% (see Table 3). Independence of error assumption was met (Durbin-Watson = 1.775). Only parents' occupation positively predicted sentence use. This indicates that as the occupation was higher, sentence use was higher too according to the parents' report. No results were found regarding media use ($p > 0.05$).

Discussion

The objective of the following research was to describe the daily use of digital media by toddlers from 12 to 36 months, relate the time of use of screens with the acquisition of milestones (i.e., language and motor) and language, associate digital media use and social vulnerability variables (i.e., educational level, occupational level, overcrowding), and finally evaluate the contribution of adult participation in the use of screens on milestones and language.

First, we found that TV was the most widely used device, being used more than an hour per day, and background TV more than 2 h per day (although it is important to note that both variables showed floor effects indicating lack of use by some children in the sample). Regarding the rest of the media, on average, toddlers used them for less than an hour per day and most of the toddlers hardly used the Tablet and PC. Our results were similar to other studies (Cristia & Seidl, 2015; Tabullo & Gago-Galvagno, 2022; Simaes et al., 2022) that show that in this age range the usage of digital media is low, but it is more than the pediatrics associations' zero screen recommendation for this age group (Melamud and Waisman 2019; Sas & Estrada, 2021; Schwarzer et al., 2021), and there is a tendency for screen use to increase in this population with age (Cristia & Seidl, 2015; Schwarzer et al., 2021). It is interesting to note that when media was used by toddlers, parents often shared in this activity. This could be because at this age, language and motor skills are limited, which requires engagement from adults, and some devices (e.g., cell phone, PC, or tablet) are too fragile to be used by individual toddlers of these ages, or need help to activate the device (Karani et al., 2022; Kostyrka-Allchorne et al., 2017; Lahrouchi & Kern, 2018).

We also found several relationships between the use of digital devices and language measures (specifically lexical density and use of sentences). More specifically, greater use of cell phones, PCs, and shared use of PCs was related to lower lexical density reported in children. These results are consistent with previous studies showing that greater use of technological devices is associated with lower vocabulary scores in toddlers (Madigan et al., 2020; Medawar et al., 2023). However, other studies have shown positive contributions from the individual and shared use of the

PC, since this type of screen requires greater visual-motor coordination and, in this age, requires the presence of an adult to accompany the activity (Tabullo & Gago-Galvagno, 2022). In this case, being such young toddlers, the associations could be negative because the content used on this type of device is not age-appropriate (Madigan et al., 2020; Sas & Estrada, 2021). However, it is necessary to highlight that the effect of PC on vocabulary was also observed after controlling for sociodemographic variables in the regression models, which reinforces the findings of other studies (Madigan et al., 2020; Medawar et al., 2023) and recommendations from pediatric societies to moderate consumption in early childhood (Melamud and Waisman 2019; Sas & Estrada, 2021; Schwarzer et al, 2021).

In contrast to the negative relationships between digital media and language discussed above, we also found several positive associations between the tablet use and the construction of sentences and children's lexical density. In addition, we found that shared TV and viewership with adults and children were also related to sentence construction and children's lexical density. This aligns with other studies that have found positive relations between screen use and language (Tabullo & Gago-Galvagno, 2022; Waisman et al., 2018). However, it is possible that in this study, the positive links between Tablet use, shared TV, and language could have been driven by a third related factor—socioeconomic status. More specifically, our results suggested that as parent's education and occupation were higher, children spent more time with the Tablet and books, and they shared more TV with an adult. These higher SES factors also related to higher vocabulary and sentence use. Results from our regression support this suggestion, demonstrating that when SES variables were controlled and entered in earlier steps of a regression, the positive relationship between screen use disappeared. Thus, it is possible the positive associations with Tablet use and language may be because of higher SES because families that have this type of media at their homes have on average higher educational levels (see Table 2).

Our work also showed a lack of relationship between screen use and motor and language developmental milestones, reinforcing the findings by Bedford et al. (2016) and Schwarzer et al. (2021) (although in contrast to Madigan et al., 2019). The absence of associations may be because there is a wide variation in the time that each new skill is achieved that is impacted by the genetic and the social environment. In addition, it may be that early screen use impacts language and gross motor only later in development, when these skills are more advanced (e.g., vocabulary size, physical activity), rather than the early milestones assessed here (Navarro et al., 2017; Bedford et al., 2016; Schwarzer et al., 2021).

Regarding the study of digital media use and social vulnerability, it was found that having at least one UBN was related to more TV use, less time sharing this type of media with toddlers, and less use and quantity of books at home. Also, parent's education and occupation were negative related with background TV time. These results support findings from other studies (Çelik et al., 2021; Socias et al., 2020) where it is observed that families with older children from lower SES were less likely to comply with the recommendation of pediatric associations' zero screen time recommendations. This could be due to several factors including (a) lack of knowledge about how screens could affect early development, (b) lack of parents

regulation or stressful environments that could decrease the probability of controlling parents care (Çelik et al., 2021), (c) greater concerns about neighborhoods and safety with less access to alternative activities, and (d) less access to resources and daycare (Aguilar-Farias et al., 2021; Tandon et al., 2012). However, it is important to note that overall rates of screen use were low across our sample and more work may be helpful to better understand how and why parents are using screen time across different contexts. This could lead to potentially helpful interventions targeted to different needs and populations that could involve a mixture of education (e.g., better understanding the effects of screen time and parental engagement with children), support (e.g., programs that can support employment assistance, access to housing and food resources), and resources (e.g., lending libraries integrated into early childhood curriculum, availability of alternative activities in lower SES areas).

Conclusion

In sum, this research shows the importance of continued investigating on screen use and development given that most of the children in the sample use some type of touch device or TV at least 1 h per day. Thus, toddlers likely start to use screens early in potentially because (a) the community is not aware of the possible negative effects that these devices can generate on cognitive development, (b) as a means of regulating and distracting toddlers, and (c) due to the quarantine condition derived from the COVID-19 pandemic.

The present work provides an important extension examining the associations between use of screens and language to a broader non-WEIRD sample of varying social vulnerability. It aligns with the recommendations of pediatric associations and provides some important preliminary information that may be useful as we continue to better understand screen use across multiple contexts. Based on the results obtained, interventions can be generated within the area of community clinical psychology in early childhood, giving guidance to primary caregivers and generating public policies within the educational field.

The present study presents a series of limitations. One of them was that the data was collected through parental reports for typical developed infants, which could bias the results obtained. Also, developmental milestone measure is not present in validation studies. In turn, the type of sampling was non-probabilistic; therefore, the results cannot be generalized to the population. Also, the lack of some types of digital devices in vulnerable contexts limits the analyses of how this type of devices is associated with different SES dimensions. In addition, the lack of parent age variable and type of content could be affecting the time infants spend on screens and cognitive development. Finally, having carried out a cross-sectional study does not allow us to visualize the development trajectories of these children skills.

For future research, it would be beneficial to expand the sample and recruit it from different provinces of Argentina and other Latin American countries. Also, new studies should verify in clinical samples of children with language delay whether this delay is related to the use of digital media. Similarly, it would be recommended to carry out a probabilistic sampling, based on a direct measurement of

the toddlers' behaviors, where we can control the independent variable giving all parents the opportunity to interact with their toddlers using a technological device. In addition, parent's age and type of content that infants consume could be measured to analyze moderators. Finally, carry out a longitudinal study, to be able to compare the same sample over time and thus observe the development lines of toddlers.

This study extends the existing literature as it was carried out in a much lesser studied Latin American context, with low and mid SES samples. This could lead to the development of specific interventions that consider the development of toddlers and the incidence of social and individual factors, to promote their cognition in the first years of life.

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Data Availability The data that support the findings of this study are available from the corresponding author upon request.

Declarations

Informed Consent The ethics committee of Instituto de Investigaciones en Psicología (UBA) approved the study, and the informed consent was obtained from all adults' participants.

Conflict of Interest The authors declare no competing interests.

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