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Does Use of Books and Electronic Media Associate to Joint Attention Skills and Temperament during the First Year of Life?

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Abstract

Several researchers have found that media exposure through books or electronic media contribute to preschoolers' development. However, research with behavioral measures and during the first years of life have not been carried out in Latin American contexts. The aim of the following research was to evaluate the relations between media exposure through electronic media and books with joint attention skills and temperament (i.e., effortful control, surgency and negative affect) during the first year of life. A free play session was carried out, where the number of mother-infant interaction behaviors were assessed. Findings state that only the amount and the frequency of the use of books at home between caregivers and infants were positively associated with the behaviors of joint attention and surgency. Conclusion denotes that books would probably be associated with more infant interactions and higher SES, mediating in the promotion of cognitive development from the first months of life.

Keywords: Joint Attention; Nonverbal Communication; Temperament; Books; Electronic Media; Infants

¿Se Asocia el Uso de Libros y Medios Electrónicos con las Habilidades de Atención Conjunta y el Temperamento Durante el Primer Año de Vida?

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Resumen

Son varios los investigadores que han encontrado que la exposición a los medios a través de libros o medios electrónicos contribuye al desarrollo de los niños en edad preescolar. Sin embargo, las investigaciones con medidas conductuales y durante los primeros años de vida no se han realizado en contextos latinoamericanos. El objetivo de la siguiente investigación fue evaluar las relaciones entre la exposición a los medios a través de los medios electrónicos y los libros con habilidades de atención conjunta y temperamento (p. ej., esfuerzo de control, extroversión y afecto negativo) durante el primer año de vida. Se realizó una sesión de juego libre, donde se evaluó el número de conductas de interacción madre-hijo. Los hallazgos indican que solo la cantidad y la frecuencia del uso de libros en el hogar entre los cuidadores y los bebés se asociaron positivamente con los comportamientos de atención conjunta y extroversión. La conclusión denota que los libros probablemente estarían asociados con más interacciones infantiles y mayor nivel socioeconómico, mediando en la promoción del desarrollo cognitivo desde los primeros meses de vida.

Palabras clave: Atención conjunta; Comunicación no verbal, Temperamento, Libros, Media electrónica, Infantes

During development, many variables from dissimilar levels of analysis (e.g., culture, parental style and temperament) are interrelated (Bronfenbrenner, 1986; Vygotsky, 1929), and play a role in infants' cognitive development from the first years of life (Luo et al., 2019; Tamis-LeMonda et al., 2019). The purpose of this study was focus on a specific variable within the immediate context (i.e., different types of media exposure) and its relation to individual differences in both temperament and a foundational element of early cognitive development—joint attention—in an understudied context (i.e., infants in a Latin American sample).

Media Exposure and Temperament

One area of development that has been shown to be highly influenced by different type of media is temperament. Temperament is thought to be present in infancy and is defined as infant's individual differences in arousal and self-regulation, that originate and are modulated by both genetics and the environment (Putnam et al., 2006; Rothbart, 1981). It is divided into several subcomponents, including negative affect (propensity to fear, anger, sadness and irritability), effortful control (ability to modify the focus, perception sensitivity, inhibitory control and activation) and surgency (positive affect, activation, impulsivity and risk taking) (Rothbart et al., 2004).

Specifically, access to books and electronic media show important relations to temperament (Masur et al., 2016, Vally et al., 2015). This could be due to the fact that sharing books involves and promotes prosocial behaviors, positive emotionality in cases in which the mother maintains an empathic and emotional dialogue, and sustained attention in order to not be distracted during the activity (Brophy-Herb et al., 2015; Buss & Plomin, 1986; Vally et al., 2015).

Another important type of media is television (TV), where studies have shown (with parent reports approach and samples ranging from 100 to 400 approximately) that background TV and frequency of watching TV predicted greater parent-reported difficult temperament in 4-year-olds, with relatively small effect sizes (ranging from .01 to .10, Munzer et al., 2018). Also, the number of hours that preschoolers were exposed to television and tablets predicted less effortful control (Kim, 2014; Nathanson & Beyens, 2018), while the amount of time infants and children from 3 months to 6 years were exposed to TV, cell phones, and computers were positive associated with

negative affect and high energy levels (Nabi & Krčmar, 2016; Thompson et al., 2013), with low (at first year) to moderate correlations (between .10 to .40). The use of technological tools can lead to diminishing opportunities to develop autonomous forms of regulation that will allow them to calm down and regulate emotions (Chassiakos et al., 2016; Radesky et al., 2016; Sherry, 2001), and disrupt infants' attentional focus (Masur et al., 2016; Setliff & Courage, 2011). In addition, it likely reduces parents' play involvement with their children (Kirkorian et al., 2009), but the presence of parents during the use of these devices could be a protector factor (Hipp et al., 2017; Pempek & Lauricella, 2017).

However, results showing negative relations between TV, books use and temperament are equivocal. Howe et al. (2017) and Waters et al. (2016) did not find an association between amount of TV exposure and temperament in infants from 2 to 5 years old using parent report approach; and no associations were found between the act of sharing books with infants under one year and temperament (Karrass et al., 2003). These authors suggested that their lack of findings could be due to measurement biases derived from parental reports and the use of samples from mid and high-SES.

Media Exposure and Joint Attention

As for cognitive competences, joint attention is defined as the ability to coordinate attention between an infant and an adult towards an object of common interest (Bakeman & Adamson, 1984; Bruner, 1983). Specifically, at approximately 6 months, infants start demonstrating the ability to follow gaze and the signalling of adults (Bruner, 1983) regardless of their SES (Elgier et al., 2017; Saxon & Reilly, 1999). Likewise, Bakeman and Adamson (1984) establish that parents scaffold triadic interaction performances of their infants even before they are capable of such performances unaided. From 9 months on, infants are able to generate signals and direct adult attention to objects of interest (Mundy & Gomes, 1998), as well as alternating gaze between the adult and an object of interest (Bakeman & Adamson, 1984). Infants must be able to understand that the other has intentions independent of his own—an important element of social-cognitive understanding (Tomasello, 2009).

These nonverbal communication skills in joint attention are fundamental to communication, cognition, and social cognition and they predict performance in diverse self-regulation tasks (Gago Galvagno et al., 2019; Miller & Marcovitch, 2015), and subsequent language skills (Adamson et al.,

2019; Salo et al., 2018). Therefore, it is important to explore how media exposure relate to joint attention.

Work has examined relations between media and book use with behavioral measures of joint attention. For example, researchers found (sample $n < 50$) that 2- to 3-year-olds' levels of sustained attention, joint attention and vocabulary were higher when they participated in interventions where they shared books with their primary caregivers, with low to moderate effect size (.05 to .25) (Cooper et al., 2014; Vally et al., 2015). Also, Fletcher et al. (2005) found increased levels of joint attention and engagement when infants during second year of life ($n = 25$) participated at book-sharing practices, but there were no differences with control group. The same found Hutton et al. (2004) at four years old ($n = 22$), with positive correlations between engagement behaviors and proximity during reading, child page turning, parental use of child-adjusted voice and finishing the book, and negatively correlated with maternal smartphone use.

Authors of these studies argue that the absence of high-power effects or significance results could be because the level of the reader's (e.g., a dialogic reading technique encouraged children to participate in the reading interaction), the amount of time parents spends with these activities, the novelty of books at infants of low-SES and family income. Indeed, parent-child picture book reading simultaneously involves pointing gestures, joint attention and verbal labelling, so it provides an excellent opportunity for communication in a more structured setting (Durkin, 1995; Farrant & Zubrick, 2012). Crucially, joint attention occurs more commonly in book sharing than in other contexts (Murray & Egan, 2014).

However, results are contradictory for the first year of life, since existing research showed relations between electronic media use and nonverbal and verbal communication in infants and preschoolers from 1 to 5 years old using parent reports ($n < 140$) (Beatty & Egan, 2018; Taylor, et al., 2018) and no effects with books in verbal communication (Karrass & Braungart-Rieker, 2005; Wasik et al., 2016). Also, results showed positive associations between electronic books and joint attention in behavioral approach ($n < 70$), but not with print books and vice versa (Munzer et al., 2019; Strouse & Ganea, 2017). This could be due to the wide range of individual differences observed in the first months of life, in addition to the fact that, as we seen, most research used parental reports of joint attention and verbal communication, and all of them

had a descriptive scope and use non-probabilistic samplings (Kucirkova & Radesky, 2017; Wasik et al., 2016).

Media Exposure, Temperament, and Joint Attention in a Latin American Context

To date, most of the research examining links between book and electronic media use to temperament and joint attention have been conducted in Europe and North America. However, it is important to examine these effects across multiple context and samples to have a better understanding of development. One typically neglected region is the study of these abilities in Latin America, where 90% of parents reported that their children use some type of electronic device, and that a third of infants use cell phone or TV one hour a day before turning 2 in Argentina (Sociedad Argentina de Pediatría, 2020; Waisman et al., 2018). It has been found that parents share books with their infants less than 15 minutes per day, being relegated when introducing technological screens (Waisman et al., 2018).

Further, samples from Argentina may provide additional information of the interplay between multiple environmental factors as 9.8% did not complete primary school, 31.8% were unemployed and 13.5% live overcrowding (Salvia & Bonfiglio, 2019). In addition, 8.9% of children between 0 and 17 had hunger in the last 12 months, 17.4% had no medical checks in the last year, 13.4% did not attend an educational establishment or it has stimulation at home (books or toys) and 18.5% live overcrowding (Tuñón & Poy, 2019). Research has shown that children that live in these vulnerable situations may be especially affected in these key developments in temperament and joint attention. Only three studies in Argentina used behavioral approach in small sample size ($n < 100$) studied low SES group of mother-infants under two years of age (Gago Galvagno et al., 2019; Lipina et al., 2005), founding that infants from families with UBN indicators had lower scores on regulation and joint attention tasks (effect sizes from .10 to .20), and that parental education was the variable with the highest level of correlations coefficients (.20 to .30).

These factors may make parent-infant interactions more difficult, as it is an environment bound to generate high levels of stress and socio-emotional difficulties with reduced access to information and stimulation (Brooks-Gunn & Markman, 2005; Richaud & Arán-Filipetti, 2015; Rodríguez & Monge, 2017), producing a lack of learning opportunities at home

(Bornstein & Puntnik, 2012). Thus, a better understanding of how use of different type of media may relate to children's cognitive abilities may be especially important in a Latin American Sample.

The Present Study

The objective of the present study is to analyze the relation between media exposure with joint attention skills and temperament. Although prior work has relied heavily on indirect psychometric scales (parent reports) to measure nonverbal communication related issues (Miller et al., 2017), the present study will examine joint attention through direct behavioral observation. This work will also focus on the first year of life, which is important given that temperament and joint attention are foundational skills fundamental to later development. Finally, this work will focus on a novel Latin America population, valuable to better understanding how these relations may be similar and possibly diverge from studies in another context. This work has the potential to inform interventions to promote and stimulate joint attention, effortful control and surgency temperamental styles.

We expected to find that different media (i.e., computer, TV, internet and cell phone and books) which infants are exposed to in their homes during the first months of life would be associated with their joint attention skills and with different temperamental styles. Particularly, we expected to replicate results found in North America and Europe in this Latin American sample, suggesting that activities requiring an infant sustained level of attention and behavioral arousal such as sharing books would be positively related to joint attention skill. In addition, interactions that imply infant passivity (i.e., electronic media) would have a negative relation to this ability, with a moderate effect size (.30 approximately). Also, based on previous studies, it is expected that infants with a greater use of books and less of electronic media will demonstrate higher levels of surgency and effortful control, and a positive association between electronic media use and negative affect, and negative with books, with a low effect size (.20 approximately).

Method

Participants

The sample consisted on 60 mother-infant dyads, from 9 to 13 months of age, with a mean age of 10.64 months. The sampling used was non-probabilistic, convenience type. All babies were born in Argentina, and their mothers were from Argentina (46), Paraguay (8) and Bolivia (6).

Participants were recruited from low-to-medium SES backgrounds attending public and private educational institutions and homes in the Province and Autonomous City of Buenos Aires. Although any primary caregiver was invited to participate, only 32 mothers participated at the center and 28 mothers participated in at home visits.

The sample selection criteria were: Spanish as a native language, normal vision and hearing, absence of serious illness, no family history of psychiatric illness, no history of significant head injuries, seizures or neurological disease, or substance abuse or drug dependence from the mother. In addition, infants had to be born at term and with height and weight suitable for gestational age, and they had to be free of any symptoms of acute illness. These criteria were confirmed by reviewing the medical history of the mother and toddler. Three babies born prematurely were excluded from the final sample.

Procedure

The study protocol was approved by the Ethics Committee of the Universidad de Buenos Aires; in accordance with the Declaration of Helsinki, written informed consent was obtained from all participating mothers.

Each infant was evaluated together with his or her mother. At the beginning of the session, the researcher explained the task to the mother, who was instructed to play with her child as if the two of them were at home. The toys were the same for all participants and included a book of 20 cm x 15 cm with different drawings and textures, called '¡A comer!' of the Tin Cat® edition Guadal, a doll of 20 x 15 cm, a plastic red toy car of 8 cm x10 cm, and 7 little buckets of different size and colours that fit together. After the instructions, the researcher would leave the room and return 10 minutes later to conclude the play session.

After this free-play episode, the mother was asked to complete the Home Stimulation Subscale (SES Level scale, INDEC, 2001) and the Infant Behavior Questionnaire-Revised Very Short Form (IBQ-R VSF, Putnam et

al., 2014). Behaviors were videotaped and timed using a Sony HD HDR-CX160® video recorder and a chronometer Model CR202 of the Galileo Italy® line. The researcher – who was male-, was the same for all participants.

Measures

Home Stimulation Subscale (SES Level scale, INDEC, 2001)

This instrument was used in previous research (Gago Galvagno et al., 2019; Gago Galvagno & Elgier, 2020). It evaluates the frequency of use of TV, computer, internet and cell phone using a 4-point Likert scale in response to the question “How often does your child use the following elements?”. The frequency was divided into the response options: never (1), almost never (2), almost every day, and (3) everyday (4). The presence of books was assess using a 4-point Likert scale in response to the question “How many books are there at home?” with response options of: “Less than 10” (1), “Between 10 and 51” (2), “Between 51 and 100” (3), “More than 100” (4). The reading frequency was also assess using a 4-point Likert in response to the question “How often do you read to your child?”: "Less than once a week" (1), "One time per week" (2), "Three times a week" (3) and "Every night" (4). The final score for each media use was created as an average of the scores.

Infant Behavior Questionnaire-Revised Very Short Form (IBQ-R VSF, Putnam et al., 2014)

The IBQ-R VSF is a parental reporting scale widely used to assess temperament in infants aged 3 to 12 months. The 36-item version of the questionnaire was used. Mothers rated the frequency of their baby's specific behaviors using a 7-point Likert scale: Never (1), Almost never (2), Less than half the time (3), Approximately half the time (4), More than half the time (5), Almost always (6), Always (7) and it didn't happen (no score). The 36 items of the IBQ-R VSF can be divided into three factors (based on 12-items each): effortful control (ability to suppress and inhibit dominant responses), surgency (positive emotions, affective and high level of activity) and negative affect (predisposition to fear, anxiety, sadness, frustration and discomfort). The internal consistency was examined with Cronbach's alpha. The coefficients were .65 for effortful control, .61 for surgency and .63 for negative affect, which is acceptable according to Putnam et al. (2014).

Categories of Engagement (Bakeman & Adamson, 1984)

The coding scheme developed by Bakeman and Adamson was used to measure joint attention behaviors. It categorizes behaviors exhaustively into distinct and mutually exclusive periods based on infant's engagement with objects and/or with adults (Bakeman & Adamson, 1984). This coding scheme gives rise to the following communication behaviors: a) Unengaged: The infant is not interested in an object or a person, and visually explores around. (b) Onlooking: The infant is observing another's activity but is not taking part in that activity. (c) Persons: The infant is engaged with the other person; typically, such engagement involves face-to-face or person play. (d) Objects: The child is playing or exploring an object entirely on his or her own. (e) Passive joint engagement (PJE): Infant and mother are paying attention to the same object. The mother actively manipulates the object and tries to direct the infant attention to the object through gestures and words. (f) Coordinated joint engagement (CJE): The infant is actively involved with and coordinates his or her attention to both the mother and the object that the mother is involved with. For example, the baby takes with his hand the same toy that the mother is manipulating, observes it, and then alternates the gaze to the mother. (g) Off-camera: when the infant moves outside the camera's frame (no behavior was codified during these time intervals). "Time" for each communication behavior was calculated as the sum up of the number of seconds each kind of engagement state lasted. Finally, it is worth pointing out that periods lasting less than 3 sec., were not regarded as indicating an engagement state change.

Coding Process

From the beginning, we limited our analysis to the five minutes in the middle of the play session, discarding the initial two and a half minutes and the last two and a half minutes, to avoid novelty biases and fatigue effects, respectively (Canal & Rivière, 1993). The data analysis was conducted by two evaluators previously trained to code the described variables.

The Etiquetas® program was used to code videos on real time. It allowed assigning a keyboard key to each one of the behaviors, so that when pressing a key, the previous one ceased to be valid. This facilitated the evaluation, since the program carried out automatically the process of exclusion and generated a table with the quantity of behaviors and time (in seconds) in which each behavior was manifested. In addition, the program allowed the researcher to

return to each marked behavior to check if the time from one engagement to another was correct.

Reliability Coding

The primary coder coded all the videos. A second coder coded 15 randomly selected videos (25% of total). For all communication measures, intraclass correlation coefficient were greater than .92 for the continuous variables ($p < .05$).

Analysis Plan

Data were analysed using SPSS statistical software for Windows, release 25. A post hoc power analysis was computed to determine whether sample sizes provided sufficient power to detect associations effects. With $\alpha = .05$, the power estimates ranged from .50 to .65 with an effect size of .20 and .30 respectively, indicating low to moderate power to detect association effects (Faul et al., 2009).

Table 1

Mean and standard deviation of the measured variables

Measurements	<i>M (SD)</i>	<i>95% CI</i>	<i>Range</i>	<i>n</i>
Media Exposure				
Amount of Books	2.33 (1.25)	[1.88, 2.86]	1-4	60
Reading frequency	1.97 (1.01)	[1.50, 2.27]	1-4	60
Cell phone use	1.74 (1.09)	[1.30, 1.89]	1-4	60
Internet use	1.83 (1.08)	[1.43, 1.97]	1-4	60
TV use	3.09 (1.01)	[2.72, 3.46]	1-4	60
Computer use	1.58 (1.05)	[1.19, 1.96]	1-4	60
Joint attention skills				
Time with no interaction	7.11 (14.50)	[1.37, 12.85]	0-69	60
Observation	43.08 (46.27)	[22.79, 64.55]	0-279	60
Object	161.85 (61.16)	[137.66, 186.05]	21-244	60
Person	7.37 (13.55)	[3.12, 3.61]	2-12.74	60
Passive Joint Engagement	55.74 (37.04)	[40.94, 70.54]	0-154	60
Coordinated Joint Engagement	14.78 (23.74)	[5.39, 24.17]	0-115	60
Out of Camera Time	7.93 (20.15)	[0.03, 15.88]	0-79	60
Temperament				
Surgency	5.63 (0.64)	[5.38, 5.84]	4-7	60
Negative Affect	4.31 (1.20)	[3.84, 4.79]	2-6	60
Effortful control	4.98 (0.71)	[4.70-5.26]	4-6	60

Note: PJE Passive joint engagement, CJE: Coordinated joint engagement.

The results of the descriptive statistics are shown in Table 1. We examined correlations of joint attention behaviors, temperamental styles, media use and books, presented in Table 2 to address our research question focused on examining media exposure associations with joint attention and temperament during the first year of life.

Table 2
Correlations between communication variables, temperamental styles and media

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. PJE	-	.25	.25	-.02	.20	.34*	.29*	.21	.20	.17	.19
2. CJE		-	.30*	-.14	.14	.43**	.30*	-.11	.03	-.16	-.09
3. Surgency			-	.07	.23	.52**	.38*	.09	.34	.10	.01
4. Negative Affect				-	.14	-.14	-.04	-.13	.16	.20	.18
5. Effortful control					-	.21	.15	.28	.15	.27	-.02
6. Amount of books						-	.52**	.17	.06	.09	.01
7. Reading Frequency							-	.25	.42*	.29	.50**
8. Cell Phone Use								-	.17	.27	.25
9. Internet Use									-	.20	.66**
10. TV Use										-	.13
11. Computer Use											-

Note: PJE: Passive joint engagement, CJE: Coordinated joint engagement.

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

Finally, due to the moderate to high correlation and collinearity between the predictor’s variables (i.e., Amount of Books and Reading Frequency), multiple linear regression analysis was conducted examining whether Amount of Books and Reading Frequency predicted Passive join engagement, Coordinated joint engagement and Surgency.

Results

Descriptive Statistics

On average, families had between 10 and 51 books in their homes, shared books with infants once a week or less, never or almost never used internet, computer or cell phone, and almost every day and every day used television.

With regard to descriptive statistics for engagement behaviors during the free play session, infants interacting only with an object was executed the longest time (53%), and only 2.37% of infants displayed no interaction with

an object. These descriptive results are similar to those found by [Backeman and Adamson \(1984\)](#) in a North American sample using the same measurement scale. The large standard deviation indexes, typical of this age range samples, should be highlighted. No interaction with an object, observation, person and coordinated joint demonstrated floor effect, given that skewness and kurtosis for each variable were higher than ± 2 and ± 7 respectively ([West et al., 1995](#)).

Finally, temperamental styles were average for this sample according to [Putnam et al. \(2014\)](#). Descriptive statistics are presented in Table 1.

Associations Between Variables

Associations between the different early interaction behaviors, temperamental styles and media variables were examined. With regard to early interaction behaviors, we found that passive (PJE) and coordinated (CJE) joint engagement were significantly associated with the number of books and the reading frequency. That is, as the number of books in the home and the frequency of reading to infants increased, the frequency and time of joint attention behaviors also increased. No correlations were found between the rest of interaction behaviors with media variables (No interaction, Observation, Object, Person and Out of Camera) ($p > .05$). With regard to temperamental styles, only surgency was associated in a significant and positive way with number of books and frequency of reading, as the greater the number of books and interactions with books in the caregiver-infant dyads increased, the level of surgency reported by parents increased. No correlations were found with effortful control and negative affect ($p > .05$). Correlation statistics were presented in Table 2.

Concurrent Predictors of Passive and Coordinated joint engagement

We also examined number of books and reading frequency as predictors of the time spent in coordinated joint engagement during free play sessions. The overall model was significant, explaining 37% of the variability in coordinated joint engagement ($F = 2.44, p = 0.040, R^2 = 0.369$). Only Number of Books at home significantly related to time of Coordinated joint engagement ($\beta = 0.421, p = 0.035$), indicating that as the Number of Books at home increased, time of Coordinated joint engagement during free play sessions tended to improve.

For Surgency, the overall model was significant, indicating and explaining 50% of the variability in this variable. Only Number of Books at home significantly related to Surgency level reported by mothers, indicating that as the Number of Books at home increased, frequency of Coordinated joint engagement during free play sessions tended to improve.

Finally, no associations were found between frequency of use of books with respect to Passive join engagement ($p>.05$). Regression coefficients are presented in Table 3.

Table 3. *Results of multiple linear regressions for joint attention behaviors and surgency*

Dependent variables	F	R ²	Amount of books		Frequency of reading	
			Standar β	<i>p</i>	Standar β	<i>p</i>
Passive Joint Engagement	1.36	.11	.292	.133	.076	.691
Coordinated Joint Engagement	2.44	.36	.421	.035	.198	.306
Surgency	5.26	.49	.357	.043	.115	.195

Discussion

The aim of this research was to a) analyze the associations between media exposure and joint attention skills, and b) analyze the relations of media exposure and joint attention with temperamental styles. Facts like the number of books owned and the frequency in which parents shared them, were positively associated with an increase in the time of joint attention behaviors during free play sessions. In turn, joint attention behaviors and books quantity and use were associated with higher levels of infant surgency, as reported by the mothers. These results are consistent with previously conducted research (Cooper et al., 2014; Farrant & Zubrick, 2012; Vally et al., 2015) where sharing books at home was positively associated to joint attention behaviors throughout the first year of life. Both, correlation coefficients and effect size, were moderate and large for this age range compared to other investigations in the same age period (Cooper et al., 2014; Vally et al., 2015).

However, only the number of books variable predicted joint attention and surgency behaviors with a moderate to large effect size (Vally et al., 2015). The number of books at home and their visibility could be associated with parent's education and SES, and also it was related to frequency in which they share them. Extant research findings indicate that low-SES families read

less frequently, own fewer books, ask fewer questions of their children and talk less with their children than do higher SES families (e.g., [Brooks-Gunn & Markman, 2005](#)). All these variables were connected to cognitive performance during the first years of life in an Argentine context ([Prats et al., 2018](#); [Rubilar et al., 2017](#)).

Nevertheless, other researchers did not find these effects and if so, they were very limited, such that sharing books between adult and infant during the first years did not predict nonverbal communication skills in later years ([Karrass & Braungart-Rieker, 2005](#); [Wasik et al., 2016](#)). This result divergence could be because of the way communicative skills are measured in the first years of life. In most studies, psychometric parental reports are used, which could bias the results, whereas it was found that parents tend to overvalue infant behaviors ([Miller et al., 2017](#)). In this sense, this research is the first one to use this type of behavioral measurements in the first year of life in a Latin American sample.

Regarding the lack of associations between media exposure and the other engagements (e.g., no interaction, observation, object and person interaction behaviors), it should be noted that these behaviors are present from the first months, as it is a consequence of the mere interaction with adults without an intermediate object. Being such simple and robust behaviors, where only an alert attention system is required ([Saxon & Reilly, 1999](#)), they are not linked to toddler's environment. However, it is necessary to highlight that most of these variables obtained a floor effect, this could be because of the novelty of the task for some infants, which could generate more interactions with objects and passive engagement with the mother ([Hutton et al., 2004](#)). On the other hand, a lack of correlation with the other variables could be due to the fact that during the first year of life infants are still not in contact with internet, cell phone and computers, as the descriptive statistics showed.

However, in the first months of life, adults tend to be more present and share moments watching television ([Hipp et al., 2017](#); [Pempek & Lauricella, 2017](#)) compared to the following years, where children have more autonomy. This could explain the later negative effects of media on nonverbal communication observed in research in Europe and North America ([Masur et al., 2016](#)). Along these lines, several pediatric associations suggest the use of electronic media should not exceed one or two hours a day for children over two years of age, and should be avoided under this age ([American Academy of Pediatrics, 2016](#); [Sociedade Brasileira de Pediatria, 2016](#)). Although,

descriptive results revealed that in certain cases, infants under 1 year of age are already using electronic media.

Concerning temperamental styles, surgency was the only one positively associated with joint attention behaviors, book quantity and reading frequency, with a high coefficient for this age range, perhaps because of the sample characteristics (Cooper et al., 2014). Also, surgency was related to higher levels of activity, positive affect, impulsiveness and risk taking; therefore, infants so described by their mothers would be expected to carry out more communication and active interaction behaviors with adults and encourage them to share books, since they outnumber the others in environmental exploration behaviors (Rothbart et al., 2004).

The absence of relations with negative affect and effortful control may be due to, i) the volatile communication behaviors and the high intersubject variability in early childhood (as observed at the relation of means, deviations, skewness and kurtosis); ii) that temperament is a very unstable characteristic at this stage of development (Putnam et al., 2006), iii) to the use of parental reports, iv) being Argentina a more collectivist culture, even when they use electronics which have less interaction with a caregiver, they approach it in a more collective rather than independent way leading to possibly less negative effects in media use activities.

Conclusions

We found associations between books quantity and use, joint attention behaviors and surgency in the first months of life. Sharing books, as stated, implies that the infants must exercise sustained attention in the first place, to be able to codify the relevant stimuli shared with the adult. On the other hand, while sharing a book, the infant enters into an activity where he shares gestures and gaze with the adult. Not only do the infant follow the adult's gaze and signalling towards relevant stimuli but the infant also generates indications to guide the adult's behaviour and thus be able to take part and participate in the task. This joint attention exercise would lead to an increase in verbal communication behaviors and participation from early developmental stages (Adamson et al., 2019; Salo et al., 2018). This could demonstrate the importance of sharing books in both low and mid SES Argentinian contexts, being that this activity is associated with greater probabilities of interacting with adults (Murray & Egan, 2014).

It should be clarified that the following research has certain limitations. For example, due to accessibility and evaluation restraints in this population, the representation size is relatively small and collected from a non-probabilistic sampling. Given the small size and heterogeneity of the current research sample (from 9 to 12 months), it is possible that these non-significant findings can be attributed to a lack of statistical power. In addition, another limitation was that families' socioeconomic and educational level were not controlled, which, as stated, could be linked to the number of books and use of electronic media. Further, this was a cross-sectional study with the limitations - and benefits - that this approach brings. In addition, adult behavior should have been coded as well, and used in conjunction with infant behavior to provide a more thorough analysis of coordinated interaction. Also, the type of media content and if the parents share the activity with infants should be considered. Finally, temperament was estimated using parental reports, which makes it an indirect type of measurement.

Future research should increase and diversify (to other provinces in the country) the sample size; generate a longitudinal study assessing the trajectories of communicative development; and use direct behavioral measurements of childhood temperament, adult behaviors, type of media content and if parents share activity with electronic media. Finally, our work shows the potential of nonverbal communication research. To enhance the integral development of children it would be useful for future researches to focus on the impact of reading to infants in their first months of life, in favor of promoting joint attention skills during that time span.

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