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## Resumen

En este trabajo realizamos un experimento de información sobre la exposición a pantallas en la primera infancia, proporcionando a los cuidadores recomendaciones basadas en instituciones de salud reconocidas a través de un video en línea y un folleto digital. Evaluamos la efectividad de esta intervención de bajo costo utilizando datos originales sobre la cantidad y calidad de la exposición a pantallas. Encontramos efectos nulos en el tiempo de pantalla y la calidad de la exposición en la muestra general, con efectos leves en las creencias parentales. Sin embargo, los cuidadores pertenecientes a grupos vulnerables mejoran sus creencias y la calidad de la exposición a pantallas de sus hijos. Además, hallamos evidencia sugestiva de efectos significativos de la encuesta, donde la autoevaluación de las prácticas de crianza se ve influenciada por la realización del cuestionario. Estos resultados ofrecen información relevante para el diseño de políticas que fomenten la adquisición de habilidades a través de las tecnologías digitales, modificando las creencias y prácticas parentales.

Palabras claves: Experimento de información, creencias y inversiones parentales, medios digitales, bebés y niños pequeños.

Código JEL: C93, D83, O15, J13.

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# Screen Exposure in Early Childhood: an Experiment on Parental Practices and Beliefs

Karina Colombo* Elisa Failache†

**Abstract**

We conduct an information experiment on screen exposure in early childhood by providing caregivers with recommendations based on recognized health institutions through an online video and digital leaflet. We evaluate the effectiveness of this light touch intervention using original data on the quantity and quality of screen exposure. We find null effects for screen time and quality of exposure in the overall sample, with mild effects on parental beliefs. However, caregivers belonging to vulnerable groups improve their beliefs and their child's quality of screen exposure. In addition, we find suggestive evidence of strong survey effects from the self-assessment of parenting practices motivated by the completion of the questionnaire. These results provide evidence to design policies that promote skill acquisition from digital technologies by changing parental beliefs and practices.

**Keywords: information experiment, parental beliefs and investments, screen media, infants and toddlers.**

**JEL Codes: C93, D83, O15, J13.**

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# 1 Introduction

We are living in a time of digital technologies. Internet connected devices have paved their way into almost every aspect of our lives (UN, 2019). This has substantially changed the relationship between screens and children, especially in early childhood. The new generations of digital natives are exposed to screens at increasingly early ages, affecting they way in which they are mentally stimulated and potentially the development of their cognitive and non-cognitive skills (Goode et al., 2019; Holloway et al., 2013; Rideout et al., 2013). This is why many health related institutions have issued recommendations on limiting screen time of infants and toddlers (Radesky et al., 2016; WHO, 2019). However, a significant proportion of parents are not complying with these guidelines. In this paper we analyze whether imperfect information is the reason behind this by implementing an information provision experiment to improve screen exposure in early childhood.

Media parenting practices reflect a complex decision-making process, involving the balancing of costs and benefits in a context of heterogeneous beliefs and imperfect information. Parents are receiving mixed informational signals concerning the potential benefits and harms of screen exposure on children's abilities. On the one hand, they are being bombarded by a plethora of screen products designed for infants and marketed as educational (DeLoache and Chiong, 2009). On the other hand, the knowledge of screen exposure recommendations is still limited. Data for the U.S. shows that only 20% of parents of young children are aware of these recommendations or have discussed media use with their child's pediatrician. Furthermore, many caregivers believe media use is beneficial for their child's learning skills, even for children under 2 years of age (Rideout, 2017). Moreover, even if parents incorporate the potential risks of screen exposure in early ages into their information set, limiting screen time is costly. Given that they are extremely effective in capturing infants attention, they function as on-demand babysitters with endless availability at a very low cost (DeLoache and Chiong, 2009; Kostyrka-Allchorne et al., 2017).

This study analyzes the effects of an intervention aimed at improving children screen media exposure by providing information to parents of children between 0 and 5 years of age. Caregivers were exposed to an online video summarizing the recommendations made by recognized health institutions on the regulation of media time and best practices during exposure. We complemented this by sending a digital leaflet containing information reinforcing the video and personalized recommendations on day-to-day strategies to improve the quantity and quality of screen exposure. The objective of our intervention was two-fold: align parental beliefs with international guidelines on screen exposure, and provide simple strategies to reduce the cost of improving exposure.

Highly recognized health institutions such as the World Health Organization (WHO) and the American Academy of Pediatrics (AAP) recommend parents to limit young children screen time given its opportunity cost in terms of development. They suggest avoiding screen media for children younger than 18 months, and then restricting screen time to 1 hour a day.[1] Moreover, since the potential effects of screen time on children's skills depends

[1] The WHO guideline is even stricter, recommending to avoid screens for children younger than 24 months.

on the type of exposure, they also recommend controlling the content and context of screen time (Radesky et al., 2016; Estefanell, 2021). They suggest: high-quality programming with parental co-viewing; avoiding screens during meals, before bedtime, and as a way to calm the child; and to restrict background exposure. We summarized these recommendations in a one-and-a-half-minute video and a short digital leaflet that communicate the suggested parenting practices in a very concise way. Our treatment can be considered a light-touch program with very low marginal costs and easily scalable.

Our intervention was implemented through a randomized controlled trial in Uruguay. Both the intervention and surveys were performed fully online. We collected baseline data starting in March 2023 from caregivers working at the main university and through social media adds, recruiting 2,341 caregivers. Our unit of analysis was the parent-child dyad, from which we collected background information as well detailed data on screen exposure practices, cost of regulating screen exposure, adult use of screens while caring for the child, and parental beliefs on screen exposure. At the beginning of the baseline survey we randomly assigned caregivers to treatment and control, embedding the intervention video at the end of the survey. After the video, parents could directly download the personalized digital leaflet or request to have it sent by email. The control group was active, with the same content asked at baseline and receiving an analogous video and digital leaflet on feeding recommendations in early childhood. Seven weeks after baseline, we collected follow-up data for 1,390 caregivers to measure short-run effects on beliefs and our primary outcomes regarding screen quantity and quality. Moreover, we conducted a short survey almost two years after baseline to assess the persistence of our study in follow-up participants and to gather additional evidence to explain our results, obtaining 563 responses.

Measuring the quality of screen exposure in early childhood is a challenging task. Potential harm in terms of child development is not given by exposure per se, but from inadequate use that reduces learning possibilities from the interaction with others and the environment. Thus, to evaluate our intervention we construct two measures that considers the complexities of screen exposure. First, to assess excessive screen time we construct a measure of screen quantity through a global time estimate considering weekdays and weekends and including primary and secondary exposure (i.e. while doing other activities). Second, to measure the quality of screen exposure we developed a survey instrument evaluating six dimensions regarding parent-child practices: co-viewing with adults, content quality, use of parental controls, moments of exposure, rules for screen exposure and background exposure. These dimensions are then summarized into an index, covering all key aspects suggested by trustworthy institutions to limit harm from exposure in early childhood. All the information used to construct our measures is reported by the child's caregiver through survey questions.

Our results show almost null treatment effects for the overall sample regarding the quantity of screen time and the index of quality of exposure. When analyzing the individual dimensions of exposure quality we observe a treatment effect of -0.122 SD in co-viewing. This is the opposite of what we expected given our intervention, and it is explained by an improvement in both the treatment and control group that is higher in the latter. In

addition, our intervention is partly effective in improving parental beliefs. Caregivers are more in agreement with avoiding screen time before 18 months of age, with a treatment effect of 0.118 standard deviations (SD). Contrary to the results in the overall sample, our intervention was effective in improving screen quality for certain vulnerable groups. When considering heterogeneous effects we observe an improvement in the quality index for those with lower quality of child-caregiver time, and for those caregivers that believe child development is not malleable to their own actions. Moreover, the index of overall beliefs on screen exposure improves for the least educated caregivers and for those who with lower quality time with the child (0.160 SD and 0.194 SD, respectively).

The mild effects of the intervention are not explained by parents already complying with recommendations on screen exposure, nor by a lack of relevance of the treatment. Our data shows that the level of compliance with international guidelines is low across most dimensions. Around three quarters of the children in our study do not comply with the suggested screen time limit, almost 60% watches mostly non-educational videos, around half is exposed to content that is not identified for the child's age, 18% uses screens during meals, and almost one fifth uses screens before bedtime. 28.9% of caregivers never use parental controls, and almost 60% uses screens to calm their child. In addition, participants found the intervention relevant and provided positive feedback. Among the treated caregivers, 80.6% watched the full video and a similar figure requested the online leaflet. Almost all caregivers had heard of at least some of the recommendations in the video, but still 83.6% found its content quite or very useful. From those in the follow-up sample, 70.8% reported reading the digital leaflet and 86.2% found it useful. This suggests that an information intervention on screen exposure is relevant to improve parental practices.

Our data also shows significant improvements between baseline and follow-up in both the treatment and control groups for several dimensions of quantity and quality of screen exposure. Screen time decreases significantly, with reductions of 0.141 SD in the treatment group and of 0.148 SD in the control group. Co-viewing practices also increase significantly between survey waves, with a difference of 0.111 SD in the treatment group and a difference of 0.255 SD in the control group. Moreover, the overall quality index increases for the complete sample by 0.074 SD. Beliefs show a positive trend, with caregivers being more in disagreement with the phrase "playing with screens they can learn as much as with adults".[2] We believe that these changes in beliefs and behaviours are explained by survey effects, that is, effects derived from answering the questionnaire in the baseline survey. We believe that the completion of the baseline survey conveyed part of the information contained in the recommendations of screen exposure, while prompting a self-assessment of parental practices that signaled opportunities for improvement, leading to a change in behavior. Although our evaluation was not designed to causally identify this type of effects, we have suggestive evidence pointing that this is the case. Almost two years after the beginning of our study we find evidence that the questionnaire in itself left a mark in the memory of participants and motivated changes in behavior. Within caregivers in our medium term survey, half

[2]From the six beliefs measured in the follow-up survey, we can only analyze the evolution of two beliefs that were also measured at baseline.

remembered the topic of the study. Among the treated, for 70% the first subject that came to mind was screens. For those in the control group, around half says feeding, the topic of their intervention, but still 36% mentions screens as the first topic. Moreover, when we inquired on the topic of the video, 16% in the control group incorrectly remembers it was about screens, showing the saliency and persistence of the questionnaire vs that of the video. Finally, when asked if the study had motivated a reflection on daily parenting issues, the most named topic both in treatment and control was screens.

Our baseline questionnaire had an extensive module on screen exposure practices both in the treatment and control group, assessing each of the recommendations with clear examples, inadvertently passing on partial information on international guidelines to both groups. Moreover, our follow-up survey was only seven weeks apart, without any major social or economic events occurring during that time. In addition, data shows that the improvements are driven by those with beliefs less aligned with the recommendations at baseline, providing evidence of genuine belief updating. We also test for the robustness of these improvements to the Easter holiday week and atypical climatic events (heat or cold waves), since these circumstances can incentivize screen time in children. We observe the same evolution in the sub-samples excluding caregivers affected by these factors. In addition, we find qualitatively similar results in caregivers with low social desirability, making these improvements robust to experimenter demand effects and social desirability issues.

Overall, our study indicates that a light-touch intervention on screen exposure can have differential effects on vulnerable groups with higher marginal gains from the provision of information. Moreover, being exposed to opportunities for reflection on habits and practices can also serve as a tool for behavioral change, as our survey effects suggests. Additionally, information-based interventions alone may not be sufficient, as our data show that most caregivers who do not comply with the recommendations face effort-related barriers in aligning their behavior with these guidelines.

This study contributes to the literature in several ways. First, it provides evidence on the effects of a light touch information intervention on early parental investment, contributing to the abundant literature on parental decisions in early childhood. To the best of our knowledge, this is the first study that analyzes imperfect information issues in parental decision-making regarding screen exposure. Second, we introduce a survey instrument to measure the quality of screen exposure in early childhood, summarizing the aspects considered by international guidelines and allowing us to conceptualize exposure beyond screen time. Third, we evaluate if imperfect information is the relevant constraint in improving children media exposure. Our results provide evidence for the design of policies that foster a responsible relation with new technologies in a crucial life period for human capital accumulation, contributing to the analysis of the new challenges posed by the expansion of digital technologies.

**Related literature.** This paper relates to three strands of the literature. First, it contributes to the increasing economic literature on information provision experiments. Several articles have analyzed the role of information on parental decisions in school years. Greaves

et al. (2021) exploit randomly-induced variation in parental beliefs on school quality in England, finding crowding out effects of good news on parental time investments. Dizon-Ross (2019) analyzes how information on children's academic performance affects parental decisions in Malawi. Her results show that parents use their beliefs to make high-stakes investment decisions, and that they react to information by choosing educational inputs that are more aligned with true performance. Moreover, experiments have also been used to study the effects of information on parental health decisions, such as children's vaccination, preventive measures on worm infections, children's nutrition, diarrhea treatment and children's weight, usually finding positive effects of information on parental behavior (Fitzsimons et al., 2016; Kremer and Miguel, 2007; Levine and Kinder, 2004; Nyhan et al., 2014; Prina and Royer, 2014).

Second, this paper relates to the literature that focuses on parental beliefs and its relationship with parental investments and outcomes in young children. Several papers have showed that the variation in parental beliefs is relevant to explain investments during early childhood (Cunha et al., 2013; Attanasio et al., 2019; Boneva and Rauh, 2018; Cunha et al., 2020; Bhalotra et al., 2020; Biroli et al., 2020). Moreover, more recent studies have analyzed how interventions may affect parental beliefs and consequently behaviour. Carneiro et al. (2019) analyze how a large-scale parenting program targeting poor families in Chile affects parental beliefs, and how this relates to children's outcomes. They find significant impacts on parental expectations and children's outcomes. List et al. (2021) analyze the malleability of parental beliefs in two field experiments, one involving an audiovisual information treatment and the other one involving home visits, using data from mothers with low socioeconomic background in the US. They find that beliefs are positively affected in both interventions, but children outcomes only change with the more intensive version. Overall, this literature highlights the importance of early interventions on parental beliefs, specially in households with lower socioeconomic backgrounds.

Finally, our study relates to the literature on inteventions aimed at improving parenting skills in early childhood to increase child development. There is an extensive literature on intensive programs mediating human intervention, such as parental workshops or home visits (for example Love et al. 2005; Gertler et al. 2014; Araujo et al. 2021; Attanasio et al. 2022). More recently, several studies have focused on technology based interventions, such as using automated calls or text messaging (for example York et al. 2019; Mayer et al. 2019; Bloomfield et al. 2023). While programs with human intervention tend to be more effective in improving parenting practices and children outcomes, they imply higher costs and are therefore more difficult to scale up and sustain over time. On the contrary, technology-intensive programs face lower costs but may not always be effective.

Our study contributes by analyzing the causal effect of parental beliefs on investments, by randomly inducing changes in the information set of parents. It is closely related to the paper by List et al. (2021), but in our case we focus on parental beliefs regarding screen exposure and analyze the effects of a light intervention that is easily scalable, on a sample with high level of education. We differentiate from the existing literature by focusing only on one

area of child-rearing, screen-related parenting practices, whose challenges extend to children belonging to higher socioeconomic backgrounds. In addition, our intervention implies low implementation costs, as well as low participation costs when considering caregivers time. The latter is crucial when wanting to involve more educated parents.

**Outline.** The remainder of the paper is structured as follows. Section 2 describes the context of the country in which the intervention was implemented. Section 3 presents the content of the intervention. Section 4 details the evaluation design. Section 5 describes our empirical strategy, including our outcomes measures. Section 6 presents the results, and Section 7 presents our final remarks.

# 2 Context

## 2.1 Screen Exposure in Early Childhood

Digital technologies have been rapidly expanding worldwide, reaching not only developed countries but also the developing world (WB, 2016). Considering children under 18, UNICEF estimates that one in three children are internet users worldwide, a figure that tends to increases for more developed countries (UNICEF, 2017). For instance, in the UK, approximately 60% of children aged 3 to 4 use devices to go online, a percentage that is even larger for Dutch, Belgian and Swedish preschoolers, reaching more than two thirds of this population (Holloway et al 2013). This has resulted in an overall increase in screen time for recent generations, together with a higher prevalence of media multitasking (Anderson and Kirkorian, 2015; Goode et al., 2019; Rideout et al., 2013). Furthermore, studies for the US have shown a rise in screen time during recent decades. For children up to two years of age time spent with screens has more than doubled, from approximately 1.3 hours a day in 1997 to 3.1 hours in 2014 (Chen and Adler, 2019). Likewise, children aged two to five show an increase of around one third in average daily hours, from 2.7 to 3.6. This increment in exposure has been mostly driven by the use of screens as a secondary activity while being engaged in a different primary activity, with most hours being devoted to watching television-like programming (Goode et al., 2019).

In this context, there has been a drastic expansion in the multimedia offer designed and marketed for children. Television-like content has considerably expanded to modern platforms, providing an almost unlimited amount of products through video-on-demand services. The two top streaming services, Netflix and YouTube, have launched their own kids section in 2011 and 2015 respectively, with more than 35 million users accessing children programming in the US (MUO, 2021; Nielsen, 2021; Post, 2016). Moreover, there has been a surge in the number of apps available for children, with currently more than 75,000 apps branded as educational in the Apple App Store (Apple, 2021). However, apps commercialized as educational have usually no evidence on their efficacy and are not designed by child specialists (Chassiakos et al., 2016; Radesky et al., 2016).

The setting we chose for the intervention is Uruguay, a developing country with a remarkable growth in the telecommunications sector, showing a digital development similar

to that of European countries (ITU, 2017, 2023). Over the past decade, the government has implemented a wide array of policies to increase internet quality and guarantee digital inclusion, such as a basic broadband plan that offered entry-level connectivity at no extra cost for households with landlines, the fiber-optic-to-the-home (FTTH) project, and the one-laptop-per-child program. As a result, the country has one of the most affordable mobile and fixed broadband services in America (ITU, 2017). This was accompanied by an improvement in the type of connectivity, with significant rises in fixed broadband and fiber-optic connections, reaching approximately 61% and 52% of households by 2018, respectively. In this context, internet use in children has more than doubled in the last decade, from almost 25% of school-aged children being daily users in 2006 to more than 60% in 2018. Even though there is no data available for children in early childhood, it is worth noting that more than half of 6-year-old-children are already daily internet users. Almost all children of this age use internet for entertainment purposes, while only 14% uses it for learning.[3]

Evidence on screen use in early childhood for Uruguay indicates high levels of exposure at early life stages, showing low levels of compliance with recommended exposure practices. Own estimations based on the Nutrition, Child Development and Health Survey (NCDHS) 2018 from the National Institute of Statistics and the Ministry of Social Development, show that a significant proportion of children are exposed to screens more than one hour a day. This percentage is increasing with age, going from 6.5% for those aged less than one, 20.6% for 1-year-olds, 39.5% for two-year-olds, 52.8% for 3-year-olds and 56.2% for 4-year-olds. Moreover, at least one fifth of 3- and 4-year-olds are exposed to screens for at least three hours a day, tripling the suggested time of exposure at these ages. In addition, evidence shows an increase in screen time among younger children.[4]

Complementary to this measure, we proxy low quality of exposure by analyzing caregivers' agreement with the following statement: "Leaving kids in front of the TV for a long period of time is a solution when mothers are busy". We use this question as an approximation for the quality of children's screen exposure given that it informs on using screens to entertain children without parental presence, going against the recommendation of children co-viewing with adults.[5] Around one third of parents with children aged 0-4 believe this practice is acceptable.

Another relevant indicator in the quality of exposure refers to the percentage of children that watch screens while eating, given that this practice is advised against in young children. Almost half of children aged 0 to 4 watch TV while eating. The incidence of this habit increases with age, with around one fifth of children younger than 1 watching TV while eating, while among 4 year-olds this indicator is close to 60% (see Section A of the Appendix).

[3] Own estimations based on the Continuous Household Survey from the National Institute of Statistics (CHS) and ANTEL administrative records on fiber-optic active services.

[4] Considering the NCDHS 2015 for comparable ages (2 to 4 years old) and using the same categories as for the screen time question as in 2015, we observe an increase in screen time for 2 year old children, where the proportion of those watching 1 hour or more increases from 0.582 to 0.682.

[5] Although agreeing with this statement does not necessarily mean that the caregiver her/himself is engaging in this practice, we believe it denotes a higher prevalence and acceptance of this behavior in her/his environment.

## 2.2 Information Provision on Child Rearing

Official recommendations on child rearing practices during the first years of life in Uruguay are provided to caregivers through the health care system. Uruguay has a centralized and publicly regulated system, the Integrated National Health System, that combines public and private providers. Health care coverage is almost universal, with 98.8% of the population declaring to have entitlements in a health provider. The Integrated National Health System ensures minimum and common standards on a set of basic requirements defined by the Ministry of Public Health (Fernández Galeano et al., 2015). The control of pregnant women and children in the first years of life are part of the healthcare goals established in the system. In this regard, the NCDHS 2018 shows that 96% of pregnant women had at least 5 prenatal visits, and 91% of children aged 0 to 4 years had a medical check-up during the previous year.

There are two main information policies on child rearing recommendations in early childhood: a welcome pack provided to all pregnant women through their health care provider, and a child health card provided by the pediatrician on the first consultation. The welcome pack is elaborated by the unit specialized in pregnancy and early childhood from the Ministry of Social Development, called "Uruguay Crece Contigo" (from now on, UCC). It contains several educational resources for the first months of life, including two books on child rearing practices. One is focused on the necessary care, stimulation and start of breastfeeding during the first three months of life, and the other one is a guide on attachment, stimuli, limits, habits and children's learning at each stage of development (MIDES, 2018). Almost 80% of parents with children aged between 0 and 4 declare having received the welcome pack, and around half state that they use the books on child rearing practices frequently.[6]

The child health card is an instrument to monitor children's health. It should be brought by the parents to each medical check-up for the pediatrician to fill-out. This card includes the child's medical history, vaccination record and data on their growth and development. Although this is not an information policy per se, the health card also contains a brief summary of official recommendations on development, feeding and safety. The coverage of the child's health card is almost universal: among the population of children between 0 and 4 years of age, 96% report having the health card (NCDHS 2018). Although the welcome pack and the child health card have almost universal coverage in the population of caregivers of infants and pre-school children in Uruguay, they do not address the topic of screen exposure in early childhood.

Finally, given that children in this age range regularly attend the pediatrician, there is a third informational channel through medical visits. According to estimations based on

[6]Starting in October 2022 UCC improved the welcome pack by updating the guide on child rearing practices. This new books includes a chapter on screens of approximately 800 words, describing the screen time limit recommendation and giving suggestions on how to implement it. We don't believe this poses a problem to our study since the stock change of the welcome pack was done gradually, and our baseline and follow-up surveys took place between March and June 2023. Moreover, the objective population of this policy are pregnant women and mothers of new borns, and our sample has only 11% of children younger than 12 months. This makes it less likely for our sample to have been affected by the new version of the welcome pack.

the NCDHS 2018, 86% of children aged 0 to 4 had a medical check-up in the last semester. The Uruguayan Society of Pediatrics includes the topic of screen exposure in the general guidelines for pediatric controls, but only starting at 4 years of age.(Alves et al., 2016) Given that 80% of 4-year-old children are already exposed to screens for at least one hour a day, the potential effectiveness of this policy is limited. Moreover, preliminary qualitative evidence from Uruguay indicates that this topic is not generally addressed in a preventive way by pediatricians (Cazulo et al., 2022). This is consistent with survey data from the U.S. in which a low proportion of parents declare speaking with their pediatrician on media use (although this figure has been increasing over the past years), and only half knows the recommendations given out by the American Academy of Pediatrics (Rideout, 2017). Overall, it seems that pediatricians have not yet fully incorporated screen recommendations into the usual advise given to parents on child-rearing practices during medical check-ups.

All in all, Uruguay provides an interesting setting to evaluate the effect of an information provision program on parental practices and beliefs regarding screen exposure. First, it has a high level of diffusion of new information and communication technologies, which are a key determinant of current patterns in screen media use (Anderson and Kirkorian, 2015; Kostyrka-Allchorne et al., 2017; Goode et al., 2019). Second, it does not have an official information policy on screen exposure aimed at caregivers of children aged 0 to 5. Third, evidence shows a low level of compliance with the screen recommendations made by health institutions for early childhood in this country. Therefore, setting the experiment in Uruguay allows us to evaluate: the role of imperfect information in the lack of compliance with screen exposure recommendations; how easy it is for caregivers to incorporate the recommendations in their information set; and how updates in beliefs can transfer into changes in behaviour.

## 3 Content of the Intervention

The objective of the intervention was to improve parental practices on screen exposure in early childhood by providing information to caregivers. The treatment was based on scientific literature on the topic and on recommendations made by trustworthy institutions, AAP, WHO and UNICEF Uruguay. We present a summary of the recommendations in Section B of the Appendix, and a summary of the scientific literature in the following paragraph.

The provided information was designed following five key concepts in the literature: video deficit and opportunity cost of screens, co-viewing with caregivers, children's media diet, moments and rules for screen exposure, and caregivers' media use. The phenomenon denominated "video deficit" refers to the lower ability infants and toddlers have to learn new skills from videos compared to live sources (DeLoache and Chiong, 2009; Radesky et al., 2016). This robust finding has been attributed to lower symbolic skills, immature attention control and memory flexibility, which leads to difficulties in transferring what is seen in a screen to the 3-dimensional world. The existence of lower educational benefits increases the opportunity cost of screens, specially considering that early childhood is an extremely sensitive period for skill accumulation. Even if screens are not bad in itself, they may displace

activities with higher productivity rates in the production of skills, potentially affecting human capital in the long-term. Another key finding in the literature refers to the importance of parental presence during viewing episodes. Studies show that video deficit can be partially mitigated with active parental presence during exposure, increasing children's ability to learn from screens, particularly when they explain and reteach the content. This shows how adult interaction remains fundamental for learning in very young children, highlighting the importance of co-viewing practices (Barr et al., 2007; Chassiakos et al., 2016; Kostyrka-Allchorne et al., 2017).

Furthermore, there is significant evidence underlining the importance of the type of content consumed. For children up to 30 months of age, adult programming has mostly shown negative associations with developmental outcomes, while children programming shows negative or no effects (Anderson et al., 2017; Chassiakos et al., 2016; Kostyrka-Allchorne et al., 2017; Radesky et al., 2016). For pre-school children older than 30 months, there is substantial evidence suggesting that educational television has a positive impact on children's development and subsequent academic performance. Moreover, positive effects on socio-emotional abilities have been found from programming with prosocial content. On the other hand, there is also evidence that children can learn non-beneficial attitudes, like unhealthy food habits from advertising and antisocial behaviour from inadequate or violent content. In this regard, changing the screen media content to high-quality has shown positive effects on behavioral and emotional outcomes (Calvert, 2015; Chassiakos et al., 2016). These results point to the relevance of media diet in young children's development. In this regard, specialists recommend the use of parental controls to regulate the type of content children are exposed to. Parental controls are tools that allow caregivers to limit what children can use/watch/do while engaged with internet-connected devices. They can be useful since the beginning of screen use to, for example, help limit the content to age-appropriate shows, limit the searching tools of online streaming apps, and to limit screen time by eliminating the autoplay of the next episode and through the use of timers (Estefanell, 2021; Netflix, 2022; YouTube, 2022).

In addition, beyond the use of screens as a primary activity, the literature provides evidence on the negative effects of using screens as a secondary activity, particularly while playing or during meals. The use of screens during active time can reduce the benefits of this activity since our memory system may work differently under multitasking, resulting in a deterioration in the quality of learning (Anderson and Kirkorian, 2015; Goode et al., 2019). Therefore, exposure to background television is discouraged. Eating while watching TV is associated with an increase in food intake since it distracts attention from satiety cues, resulting in a higher propensity towards obesity. Moreover, there are other moments in which the use of screens may be harmful to a child, even if it is with a primary focus. The use of screens before bed may alter children sleep patterns since exposure to the blue light emitted by modern devices in the evening hours affects melatonin production, a hormone associated with the regulation of sleep cycles (Gottschalk, 2019; Radesky et al., 2016; Moreno et al., 2016). Furthermore, the use of screens during tantrums as a frequent tool to calm a child

may prevent him/her to learn how to manage their own emotions, displacing the emocional learning that takes place in the interaction with caregivers (Estefanell, 2021; Radesky et al., 2023). Finally, the literature has found negative effects on children derived from parental exposure to television and interactive devices while taking care of the child. This stems from a reduction in the quantity and quality of interactions between parents and children due to parental use of screens (Kostyrka-Allchorne et al., 2017; Moreno et al., 2016; Radesky et al., 2016).

The intervention involved one treated and one control group. We incentivized the treated group to incorporate information on how to improve children's relation with digital screens by providing a short online video and a digital leaflet. The video was embedded at the end of the baseline survey and addressed four topics: recommended screen time by age, good practices during exposure (co-viewing and appropriate content), day-to-day tips on how to regulate screen use, and the importance of screen-free family time. The objective was two-fold: to emphasize the importance of limiting screen time and improving the quality of exposure to generate an update in caregivers' beliefs, and to provide easy suggestions on how to improve screen exposure that lowered the cost of compliance with official recommendations. The video script was 257 words, with a duration of 1 minute and 45 seconds. We kept the video aesthetics light, with a colorful graphic design, playful background music and a script that focused on a positive message and not on making parents feel guilty. Realistic suggestions on how to put recommendations into practice aimed at making the information more approachable by providing attainable alternatives by modern day parents. The full video script is available in Section C of the Appendix.

Treated caregivers could also received a digital leaflet with personalized recommendations on screen exposure based on 19 questions answered in baseline. The leaflet always started with a module reinforcing the information provided in the video, plus four potential modules on: limiting screen time, content curation and parental controls, limiting moments of exposure and background exposure, and, alternative activities. The end always contained useful online references. The combination of the four modules resulted in 14 different leaflets assigned according to screen exposure practices in baseline. Each leaflet contained between 374 and 1.816. The content of each module is in Section D of the Appendix. The digital leaflet could be downloaded by caregivers through a traceable link after the video in the baseline survey, or they could asked to have it sent by email or cellphone. This allowed us to keep track on the number of caregivers who showed interest in acquiring the new information.

The control group was an active control group that received an analogous intervention on a different child-rearing topic. This was designed to understand if potential changes in screen exposure practices are driven by a genuine belief updating based on the new information. We provided information on feeding recommendations feeding in early childhood through a short video and personalized digital leaflets. The video duration was 1 minute and 35 seconds with a script of 259 words. The addressed topics were: feeding recommendations by age, which foods should be avoided, day-to-day tips on improving feeding quality, and, cooking and eating as a family. There were 11 different digital leaflets by combining the following

four modules: feeding under 6 months of age and starting of solid food, a common module reinforcing the video for children aged 6 months and up, homemade and ultra-processed food, and, fish intake.

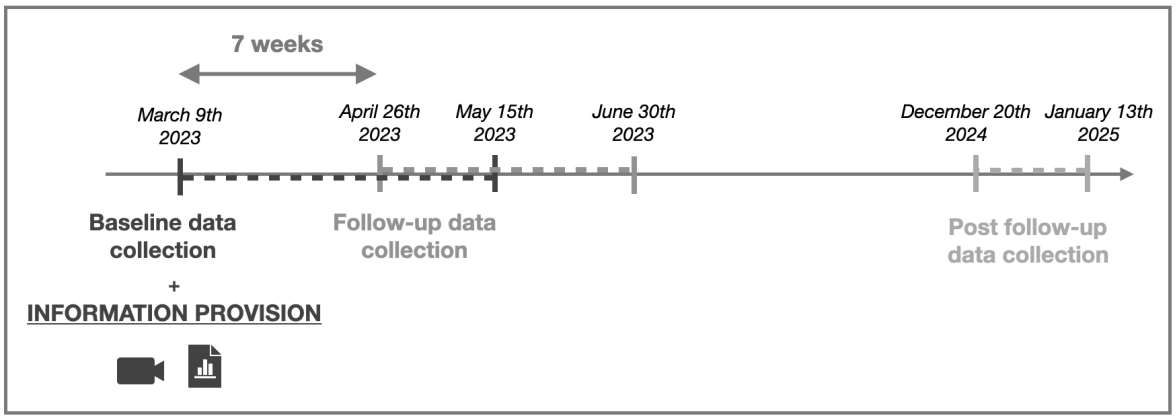
# 4 Evaluation Design

The evaluation was implemented between March 9th and June 30th 2023 to caregivers of children aged 0 to 5. To maximize participation under a limited budget, we combined different sample frames. First, we used the sample frame of students and workers from Uruguay's main university, Universidad de la República (UDELAR). Potential caregivers of 0-5 year olds received an institutional email with the invitation to participate in our study. We obtained 813 valid baseline surveys. Second, we advertised our study in social media (Facebook and Instagram) through a recruiting company, obtaining 1,272 valid surveys. Third, we obtained an additional 256 surveys through the recruiting company historic database. The final baseline sample is 2,341 caregivers, of which 1,168 are assigned to the treatment group and 1,173 to the control group. As expected, our sample is biased towards caregivers with high educational levels. According to our computations using data from the National Institute of Statistics, the highest educational level attained by caregivers of children aged 0 to 5 in Uruguay is 14% primary, 60% secondary and 26% tertiary. The educational level of the caregivers in our sample is 1% primary, 22% secondary and 77% tertiary.

Our baseline data collection was done between March 9th and May 15th 2023. Invited participants received a link to an online survey with the informed consent form, a short set of questions to determine eligibility, and our baseline survey. Eligible individuals were primary caregivers of children aged between 0 and 5, of at least 18 years of age, living with their child at least 3 days a week. Eligible participants were then randomly assigned to treatment or control, since the intervention was embedded in the survey. Additionally, since our unit of analysis is the parent-child dyad, caregivers with more than one child were randomly asked to answer for their older or younger child. The baseline survey covered the following topics: household background characteristics, child characteristics, feeding practices, screen exposure practices, reasons for using screens, costs of regulating screen exposure, adult use of screens while taking care of the child, parental beliefs on screen exposure and child development, social desirability, and risk and time preferences. After the informational video participants were asked whether they knew the recommendations presented in the video, and how useful they found the video. In addition to implementing the intervention through the baseline survey, having baseline data allows us to: evaluate balance across groups, define control variables for our outcomes regressions, measure heterogeneous effects over time-varying variables and separate the effects of priming from actual belief updating (Haaland et al., 2020).[7]

[7]The only difference between the treatment and control group, besides the child-rearing topic of the intervention, was that in the treatment group the questions on feeding were done after the child background module, while in the control group the questions on feeding were done after the video. We implemented this change to estimate social desirability effects, as we explain in the following chapter.

Figure 1: Intervention Timeline




Follow-up data collection was done between April 26th and June 30th 2023. For each participant, invitation to the follow-up survey was sent almost seven weeks (48 days) after the completion of the baseline survey, with the median time between surveys being 51 days. We obtained 1,390 answers, implying an attrition rate of 40.6%. In addition to our main outcome variables, it included questions on parental knowledge and beliefs related to screen and feeding recommendations in early childhood, and questions on whether they had read the personalized leaflet and how useful they had found it. The follow-up survey allowed us to collect data con final outcomes and program implementation.

In addition, after our first round of analysis with the follow-up data we decided to conduct a short survey during December 2024/January 2025 to collect additional medium-term evidence. We asked participants if they remembered any of the topics addressed in the survey and if they could name at least one, which was the topic of the video at the end of the survey, if having participated in the study had helped them reflect on daily parenting issues, and if they could name at least one issue the study helped them reflect on. We collected 563 responses out of 1,390 participants in the follow-up survey. A summary of the intervention timeline is presented in Figure 1.

One important concern in our design is that the information provision treatment is likely to induce social desirability and experimenter demand effects in the data collected in follow-up. We deal with this issue with the current tools available in the economic discipline. First, the survey was conducted online in an anonymous way, which has been shown to have relatively mild experimenter demand effects (De Quidt et al., 2018; Mummolo and Peterson, 2019). Second, we included a short-version of the Marlowe-Crowne social desirability scale (Crowne and Marlowe, 1960) in baseline, which allows us to analyze our results according to participants' propensity to give socially desirable answers. Third, we offered again in follow-up personalized recommendations to parents to incentivize truthful answers. Fourth, we use objective data on time spent watching the video and on whether parents requested personalized recommendations as a proxy for their willingness to update their beliefs.

The design of the questionnaires was based on an extensive revision of previous surveys.

The most relevant resources on children media use that served us as reference were: OFCOM research on Children's Media Use and Attitudes, the Pew Research Center project on Parenting Children in the Age of Screens, and the Common Sense Census Media Use by Kids Age Zero to Eight.[8] The question on the belief regrading the malleability of children's skills to parental investment is taken from Bhalotra et al. (2020), and the set of questions on the costs of limiting screen exposure is an adaptation following this same article. We include a proxy of the child's home environment through an adaptation of the MICS module on the availability of learning materials at home and adult support for learning and school readiness Cappa (2014).[9] For the social desirability questions we followed the 5-item reduced version by Hays et al. (1989) and the 9-items reduced version by Manganelli et al. (2000). For the module on risk and time preferences we followed the qualitative measures in Falk et al. (2018), which assess the willingness to wait and to take risks on an 11-point Likert scale.

The questionnaires were designed using the Qualtrics software. The median duration of the survey was 20 minutes in baseline and 10 minutes in follow-up. Survey participation was encouraged by the use of monetary incentives. Baseline respondents who finished the survey participated in 4 gift card lotteries at well-known retailers, and follow-up respondents participated in 2 gift-card lotteries. The value of each giftcard was around 100 USD, which represents 6% of the median income. These monetary incentives also applied to the watching of the video, since it was embedded in the survey. The download or request of the personalized leaflet was optional.

Overall, our program design allows to estimate the causal effects of a light-touch information intervention on parental beliefs and parental practices regarding screen exposure, including screen time and quality of screen exposure. In Figure 2 we show a summary of our theory of change.

[8] For more details see: https://www.ofcom.org.uk/media-use-and-attitudes/media-habits-children/childrens/, https://www.pewresearch.org/internet/2020/07/28/parenting-children-in-the-age-of-screens/, https://www.commonsensemedia.org/sites/default/files/research/report/2020_zero_to_eight_census_final_web.pdf.

[9] Availability of learning materials is measured through a 3-categories question on the number children books available for the child at home (none, 0 to 9, 10 or more). Adult support for learning is measured through a 5-point Likert scale on the frequency of engaging with the child in the following activities: reading books to the child, telling stories to the child, singing songs to the child, taking the child outside the home, playing with the child, and, naming, counting or drawing things with the child.

Figure 2: Theory of Change

| | Objectives | Indicators | Sources of Verification | Assumptions/Threats |
|---|---|---|---|---|
| **Input (intervention)** | **Video/digital leaflet on recommendations for screen exposure in early childhood** | Video/digital leaflet is delivered | Data from own survey | Sufficient materials, funding and labor |
| **Output** | **Parents watch the video/read the leaflet** | Indicator on whether the video was watched/ leaflet was read | Data from own survey | Parents find the topic appealing enough to devote time to this activity |
| **Intermediate Outcome** | **Parents adjust their beliefs on screen exposure using the acquired information** | Summary indicator on changes in beliefs due to the intervention | Data from own survey | Parents incorporate the new information and update their information set |
| **Final Outcome** | **Children reduce screen time and/or improve screen exposure quality** | Self-reported indicators on hours of screen exposure and screen exposure quality | Data from own survey | The optimal behaviour in parents' decision making problem changes as a result of the new information |

# 5 Empirical Strategy

## 5.1 Primary and Secondary Outcomes

Our study attempts to answer the main following question: what is the impact of providing recommendations based on international guidelines on screen exposure to caregivers, on the quantity and quality of media exposure in early childhood? With our treatment we expect to: incentivize the regulation of hours of media time, encourage parental involvement during exposure (co-viewing), improve the quality of children's media diet, improve screen media habits and reduce parental use of screens while taking care of the child.

Our main primary outcomes refer to the quantity and quality of screen time. Regarding the former, our main outcome is the total screen time in daily hours, computed as the weighted average of screen time during weekdays and weekends. We measure screen time through a global time estimate provided by caregivers, in which we inquiry on the usual time the child spends using a TV, cellphone, tablet or computer, to watch videos, use apps or play games. We ask caregivers to include screen time as a primary or secondary activity, that is, in the background while being engaged in a different primary activity (e.g. while eating, travelling, playing with other toys). We ask them not to include time spent on video calls, since it is not considered in the screen time limit suggested by AAP given its different nature (Radesky et al., 2016).

Regarding the quality of screen time, we construct a novel survey measure considering six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules

for screen exposure, and background exposure. Co-viewing refers to proportion of the child's screen time in which he/she is watching together with an adult. To measure content quality we construct an index based on the proportion of videos or apps that are known by the caregiver, labelled as for kids, labelled as educational, and labelled as adequate for the child's age. We complement this by measuring the use of parental control when the child is exposed to screens. We measure quality with respect to moments of exposure by constructing an index that combines the use of screens during meals, before bedtime, when the child's upset or throwing a tantrum, or while he/she is playing with other toys. We summarize the use of rules for the child's screen time by constructing an index that considers: limiting time (cannot use for more than a certain amount of hours a day), limiting moments of exposure (cannot use it at certain moments of the day), limiting content (cannot use videos or apps without pre-approval of an adult). Finally, we measure background exposure by assessing the presence of television in the background when they child is awake (because other person is watching it or it is left turned on). In Section E of the Appendix we provide detailed information on our measurement inventory. Our quality of screen time outcome is constructed through a summary index considering all dimensions. We constructed all indices using factor analysis and standardized our main outcomes according to sample values in baseline.

Regarding our secondary outcomes, the information provision treatment aimed to improve children's relation with screens by changing parental beliefs on screen exposure. Therefore, we assess the changes in beliefs concerning the information provided in our intervention. We construct a belief index including six dimensions of screen exposure practices: limiting time, co-viewing, learning through screens, early start, no screens in babies, and content quality. These beliefs are measured through 5-point Likert scales regarding the level of agreement with the following phrases: "screens are not like any other toy, we need to limit the amount of time they are used", "the good thing about screens is that they learn the same whether or not an adult is watching together with them", "playing with screens they can learn as much as with adults", "the sooner they learn to use screens, the better", "kids shouldn't use screens until they are one year and a half", and, "as long as they are made for kids, the content of the shows doesn't matter". We construct the index using factor analysis, and standardize outcomes according to sample values in follow-up since only two of these beliefs were collected at baseline.[10]

Overall, our experiment provides evidence on whether information is the binding constraint for parents in improving child media exposure. We are able to test if parents adjust their beliefs on screen exposure after a light-touch intervention, and if belief updating has an effect on parenting practices.

### 5.2 Balance and Power Calculations

Even though random allocation promotes balance between the treated and control groups, differences can be found due to small sample size or attrition. We evaluate balance by

[10]Parental beliefs on screens collected at baseline were the following: "playing with screens they can learn as much as with adults" and "the sooner they learn to use screens, the better".

regressing the variable of interest on a treatment indicator using the complete sample. We test for the differences in means in characteristics of the household and caregiver, as well as in characteristics of the child and our screen exposure outcomes in baseline. Considering the complete sample, out of 37 characteristics we find significant differences in 4 attributes at the 5% level of significance: caregiver's age, caregiver's hours of work, child's age and the index of moments of exposure. At the 10% level of significance we add differences in 3 more attributes: number of tablets at home, index of content quality and index of rules (Tables F.1 and F.2 in the Appendix). Differences are small, less than 10% of a SD, except for the index of moments of exposure which shows a difference of 12% of a SD. We control for these variables when estimating our main regressions as we detail in the following section.

We also analyze if attrition is balanced between the treatment and control group. The difference in attrition rates is 3 percentage points (pp), with a p-value of 0.14. More importantly, we do not find evidence of differential attrition by observable characteristics, since balance in the follow-up sample is very similar to what we obtained in the complete sample. We compute balance in the follow-up sample by restricting our sample to caregivers that participated from both baseline and follow-up. We find significant differences in 4 attributes at the 5% level: number of tablets at home, caregiver's gender, child's age and the index of moments of exposure. At the 10% level we add 1 more attribute, caregiver's hours of work (Tables F.3 and F.4 in the Appendix).

In addition, we study the potential bias in those caregivers that answered the post follow-up survey. Although the aim of this short survey was to collect suggestive evidence on the channels through which our study might have affected caregivers, since we have information on only 42% of the follow-up sample, it is worth studying the differences between those who answered and those who did not. Those caregivers who replied to the post-follow-up survey are less likely to be female, slightly older and more educated than those who did not reply, with a lower social desirability score and a higher level of agreement with the belief that children's skills are malleable to their actions. On the other hand, they show no significant differences in the proportion of treated, child screen time and baseline beliefs on screens, among other variables (Table F.5 in Appendix).

To assess the power of our study we estimate minimum detectable effects (MDE) in our follow-up sample using the following formula (Bloom, 1995; Duflo et al., 2007):

$$MDE = (t_{1-\kappa} + t_{\alpha})\sqrt{\frac{1}{P(1-P)}}\sqrt{\frac{\sigma^2_{res}}{N_{follow\_up}}}$$

where $t$ is the inverse cumulative standard normal distribution, $\kappa$ the power set at 0.8, $\alpha$ the significance level set at 0.05, $P$ the proportion of treated, $\sigma^2_{res}$ the residual variance of the standardized outcome variables, and $N$ is the sample size in follow-up. The residual variance is equal to the variance of the residuals in a regression of the standardized outcome variable on the observable controls. We present these results in Table G.1 in the Appendix. As recommended in Haaland et al. (2020), we managed to obtained a minimum detectable effect of at least 15% of a standard deviation in all our outcome variables.

### 5.3 Empirical Specification

Our intervention is based on introducing random variation in the information set of caregivers regarding international guidelines on screen exposure in early childhood. This implies a random assignment to treatment and control such that, under correct implementation, it will ensure obtaining the causal effects of the intervention through the following regression:

$$y_i = \alpha + \beta \mathrm{T}_i + X_i'\gamma + \delta_i + \epsilon_i$$

where $i$ refers to a parent-child dyad, $y_i$ is the outcome of interest, $T_i$ is a binary indicator for being assigned to treatment, $X_i'$ is a vector of observable characteristics of the household, caregiver and child defined before treatment, $\delta_i$ represents fixed effects for sample origin, and $\epsilon_i$ our unobservable error term. Our coefficient of interest is $\beta$, which gives the average intention-to-treat (ITT) effect of being encouraged to incorporate information on screen media exposure in early childhood.

We include two type of control variables. On the one hand, we include variables that are predictive of the outcomes to increase precision in the estimation of our treatment effects. On the other hand, we control for variables in which the assignment between treatment and control is not balanced in our sample. We control for the following caregiver's attributes: gender, age, years of education, hours of work, patience, number of offspring in the household, beliefs on screens, and belief on malleability of child development. We add the following child controls: age in months, hours of preschool, adult support for learning, and variables accounting for screen exposure at baseline (screen time, co-viewing, parental controls, content quality, moments of exposure, rules). We also include number of tablets in the household, availability of TV with cable or internet connection in the household, and having an internet connection at home. The construction of these variables is detailed in Table H.1 in the Appendix. We impute missing values with the sample medians, since these covariates should not affect identification.

Standard errors are estimated using robust standard errors. Moreover, to account for the potential issue in multiple-hypotheses testing, we estimate Romano-Wolf p-values. This is a step-down method that adjusts for multiple hypothesis and at the same time allows for correlation across different outcomes.

We estimate if effects are heterogeneous according to pre-treatment attributes of the caregiver by interacting our treatment variable with each attribute of interest. Parental decisions concerning screen exposure can be explained as the result of the utility maximization problem of the caregiver subject to the production function of skills of the child. In this line, different practices reflect different parameters in the utility function of the caregiver, such as: his/her time preferences, how costly it is for him/her to regulate screen exposure, the quality of time spent with the child, his/her beliefs beliefs regarding the malleability of the child's skills to his/her behavior, as well as beliefs regarding screen exposure in early childhood. We measure time preferences through a a patience measure following Falk et al. (2018); we approximate the effort costs of regulating screen exposure by an index summarizing how tiring would it be to reduce screen time, improve co-viewing and control content; we approximate

the quality of time spent with the child by how often caregivers get distracted with their cellphone when taking care of the child; we elicit the belief on how malleable caregivers think child development is to their own actions following Bhalotra et al. (2020); and, we measure beliefs on screen exposure by an index summarizing beliefs measured at baseline ('learning' and 'early start'). We test for differential effects according to these factors. Moreover, we analyze heterogeneous effects according to the caregiver's years of education since this is a key characteristic that may also affect the parameters of the utility function (Attanasio et al., 2022; Caucutt et al., 2020)

In addition to the ITT effects, we assess the level of treatment compliance and estimate local average treatment effects (LATE). We estimate the effect on compliers using two different binary instruments. First, we consider whether the caregiver watched the intervention video in full since we recorded time spent in the page showing the video. This subgroup represents 80.6% of the treatment group. Second, we consider having watched the video in full and having requested and read the information on the personalized digital leaflet (37.2% of the treatment group). We consider actual access to the digital leaflet by identifying direct downloads and emails sent with this attachment, and we consider whether parents actually read the information on the digital leaflet through a self-reported measure . For the LATE to be identified we assume monotonicity, which is given by the construction of our study, and that treatment assignment only affects our outcomes through the treatment itself.

# 6 Results

## 6.1 Relevance of the Treatment

First we assess the level of compliance with recommendations on screen exposure at baseline. Regarding screen time on weekdays and weekends, only 23.7% of caregivers comply with the suggested daily limit of zero screen time until 18 months of age and at most 1 hour for older children. The level of compliance is slightly higher on weekdays (35.2%) compared to weekends (30.4%). Within those children who do not comply with the recommendation, we observe an average screen time of 2.7 hours on weekdays and 3.2 hours on weekends, more than doubling the suggested limit. Furthermore, close to one third of children watch more than three hours a day either during weekdays or weekends (30.8%). Regarding the quality of exposure, we observe that 63.9% of children co-view with an adult all or most of the time, leaving a significant proportion that does not comply with the co-viewing recommendation. In terms of content, the majority of caregivers know the videos or apps his/her child uses (99.4%) and most of these videos/apps are identified for children (88.8%). However, only 33.8% of children watches mostly educational videos/apps identified for his/her age. Regarding the use of parental controls, 63.8% say of caregivers declare using them always or most of the time. Considering the moments when no screen use is recommended, we observe that 17.5% of children uses screens during meals almost always, and 19.5% uses screens before bedtime almost always. Moreover, 59.4% of caregivers use screens to calm their child at least sometimes. Most caregivers implement rules to limit time, moments of exposure or

videos/apps on most days (80.7%, 86.4% and 92.4% respectively). Finally, 31.2% of children live in households where the television is left on in the background.

All in all, there is still significant room for improvement in the fulfillment of screen exposure recommendations. A key question in this regard is weather lack of compliance is mostly an informational issue, or if there are more aspects at play. To provide some insights on this issue, we analyze how costly would it be for parents to comply with recommendations in terms of their effort. 64.8% of caregivers not fulfilling the time limit believe it would be tiring for them to reduce their child screen time. From those not co-viewing, 67.5% state that it would be tiring to have an adult watching with the child all the time. Considering those that do not control all videos or apps, 22.1% says it would be tiring to do so. Therefore, there is evidence pointing to a non-zero cost of compliance, as we initially expected.

With these aspects in mind, we move on to assessing the relevance of our information intervention in the treatment group. After watching the video we ask parents if they knew any of the recommendations mentioned in the video and if they had discussed them with a health or education professional related to child development (pediatrician, teacher or psychologist). Almost all participants had heard at least one of the recommendations from the video before (96.2%), but only half of them had discussed them with a health or education professional (52.7%). This contrasts with the feeding information received by the control group, in which 99.6% had heard of the recommendations before and 87.8% had discussed them with a health professional. Moreover, 83.6% of caregivers in the treatment group found the video quite or very useful. This shows that even though most caregivers are familiar with some of the recommendations, they do not know them fully. Furthermore, 78.9% downloaded or requested the digital leaflet with personalized recommendations on screen exposure. Seven weeks later, in the follow-up survey, 70.2% of those who requested the leaflet had read it, and of those, 86.2% had found it useful.

Overall, data indicates that providing information on international guidelines and practical tips on how to follow them is a relevant intervention. In line with our initial hypothesis, our evidence points to an imperfect information issue regarding recommendations on screen exposure in early childhood, together with positive effort costs in the caregiver's decision problem.

### 6.2 Overall Intention-to-Treat Effects

Given the relevance of the treatment, we explore effects in three dimensions: screen time, screen exposure quality and parental beliefs. Table 1 presents the treatment effects on screen time during weekdays, weekends, and the total average. We do not estimate any significant effects on these variables, showing that the intervention did not affect time devoted to screens. However, we do observe an improvement when comparing the evolution between baseline and follow-up in both treatment and control, given by a significant reduction in screen time during weekdays and weekends. Total screen time decreases 0.141 SD (p-value of 0.004) in the treatment group and 0.148 (p-value of 0.004) in the control group (Tables I.1 and I.2 in Appendix). Given that both surveys were only seven weeks apart, this points to

the possibility of having effects derived from answering the survey in itself or from priming individuals on the issue of screen exposure, as discussed below in Section 6.4.

Table 1: Treatment Effects on Screen Time

| | Screen Time Total | Screen Time Weekdays | Screen Time Weekends |
|---|---|---|---|
| Treatment | 0.001 | 0.005 | -0.007 |
| | (0.026) | (0.028) | (0.030) |
| P-Value | 0.970 | 0.852 | 0.817 |
| Control Mean | -0.148 | -0.155 | -0.113 |
| Observations | 1373 | 1373 | 1373 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables are daily time estimates of screen time, standardized according to values of the follow-up sample in baseline.More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2 shows treatment effects on the quality of screen exposure considering an overall index and its individual dimensions. We do not observe significant effects on the overall quality or any specific dimension except for co-viewing, in which we detect an effect of -0.122 SD. This implies that in the follow-up survey children in the treatment group show a lower amount of time co-viewing with an adult compared to those in the control group. This result is the opposite of what we were initially expecting given our intervention. When analyzing the evolution between baseline and follow-up, we observe that both children in treatment and control show an improvement in this dimension: 0.111 SD in the treatment group (p-value of 0.043) and 0.255 SD in the control group (p-value 0.000). Given that the improvement in the control group is significantly larger, we end up with a negative treatment effect.

Table 2: Treatment Effects on Screen Exposure Quality

| | Overall Quality | Co-viewing | Content | Parental Controls | Moments | Rules | Background TV |
|---|---|---|---|---|---|---|---|
| Treatment | -0.002 | -0.122*** | -0.012 | 0.051 | -0.019 | 0.032 | -0.063 |
| | (0.038) | (0.039) | (0.044) | (0.048) | (0.035) | (0.044) | (0.045) |
| P-Value | 0.965 | 0.002 | 0.783 | 0.289 | 0.582 | 0.457 | 0.158 |
| Control Mean | 0.041 | 0.238 | 0.033 | -0.098 | 0.025 | 0.018 | 0.096 |
| Observations | 1205 | 1223 | 1218 | 1209 | 1208 | 1209 | 1357 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables indicate screen exposure quality and are standardized according to values of the follow-up sample in baseline. Quality of Screen Time is a standardized index inlcuding six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are constructed such that an increase implies an improvement in the dimension. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Finally, we analyze our treatment effects on parental beliefs regarding screen exposure.

Table 3 shows the estimated effects on an index of overall beliefs and its individual dimensions. We only observe an effect on the belief related to avoiding screen time before the child is one year and half (No Screens Babies), showing an improvement of 0.118 SD (p-value of 0.055). This implies a higher level of agreement with the phrase "kids shouldn't use screens until they are one year and a half" in the treatment group compared to the control. It is worth noting that this belief was the only one that assessed a particular piece of information, the one and a half threshold, that was clearly stated in the video and online leaflet in the treatment group, and it could not be derived in any way from answering the questionnaire in itself. Given this result we test for heterogeneous effects for caregivers of children younger or older than 18 months. We find that the improvement in the "No Screens Babies" belief is mostly explained by caregivers of children 18 months or older, with no significant differences in treatment effects of screen time or screen exposure quality.[11]

Table 3: Treatment Effects on Parental Beliefs

| | Overall Beliefs | Limiting Time | Co-viewing | Learning | Early Start | No Screens Babies | Content |
|---|---|---|---|---|---|---|---|
| Treatment | 0.007 | 0.019 | -0.031 | 0.001 | 0.018 | 0.118** | -0.005 |
| | (0.040) | (0.054) | (0.049) | (0.040) | (0.043) | (0.055) | (0.049) |
| P-Value | 0.863 | 0.727 | 0.528 | 0.975 | 0.670 | 0.032 | 0.924 |
| Control Mean | 0.005 | -0.006 | 0.020 | 0.150 | -0.034 | -0.067 | 0.010 |
| Observations | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables are parental beliefs on screen exposure in early childhood, with increases indicating an improvement. Overall Beliefs is an index of beliefs available at follow-up including the beliefs on: limiting time, co-viewing, learning, early start, no screens babies, and, content. Beliefs on learning and early start are standardized according to baseline mean and standard deviation. The remaining variables are standardized according to values in the follow-up sample since they were not collected at baseline. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

As robustness we estimate our treatment effects on screen time, screen quality and parental beliefs by adding covariates to control for school year calendar and weather. First, since the baseline survey was open for around two months and included Easter holidays, we estimate our results including controls for Easter and the number of days since the start of the school year when the baseline survey was filled-out, given that children's hours in school correlates with screen time Cazulo et al. (2022). Tables I.3 to I.5 show that results are not modified. Second, since weather could also affect screen time, in Tables I.6 to I.8 we show estimations controlling the within-person variation in weather conditions between the start of the baseline and the follow-up survey. Results are unaffected. Third, we estimate our results in a sub-sample that excludes caregivers with high social desirability, defined as those with the 9-items Marlowe-Crowne index above the median (Manganelli et al., 2000). Once

[11] The only exception is Content Quality in which older children show an improvement of 0.082 SD (p-value of 0.092), but the difference with younger children is not significant (p-value of 0.204).

again we find similar results (Tables I.9 to I.11).[12] Finally, to control for multiple hypothesis testing we estimate Romano-Wolf p-values, finding a p-value of 0.020 for the decrease in co-viewing and a p-value of 0.171 for the improvement in the 'No Screens Babies' belief (Table I.12 in Appendix).

Finally, we consider the local average treatment effects using two binary compliance indicators: having watched the complete treatment video, and, having watched the complete video and read the personalized digital leaflet. Tables I.13 to I.15 in Appendix show the LATE effects. As expected, LATE effects are very similar to ITT effects, only slightly larger for some outcomes.

### 6.3 Heterogeneous Effects

We estimate heterogeneous effects according to pre-treatment characteristics that might affect the decision making process of the caregiver when deciding the screen exposure of the child. To assess this we consider a subset of four outcomes: total screen time, index of screen exposure quality, index on beliefs of screen exposure, and index of screen exposure quality without co-viewing given the negative effects presented in the previous section.

First we consider those caregivers with education up to high school (12 years of education or less) vs those with at least some tertiary studies (more than 12 years of education). Panel a) in Table shows that the intervention has a positive effect on parental beliefs for the less educated group equal to 0.160 SD (p-value of 0.070). However, this does not translate into a significant change in behavior although the sign of the coefficients in screen time and quality is coherent with an improvement. When considering the expected costs of improving screen exposure, we observe a different effect in quality across groups, specially for the index without co-viewing (p-value of 0.078, Table I.16 in Appendix). Those with higher costs show a positive effect of 0.082 SD, although not significant at conventional levels (p-value of 0.153), that is mostly explained by a significant improvement in rules (0.121 SD, p-value 0.060). In addition, in Panel b of Table 4 we study heterogeneities according to the quality of time spent between the child and the caregiver, approximated by how often the adult gets distracted with his/her cellphone while taking care of the child. For the group with lower time quality we observe a significant increase in screen exposure quality (0.147 SD, p-value 0.098) as well as a strong improvement in beliefs (0.194 SD, p-value 0.028). This goes together with significant increases in several individual beliefs (limiting time, co-viewing and early start). Finally, for those caregivers that believe their child's skills are not malleable to their actions, we observe an increase in overall quality, specially without co-viewing (0.134 SD, p-value 0.070). This is mostly explained by an improvement in parental controls and in content. For this group, overall beliefs also seem to improve, but it is not significant at conventional levels (0.113 SD, p-value 0.162).

We do not observe significant differences by caregivers' time preferences nor by prior beliefs regarding screen exposure in early childhood (Tables I.17 and I.18 in Appendix).

[12] The only difference is that the effect on the belief 'No Screens Babies' is not significant at conventional levels probably due to low power, since the estimated coefficient is very similar and the p-value is 0.162.

Overall, those caregivers that are more vulnerable in terms of years of education, quality of time spent with the child and belief regarding child development appear to have positives effect derived from the treatment video in itself, beyond the general improvement between baseline and follow-up. These groups show worst results in all outcomes considered, pointing to a higher marginal gain from the provision of information.

Table 4: Heterogeneous Effects

| | Screen Time Total | Overall Quality | Overall Quality w/o co-viewing | Overall Beliefs |
|---|---|---|---|---|
| *Panel a: Years of Education* | | | | |
| $\leq$ 12 years | -0.030 | 0.020 | 0.036 | 0.160* |
| | (0.655) | (0.820) | (0.680) | (0.070) |
| $>$ 12 years | 0.011 | -0.008 | -0.000 | -0.039 |
| | (0.701) | (0.843) | (0.994) | (0.394) |
| P-Value Equal Effects | 0.572 | 0.770 | 0.708 | 0.046 |
| Control Mean - $\leq$ 12 years | 0.153 | -0.027 | -0.079 | -0.376 |
| Control Mean - $>$ 12 years | -0.236 | 0.062 | 0.051 | 0.115 |
| Observations | 1373 | 1205 | 1205 | 1346 |
| *Panel b: Quality of Time Child-Caregiver* | | | | |
| Below median | -0.062 | 0.147* | 0.146 | 0.194** |
| | (0.251) | (0.098) | (0.102) | (0.028) |
| At or above median | 0.018 | -0.042 | -0.030 | -0.045 |
| | (0.546) | (0.320) | (0.488) | (0.323) |
| P-Value Equal Effects | 0.191 | 0.055 | 0.076 | 0.015 |
| Control Mean - Below median | -0.053 | -0.240 | -0.246 | -0.117 |
| Control Mean - At or above median | -0.173 | 0.114 | 0.091 | 0.038 |
| Observations | 1373 | 1205 | 1205 | 1346 |
| *Panel c: Belief on Malleability of Child Development* | | | | |
| Below median | -0.057 | 0.114 | 0.134* | 0.113 |
| | (0.285) | (0.122) | (0.070) | (0.162) |
| At or above median | 0.025 | -0.050 | -0.044 | -0.038 |
| | (0.405) | (0.253) | (0.316) | (0.413) |
| P-Value Equal Effects | 0.175 | 0.054 | 0.037 | 0.104 |
| Control Mean - Below median | 0.069 | -0.072 | -0.115 | -0.318 |
| Control Mean - At or above median | -0.229 | 0.086 | 0.075 | 0.127 |
| Observations | 1373 | 1205 | 1205 | 1346 |

Notes: Estimates obtained through OLS regressions including a binary indicator one group of the variable considered for heterogeneous effects and an interaction between this variable and the treatment indicator, controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. In each panel we exclude as control variable the one analyzed as heterogeneous effects. The dependent variables are: a daily time estimate of screen time; an index of quality of screen time including co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure; the same index excluding the co-viewing dimension; and an index of overall beliefs including limiting time, co-viewing, learning, early start, no screens babies, and, content. All variables are standardized according to values of the follow-up sample in baseline. More details in Section E in the Appendix. In each panel the first four rows report the treatment effects for each group, with stars indicating their significance level and p-values in parentheses. The fifth row reports the p-value for the test of equal effects (interaction term). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

### 6.4 Survey Effects

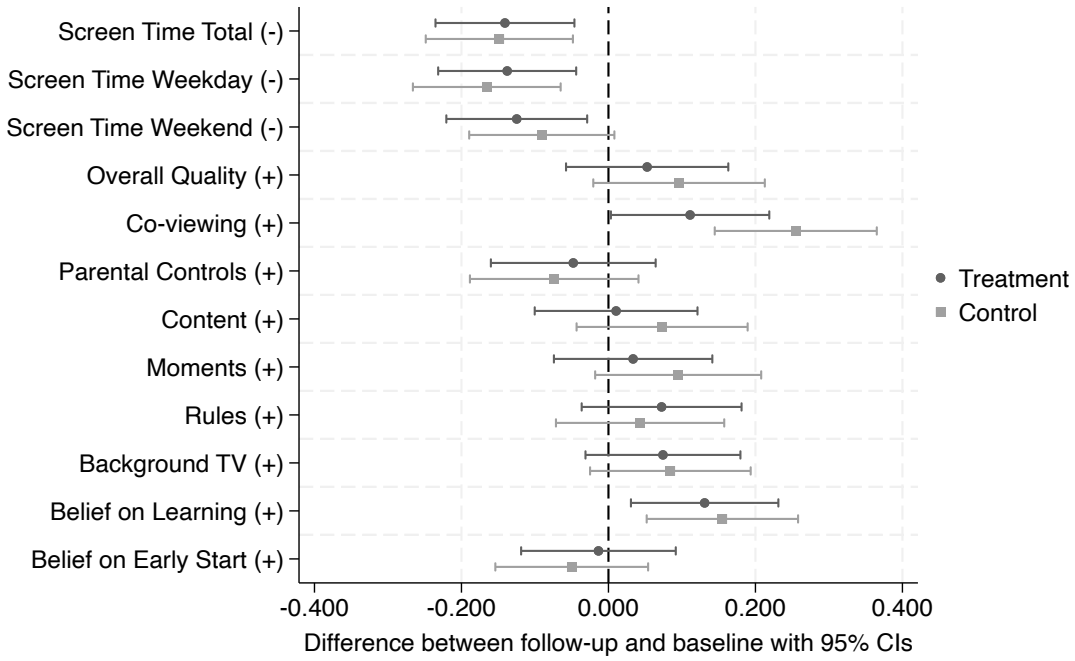
To further understand our results, in Figure 3, and Tables I.1 and I.2 in Appendix, we present the mean changes between baseline and follow-up by treatment status for our main outcome variables and the beliefs measured in both surveys. As mentioned above, we observe a decrease in total screen time in both treatment groups, explained by reductions in screen time during weekdays and weekends, and an improvement in co-viewing practices. We also observe positive coefficients for all dimensions of screen exposure quality, except for parental controls, although the improvements are not significant probably due to of lack of power (see Table G.1 in the Appendix). When considering the complete sample to overcome this issue, the index of overall quality increases by 0.074 SD (p-value of 0.072) and an analogous index excluding parental controls increases by 0.082 (p-value of 0.046).[13] Moreover, we observe a significant increase in the belief related to learning, implying a higher level of disagreement with the phrase "playing with screens they can learn as much as with adults". The estimated difference is of 0.131 SD (p-value of 0.011) in the treatment group and of 0.155 (p-value of 0.003) in the control group. When estimating the robustness of these changes to multiple hypothesis testing, we observe that the decrease in screen time, the increase in co-viewing and the improvement in the learning belief are still significant at the 1% level using Romano-Wolf p-values (I.19 in Appendix).

We believe these changes are explained by survey effects from having an extensive module on screen exposure practices, in which we asked direct questions on several areas of parental behavior. Although our study design does not allow us to make a pure causal identification of survey effects, we have substantial evidence pointing in this direction. Our survey covered seven areas of screen exposure, including detailed questions on compliance with international guidance, in which we provided clarification on the meaning of each concept with clear examples. We asked about screen time, considering: a global time estimate in weekdays and weekends, as a primary and as a secondary activity; how much of that time is co-viewing with adults clarifying that it implies watching together with the child, not just supervising; and, a subjective assessment of screen time. Second, we asked questions on content quality: if they knew which videos his/her child is watching, if these videos were labelled for kids, labelled as educational, labelled as adequate for his/her child age; if they had rules regarding time, moments or type of content, with clear examples of what a rule in each area are would look like; and parental controls, also clarifying its meaning. Third, we asked about moments of exposure, particularly on the frequency in which the child watches screens during lunch/dinner, before bedtime, and when he/she is upset or throwing a tantrum. Fourth, we asked on the reasons why they expose his/her child to screens, inquiring on the frequency of five possible reasons. Fourth, we asked on the potential costs of improving screen exposure, by inquiring how tiring would it be to reduce screen time, improve co-viewing or control

[13] In the treatment group we observe an increase of 0.053 in the overall quality index and in 0.060 in the index excluding parental controls. Both estimates are not significant, which is consistent with a minimum detectable effect in this dimension of 0.12. In the control group we observe a non-significant increase of 0.096 (p-value of 0.106) in the overall index, and a significant increase of 0.105 (p-value of 0.077) in the index excluding parental controls.

content. Fifth, we asked on the frequency of exposure to television in the background. Sixth, we asked how distracted were caregivers with their cellphones when taking care of the child. Individuals took on average 4 minutes to answer these modules, which is more than double the time spent on the intervention video. Anecdotal evidence confirms that the filling-out of the questionnaire, regardless of the treatment group, prompted the reflection on daily practices on screen exposure.

Figure 3: Changes Between Baseline and Follow-Up by Treatment Status



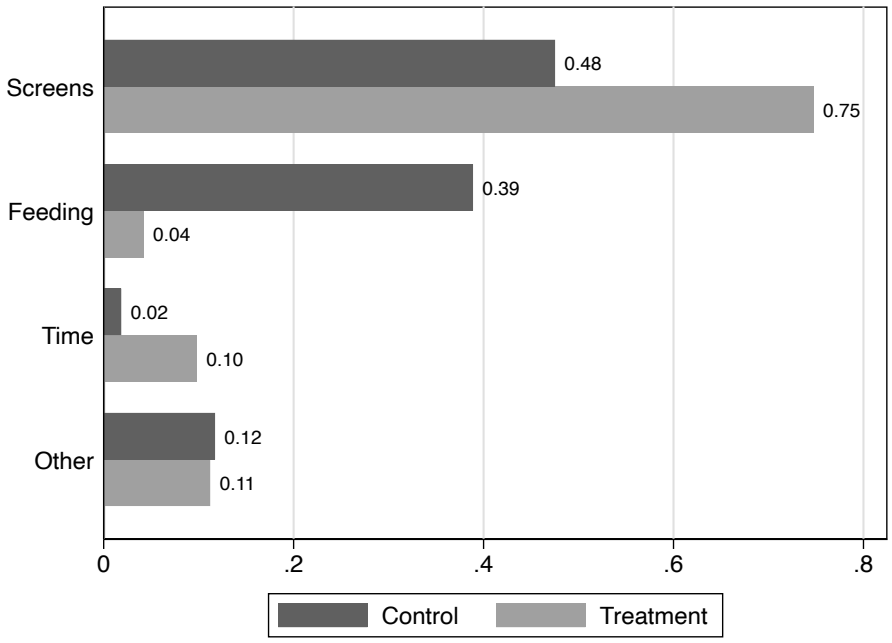

Notes: The figure depicts the estimated differences in means between follow-up and baseline for the follow-up sample by treatment status. The direction of an improvement is indicated in parentheses: (+) an increase reflects an improvement, (-) a decrase reflects an improvement. 95% confidence intervals are reported using robust standard errors. Screen Time variables variables of daily time estimates. Overall Quality is a standardized index of screen exposure quality including six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are standardized variables according to baseline values. More details in Section E in the Appendix.

To provide additional evidence on the existence of survey effects we conducted a short post-follow-up survey 1 year and 9 months after the start of baseline data collection. We asked participants if they remembered the topics addressed in the survey and the topic of the video, and if having participated in the study had helped them reflect on daily parenting issues. Around half of these caregivers remembered what the survey was about, and this figure is similar between treatment and control. However, we do observe differences by treatment group when asked to mention a topic they remembered from the survey. Among the treated the vast majority mentions screens (70%), while in the control group 54% mentions feeding and 36% mentions screens (Figure I.3 in Appendix). This shows that the questionnaire in itself was memorable, given that those in the active control group did not receive any information on screens in their intervention. Moreover, when asked about the topic of the video, 79% of the treatment group correctly states that it was about screens, while in the

control group only 44% remembers that the video was about feeding. This difference is explained by a higher percentage that does not remember the topic of the video in the control group (40% vs 18% in the treatment group) and by a 16% that incorrectly recalls the video was about screens (Figure I.4 in Appendix). These differences show the saliency of the topic of screen exposure in the memory of participants, attracting their attention in such a way that sometimes they did not remember if they were part of the treatment or control group. This is partially explained by having a light touch intervention, however, the questionnaire in itself survived the risk of fade-out when providing new information to individuals almost two years after the study.

Furthermore, besides leaving a mark in the memory of participants, the filling out the survey motivated a reflection on parenting practices. When asked if taking part in the study had helped them reflect on daily parenting issues, 80% in the treatment group replied positively vs 67% in the control group. Interestingly, when asked about the topic of reflection, the most named issue both in treatment and control was screens (Figure 4). This indicates that the self-assessment of parental practices on screens prompted by the survey was still present in the medium term for a significant proportion of caregivers, regardless of their treatment status.

Figure 4: Topic of Reflection by Treatment Status




Notes: The figure depicts the proportion of respondants answering to the open question "Can you name at least one issue that the study helped you to reflect on?", from those that answered "Yes" to the question "Did taking part in the study help you to reflect on some day-to-day issues with your child?". The open question was categorized in four groups screen exposure, feeding, child time use and quality of time spent with their child, or other topics. Question in post follow-up survey approximately 22 months after the beginning of the study, N=376.

The effects from participating in our study are in line with what is referred to as survey effects, that is, "the possibility that questioning individuals about their actions or attitudes

in a particular domain can alter their later behaviour" (Crossley et al. (2017),1). Previous studies have addressed the possibility of this type of effect either from the survey methods literature, what is known as the panel conditioning effect, or from the psychology and marketing literature, denominated the question-behavior effect (see for example (Fitzsimons and Moore, 2008; Dholakia, 2010; Van Landeghem, 2014; Warren and Halpern-Manners, 2012)). We believe our survey effects are derived from doing a detailed reflection on parental practices regarding screen exposure. The questionnaire implied a self-assessment of parenting practices through a detailed reflection on their behaviour, signalling the areas in which there was room for improvement and inadvertently suggesting ways to increase compliance with international guidelines on the matter.

These effects are also related to what is referred to as priming in recent economic literature (Cohn and Maréchal, 2016). However, our survey is not as subtle as priming individuals on an issue, and we argue that they come from genuine belief updating. Haaland et al. (2020) discuss this problem when conducting information experiments, suggesting different methods to separate priming from genuine belief updating. One possible way to provide evidence towards a real change in beliefs is to find stronger effects for those with priors less aligned with the provided information. This is precisely our case. We find that the decrease in screen time is mostly driven by those with beliefs on screens at baseline below the median (Figure I.5 in Appendix). The p-value for the difference in the decrease in total screen time between those above and below the median is 0.044. Likewise, the improvement in the 'Learning' belief is explained by those with beliefs below the median, who also show an improvement in the 'Early Start' belief. The p-values for the test of the difference between follow-up and baseline across groups are 0.000.

Since these changes occurred both in the treatment and control group, we provide evidence that this effect is most likely explained by our survey and not driven by external factors. First, both surveys were only seven months apart without any major events occurring between the two, providing stable social and economic conditions. If anything, we expected a slight increase in screen time between the two surveys as children get older, since screen time is strongly correlated with age (Cazulo et al., 2022). Second, both surveys occurred during the school year so there are no important factors altering time use in children overall. The only caveat is that 9.7% of the baseline survey occurred during Easter holiday, and data shows a negative correlation between hours in preschool and screen time (Cazulo et al., 2022). However, we observe the same evolution in the sub-sample that did not complete the baseline survey during the holidays (Figure I.1 in Appendix). Third, particular weather events could also affect screen time, such as heat or cold waves and rainy periods. Both our surveys were conducted in Autumn with mild weather and no differences in average rain (Table I.20 in Appendix). There were only two atypical weather events: a heat wave between March 11th and 15th and a cold wave between June 11th and 14th (INUMET, 2024). As we show in Figure I.2 in Appendix, results are unchanged when excluding from the estimation those observations that conducted the survey during these heat and cold waves. Fourth, we estimate the variation between baseline and follow-up in the sub-sample of caregivers

with low social desirability. This allows us to check if our results are robust to experimenter demand effects and social desirability issues. We find qualitatively similar results, but less precise given the decrease in sample size (Figure in Appendix).

Although our experiment was not designed to identify survey effects and it is not possible to rule out every possible confounding factor, we are mostly confident that we are observing a change in behavior between baseline and follow-up explained by the participation in our study. We are not aware of any other general changes in incentives or constraints that could have explained the magnitude of the effects observed between survey waves. In addition, we also observe a change in beliefs, specially for those with priors less aligned with the recommendations, supporting the existence of survey effects. Our survey helped caregivers collect evidence about their behaviour on key aspects of screen exposure, evaluating their current practices to improve future ones. The questionnaire led them to actively reflect on their daily practices, gaining awareness on the aspects that could be improved through applicable changes.

# 7 Final Remarks

The use of screens in children has been increasing across the world in the last decades, and there is no reason to believe that this trend will be reversed in the foreseeable future. Therefore, designing evidenced-based policies that induce behavioral changes to promote skill acquisition from digital technologies is an extremely relevant question for future human capital accumulation.

Research has shown that exposure to new technologies is not beneficial or detrimental in itself, but it is actually the way in which parents and children use them that determines its effects on child development. In this paper we analyzed an intervention aimed at improving screen exposure in early childhood by providing information to parents on the main recommendations from highly regarded health organizations. We implemented a light touch intervention that could be easily scalable to the general population, similar to other information policies that have been already taken to the general population.

The objective of the intervention was to induce positive behavioural changes in the relation between children and screens by modifying parental beliefs and reducing the cost of good practices. We find no effects on screen quantity or quality from the intervention itself, but we do find improvements in the more vulnerable groups. Moreover, we find improvements between survey waves that are most likely explained by survey effects motivated by a self-assessment of parenting practices when completing the questionnaire. These results highlights the complexities involved in improving parenting practices on screens during the first years of life. Light interventions might work for those with beliefs less aligned with recommended practices, but a more intensive approach is most likely necessary to have general effects. Our results provide suggestive evidence that a promising line of work involves interventions with a more active involvement of parents, promting the reflection on daily practices while suggesting ways for improvement. At the same time, interventions should

also focus on reducing the effort costs of compliance for caregivers, since this factor also plays a role together with information constraints.

This study provides evidence for the design of policies aiming at improving parental investments in young children by changing parental beliefs on screen media, contributing to the analysis of the new challenges generated by the advancement of information and communication technologies. These type of policies will be essential in the coming years to ensure that all children benefit from the expansion of digital technologies.

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# Appendix

## A Compliance with Screen Exposure Recommendations in Uruguay

Table A.1: Screen Time by Child's Age

| | Less than 1 hour | | 1 hour | | Between 1 and 2 hours | | 3 hours or more | |
|---|---|---|---|---|---|---|---|---|
| | Mean | N | Mean | N | Mean | N | Mean | N |
| Less than 1 year | 0.866 | 646 | 0.070 | 646 | 0.026 | 646 | 0.039 | 646 |
| 1 Year | 0.550 | 531 | 0.244 | 531 | 0.125 | 531 | 0.080 | 531 |
| 2 Years | 0.318 | 462 | 0.286 | 462 | 0.279 | 462 | 0.116 | 462 |
| 3 years | 0.231 | 484 | 0.241 | 484 | 0.320 | 484 | 0.208 | 484 |
| 4 Years | 0.195 | 475 | 0.243 | 475 | 0.293 | 475 | 0.269 | 475 |
| Total | 0.431 | 2,598 | 0.217 | 2,598 | 0.209 | 2,598 | 0.143 | 2,598 |

Notes: Own calculations based on NCDHS 2018. Columns 2, 4, 6 and 8 show estimated means and columns 3, 5, 7 and 9 show number of observations. Screen time is constructed using an open-ended question on screen time the day before the interview. All figures are estimated using survey weights.

Table A.2: Child Rearing Practices on Screens by Child's Age

| | Watch TV While Eating | | TV as Solution | |
|---|---|---|---|---|
| | Mean | N | Mean | N |
| Less than 1 year | 0.214 | 195 | 0.349 | 630 |
| 1 Year | 0.361 | 513 | 0.336 | 510 |
| 2 Years | 0.520 | 457 | 0.392 | 441 |
| 3 years | 0.558 | 473 | 0.403 | 462 |
| 4 Years | 0.573 | 467 | 0.333 | 452 |
| Total | 0.472 | 2,105 | 0.362 | 2,495 |

Notes: Own calculations based on NCDHS 2018. Columns 2 and 4 show estimated means and columns 3 and 5 show number of observations. 'Watch TV While Eating' refers to an indicator variable of the child watching television while eating. 'TV as solution' refers to an indicator variable of the caregiver agreeing with the following statement: "leaving children in front of the TV for a long time is a solution when mothers are busy". All figures are estimated using survey weights.

## B Recommendations on Screen Time in Early Childhood.

Table B.1: AAP Recommendations (children aged 0-5).

| **Main Recommendations** | **Details** |
|---|---|
| Recommendations according to age:<br>• Children younger than 18 months: avoid screen media other than video-chatting.<br>• Children between 18 and 24 months: restrict screen use to 1 hour per day of high-quality programming/apps with parental co-viewing. Children media use by themselves should be avoided.<br>• Children from 2 to 5 years of age: restrict screen use to 1 hour per day of high-quality programming. Co-viewing is highly recommended. | • In co-viewing with children, caregivers should help them understand what they are watching and apply it to the real world to promote learning.<br>• Exposure to high-quality content implies, among other things: avoiding fast-paced programs, avoiding apps with distracting content, avoiding violent content and avoiding apps with advertising and unhealthy messages. |
| Recommendations on how/when to expose children:<br>• Avoid background exposure.<br>• Avoid screens during meals.<br>• Avoid screens for one hour before bedtime.<br>• Avoid using screens as the only way to calm your child. | • To avoid background exposure, devices should be turned off when not in use.<br>• Screens can be considered a useful tool to calm children in exceptional circumstances, such as medical procedures and airplane flights. |
| Recommendations on parental use:<br>• Avoid screens during parent-child playtimes. | |

Notes: Based on Radesky et al. (2016).

Table B.2: WHO Recommendations (children under 5 years old).

| **Main Recommendations** | **Details** |
|---|---|
| Recommendations according to age:<br>• Children younger than 24 months: avoid screen time.<br>• Children between 2 and 4 years of age: sedentary screen time should be no more than one 1 hour a day. Less screen time is considered better. | • Children should not be restrained for more than one hour a day. When involving in sedentary time, other activities such as reading, storytelling and singing with a caregiver, are more recommended than screen time. |

Notes: Based on WHO (2019).

Table B.3: UNICEF Uruguay Recommendations (children aged 0-6).

| **Main Recommendations** | **Details** |
|---|---|
| • The less screen time the better.<br>• In challenging situations, it is preferable to calm, entertain and stimulate children though face-to-face strategies.<br>• If parents choose to let the child use screens, its must always be regulated, in quantity and quality, by a responsible adult.<br>• Children should not use internet-connected devices without the guidance of a caregiver. | • If children are using screens, it is recommended to establish schedules and routines for the use of technological devices to help limit time. In this age group, children are not yet mature to self-regulate the amount of technology they consume.<br>• Children's access to technology should not be handled with ambiguity, adults must be consistent in maintaining limits and routines.<br>• If children are using screens, tools like safe browsing, parental controls, data privacy settings, and regularly updating software and antivirus programs can help reduce online risks. |

Notes: Based on Estefanell (2021).

# C Video on Screen Exposure Recommendations

## C.1 Video Script

Duration: 1 minute 45 seconds. *Sentences in brackets only appear written on the screen.*

1) **Screens are present in children's environments every day. As the first years of life are key for future learning, it's important to regulate and make a good use of them.**

2) **What are the recommendations in early childhood?**
[Screens in children up to 5 years of age]

   - Don't use screens until they are at least one and a half years of age.
     [0 hours until 1 and a half years old]
   - After that, if they use screens, watch less than one hour per day.
     [Up to 1 hour per day until 5 years old]

3) **If we use screens, how should we use them?**

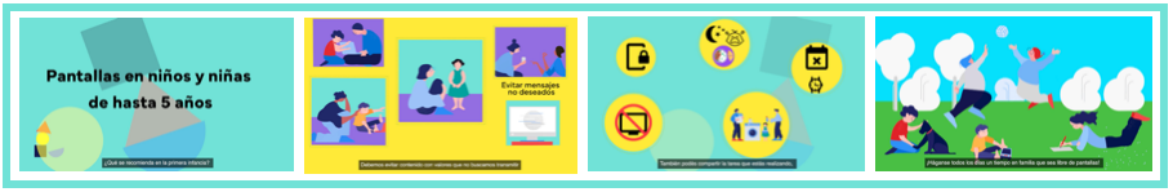
   - It's very important to be with our kids when they use them, watch as a family and talk about what we see.
   - The content should be educational and age-appropriate, kids can only learn if they understand what they are watching.
   - We should avoid content with values that we don't agree on and that we don't want them imitating. It's important to always know what they are watching.

4) **Regulating screens use can be difficult, here are some tips to help you in your day-to-day life:** [Day-to-day TIPS]

   - Turn off screens when they are not in use.
   - Use platforms that allow for parental control.
   - Try not to use screens during meals, before bedtime or to calm tantrums.
   - Set up schedules and routines for screen use.
   - When you need to entertainment them while you are doing other tasks, you can give them toys, pots, boxes. You can also share the task you are doing, have them pass you the laundry to hang up or play to cook while you prepare dinner.

5) **And the most important thing, have some screen-free family time every day!**

## C.2 Selected Video Screenshots



# D Personalized Recommendations on Screen Exposure

## D.1 Content of Each Module

#### 1) Common Module Reinforcing Video

*Recommendations for safe exposure to screens for children from birth to 5 years old*

Screens are present in the environment of children every day. As the first years of life are key for future learning, it is important to regulate and make good use of them.

*What do we know about the effects of screens?*

One way to answer this question is to think about how children aged 0 to 5 learn. At this stage they learn from imitation and interaction, when we talk, play and include them in our daily activities. Studies show that young children learn less from screens than from interacting with adults, because their brains are still immature to easily transfer what they see on the screen to real-life knowledge. This is known as video deficit.

*What is recommended at this stage?*

- Do not screens until they are one and a half years old. After that, if they do use screens, watch a maximum of one hour per day.
- Watch together with an adult who can explain and talk about what they see. This helps them understand what they are watching and apply it to the real world.
- Watch only educational and age-appropriate content. They can only learn if they understand what they are watching.
- Avoid fast-paced programs with violent content, propaganda or unhealthy messages.
- Take into account the values that are transmitted. At this age they imitate everything they see, so it is important to always know what they are watching.
- Have a daily game time between children and mothers/parents that is free of devices.

#### 2) Inadequate screen time

*How to reduce screen time?*

Reducing screen time is a great challenge. At this age children do not have the maturity to regulate the amount of technology they consume, and that is why it is important to accompany them in this task. Having time limits as well as schedules and routines for the use of screens helps to regulate exposure.

*Set time limits.*

At this age the concept of time can be too complex, and it is difficult to understand how much is 15 minutes or half an hour. Here it can be useful to help them with something visual. For example, show them a clock and tell them that we are going to turn off the screen when the long hand reaches a number that we point out. Another thing that can help is to give them power of decision, telling them that the screen has to be turned off, that we turn it off or that they can turn it off by themselves. It also helps to choose short videos, to turn off the screen when there is an interruption. Before trying to reduce screen time, it is important to explain what is going to happen, tell them that there will be a change in routine, acknowledging their feelings, that they know how much they like the screen and that they will miss it at first.

*Establish schedules and routines for screen use.*

Having the same routine day in and day out helps children become more accepting of screen time limits. They may show resistance at first, but once they get used to the fact that screens can only be used at certain times,

and what activities come before and after (e.g., after snack, before bath time, before dinner), they tolerate it much better. It is normal for them to get upset the first few times we set the limit, but if we keep calm and explain why we are doing it, after a few minutes they will get over it. Over the days, if we are consistent, they accept the limit. Establishing routines is also less tiring for caregivers, because we don't have to constantly re-negotiate with the child about it.

**3) Content curation and parental controls**

*How to expose them to better content?*

In early childhood, children are discovering the world, trying to decipher and learn from their environment and those around them. Every moment is a learning moment, and that is why a key aspect is deciding what can they watch when using screens.

We can often feel overwhelmed with the abundance of videos and apps for children. It can be very difficult to spot which videos and apps are good quality and age-appropriate.

A first step is to always look for the children's category in each platform and read the recommended age and description of the video or app. An important caveat is that this labelling is usually put in place by the content creator, so it is not a guarantee. There are thousands of apps label as educational, but only a few have been studied to see if this is really the case.

A great ally for this are independent content reviews, where experts not linked to the creation of the video evaluate the quality of the content and the suggested age. For example, the website of the non-profit organization Common Sense Media has a Spanish version with many reviews of videos and apps for different ages. Another example is Google Play's new "Teacher Approved" seal, which marks apps and games approved by specialists to help find high quality content.

In addition, it is important to choose videos and apps that show messages we want them to learn. Whenever we can, it is best to watch along with the child, but if we can't, it is important to watch at least 10 minutes of new videos or apps to understand the type of messages and content they are watching. Spending a few hours putting together a list of videos, channels or apps that seem appropriate saves time on a day-to-day basis and gives us peace of mind that children are using safe content.

*How to use parental controls?*

Nowadays it is difficult to have control over the content that children watch. They can access thousands of different options instantly and using different platforms. An indisputable ally, which should be used from the moment a child begins to be exposed to screens, are parental controls.

Parental controls make it possible to configure Internet-connected devices to make them suitable for use by children and adolescents. Among other things, they make it possible to limit the content and time of use of the devices. All platforms you use should have a way to set parental controls. Parental controls come in handy when we can't watch along with our children, when we find it difficult to control the videos they watch and the apps they use, and when other people, such as grandparents, set the screen for them.

Two popular options are Netflix and YouTube parental controls through Netflix Kids and YouTube Kids.

- Netflix Kids allows you to restrict the videos that appear based on your child's age and remove specific videos you wouldn't want them to watch. You can also disable automatic playback of the next episode.
- YouTube Kids also allows you to limit content to age-appropriate videos and allows you to disable the video search option, limiting what is shown on the platform to channels verified by a team of people (rather than by automatic filters). In addition, the YouTube Kids app allows you to go one step further, offering an option that only shows content from a list of channels selected by you, and being able to set a timer that automatically limits the time of use. Setting up parental controls for the first time may take a while, but in the long run it saves you time. Below are some links to help you get started.

**4) Limiting moments of exposure and background exposure**

*How to limit moments of exposure?*

Beyond the number of hours and content, a good way to improve children's exposure to screens is to limit their use at certain times of the day.

- Try not to use screens during meals. This distracts children from knowing what they are eating, enjoying the experience with their senses and knowing when they are full. Take advantage of these moments to talk and exchange as a family, leaving the devices out.
- Try not to use screens in the hour before bedtime and to take devices out of the bedrooms before going to bed. Screens can interfere with a child's sleep because they are overly stimulated by the screen and through exposure to blue light. Singing songs, telling stories or reading books is a better option for these times.
- Try not to use screens to soothe your child. This can limit self-regulation of their emotions. In moments of crying or anger, it is preferable to try to accompany and contain through dialogue and affection. It is okay if screens are used as an exception, in medical procedures or on long trips, but try not to make it your day-to-day strategy.
- Turn off screens when they are not in use. Create an environment where screens are not always on. For example, don't have the TV on in the background all day long.

**5) Alternative activities**

*How to entertain without screens?*

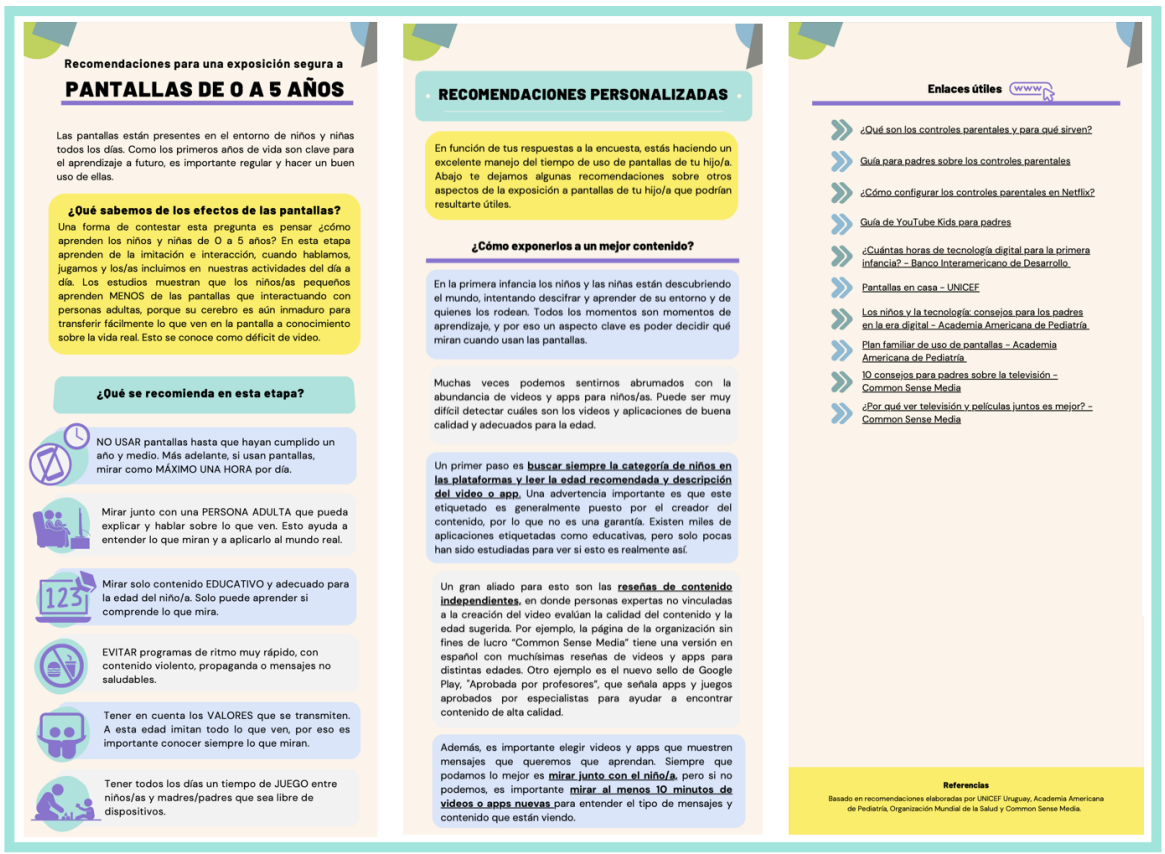
Screens are very useful to entertain and keep children busy while we do other tasks. This can be a great help in coping with the demands of today's world, in which mothers and fathers must reconcile work with household chores and caregiving.

However, it is important to remember that there are many ways to entertain our children, and that it is also important for their development that they have moments of boredom. This encourages them to use their creativity to find other ways to have fun, and to discover what is around them.

When you need to entertain your child while you do other tasks, you can set up a safe environment and give them toys, books or pencils to draw with. You can also offer them pots, boxes, paper, chopsticks, or any non-risky object you can find in your home. At this stage they are discovering the world, and everything can be new and interesting.

Another way to entertain them is to include them in the task you are doing. For example, let them pass you the laundry to hang up, play at cooking while you prepare dinner, explore the fruits and vegetables, play at cleaning with you or help you put the groceries in the cart when you go to the supermarket. This not only entertains them, but teaches them how to perform everyday tasks.

## D.2 Example of Digital Leaflet



Recomendaciones para una exposición segura a

**PANTALLAS DE 0 A 5 AÑOS**

Las pantallas están presentes en el entorno de niños y niñas todos los días. Como los primeros años de vida son clave para el aprendizaje a futuro, es importante regular y hacer un buen uso de ellas.

**¿Qué sabemos de los efectos de las pantallas?**

Una forma de contestar esta pregunta es pensar ¿cómo aprenden los niños y niñas de 0 a 5 años? En esta etapa aprenden de la imitación e interacción, cuando hablamos, jugamos y los/as incluimos en nuestras actividades del día a día. Los estudios muestran que los niños/as pequeños aprenden MENOS de las pantallas que interactuando con personas adultas, porque su cerebro es aún inmaduro para transferir fácilmente lo que ven en la pantalla a conocimiento sobre la vida real. Esto se conoce como déficit de video.

**¿Qué se recomienda en esta etapa?**

NO USAR pantallas hasta que hayan cumplido un año y medio. Más adelante, si usan pantallas, mirar como MÁXIMO UNA HORA por día.

Mirar junto con una PERSONA ADULTA que pueda explicar y hablar sobre lo que ven. Esto ayuda a entender lo que miran y a aplicarlo al mundo real.

Mirar solo contenido EDUCATIVO y adecuado para la edad del niño/a. Solo puede aprender si comprende lo que mira.

EVITAR programas de ritmo muy rápido, con contenido violento, propaganda o mensajes no saludables.

Tener en cuenta los VALORES que se transmiten. A esta edad imitan todo lo que ven, por eso es importante conocer siempre lo que miran.

Tener todos los días un tiempo de JUEGO entre niños/as y madres/padres que sea libre de dispositivos.

**RECOMENDACIONES PERSONALIZADAS**

En función de tus respuestas a la encuesta, estás haciendo un excelente manejo del tiempo de uso de pantallas de tu hijo/a. Abajo te dejamos algunas recomendaciones sobre otros aspectos de la exposición a pantallas de tu hijo/a que podrían resultarte útiles.

**¿Cómo exponerlos a un mejor contenido?**

En la primera infancia los niños y las niñas están descubriendo el mundo, intentando descifrar y aprender de su entorno y de quienes los rodean. Todos los momentos son momentos de aprendizaje, y por eso un aspecto clave es poder decidir qué miran cuando usan las pantallas.

Muchas veces podemos sentirnos abrumados con la abundancia de videos y apps para niños/as. Puede ser muy difícil detectar cuáles son los videos y aplicaciones de buena calidad y adecuados para la edad.

Un primer paso es **buscar siempre la categoría de niños en las plataformas y leer la edad recomendada y descripción del video o app.** Una advertencia importante es que este etiquetado es generalmente puesto por el creador del contenido, por lo que no es una garantía. Existen miles de aplicaciones etiquetadas como educativas, pero solo pocas han sido estudiadas para ver si esto es realmente así.

Un gran aliado para esto son las **reseñas de contenido independientes**, en donde personas expertas no vinculadas a la creación del video evalúan la calidad del contenido y la edad sugerida. Por ejemplo, la página de la organización sin fines de lucro "Common Sense Media" tiene una versión en español con muchísimas reseñas de videos y apps para distintas edades. Otro ejemplo es el nuevo sello de Google Play, "Aprobada por profesores", que señala apps y juegos aprobados por especialistas para ayudar a encontrar contenido de alta calidad.

Además, es importante elegir videos y apps que muestren mensajes que queremos que aprendan. Siempre que podamos lo mejor es **mirar junto con el niño/a,** pero si no podemos, es importante **mirar al menos 10 minutos de videos o apps nuevas** para entender el tipo de mensajes y contenido que están viendo.

**Enlaces útiles**

- ¿Qué son los controles parentales y para qué sirven?
- Guía para padres sobre los controles parentales
- ¿Cómo configurar los controles parentales en Netflix?
- Guía de YouTube Kids para padres
- ¿Cuántas horas de tecnología digital para la primera infancia? – Banco Interamericano de Desarrollo
- Pantallas en casa – UNICEF
- Los niños y la tecnología: consejos para los padres en la era digital – Academia Americana de Pediatría
- Plan familiar de uso de pantallas – Academia Americana de Pediatría
- 10 consejos para padres sobre la televisión – Common Sense Media
- ¿Por qué ver televisión y películas juntos es mejor? – Common Sense Media

**Referencias**

Basado en recomendaciones elaboradas por UNICEF Uruguay, Academia Americana de Pediatría, Organización Mundial de la Salud y Common Sense Media.

# E Construction of Primary and Secondary Outcomes

Table E.1: Survey Inventory of Primary and Secondary Outcomes

| Category | Variable Name | Construction |
|---|---|---|
| Screen Time | Screen Time Weekdays | Standardized variable of global time estimate of daily screen time in weekdays, using the following question: in general, how many hours does the child spend in front of a screen (TV, mobile, tablet, computer, or other) watching videos, using apps or playing games?, consider all screen time even if he/she is doing somethiing else at the same time (e.g. watching screens while eating, while travelling by bus or car, while changing the nappy, while playing with other toys), do not include time spent in video calls. |
| Screen Time | Screen Time Weekends | Standardized variable of global time estimate of daily screen time in weekends, using the following question: in general, how many hours does the child spend in front of a screen (TV, mobile, tablet, computer, or other) watching videos, using apps or playing games?, consider all screen time even if he/she is doing somethiing else at the same time (e.g. watching screens while eating, while travelling by bus or car, while changing the nappy, while playing with other toys), do not include time spent in video calls. |
| Screen Time | Screen Time Total | Standarized variable of global time estimate of daily screen time computed as a weighted average of screen time in weekdays (weight 5/7) and weekends (weight 2/7). |
| Screen Quality | Co-viewing | Standardized variable for a 5-point Likert scale on the proportion of the child's screen time in which he/she watches accompanied by an adult watching with him/her, considering only the time an adult uses the screen with the child and excluding time watching under the supervision of an adult engaged in another activity. |
| Screen Quality | Content | Standardized index summarizing four dimensions of the quality of content the child is exposed to. First, a categorical question on the proportion of videos or apps the child watches/uses that are known by the caregiver with answer options: all videos or apps, most videos or apps, some videos or apps, do not know which videos or app the child watches/uses. Second, three questions on the videos or apps the child uses the most: are they labelled for children? (for example: the place where you watch or downloaded it indicates that it's made for children, the channel describes itself as being for children, etc.); are they labelled as educational? (for example: the place where you watch or downloaded it indicates that it's educational, the channel describes itself as being educational, etc.); are they labelled as adequate for the child's age? (for example: the place where you watch or downloaded it indicates that it is adequate for your child's age, the channel suggests that it is designed for your child's age). Answer options are: yes, no, I don't know. age. |
| Screen Quality | Parental Controls | Standardized variable for the use of parental controls when the child is exposed to screens using the following question: do you use any type of parental control for your child's screen use?, for example, only using YouTube Kids instead of YouTube, using Netflix Kids parental controls, etc. Answer options are a 5-point Likert scale on the frequency of child screen time including: I have never heard of parental controls, I don't know what they are. |
| Screen Quality | Moments | Index summarizing moments of exposure by 5-point Likert questions on the frequency of using screens in the following moments: during meals, before bedtime, when the child's upset or throwing a tantrum, or while he/she is playing with other toys. |

| | | |
|---|---|---|
| Screen Quality | Rules | Index summarizing the use of rules regarding the child's screen use considering three dimensions: limiting time, limiting moments of exposure and limiting content. The first question stated: we limit the length of time he/she can use them, for example, no more than a certain number of hours a day. The second question stated: we limit the moments he/she can use them, for example screens only at a certain times of the day or no screens during certain moments. The third question stated: we limit the TV shows or apps he/she uses. We don't let him/her choose videos or apps before being approved by an adult. Answer options are: yes, no, I don't know. |
| Screen Quality | Background TV | Standardized variable of a 5-point Likert scale on the frequency in which the television is on when the child is awake because someone else is watching it or because they leave it on in the background. |
| Screen Quality | Overall Quality | Standardized index summarizing six dimensions of screen exposure quality: proportion of co-viewing, content quality, use of parental controls, moments of exposure, use of rules, and, exposure to TV in the background. |
| Screen Beliefs | Limiting Time | Standardized variable based on a 5-point Likert scale question regarding the level of agreement with the following phrase thinking about children younger than 6 years old: "screens are not like any other toy, we need to limit the amount of time they are used". |
| Screen Beliefs | Co-viewing | Standardized variable based on a 5-point Likert scale question regarding the level of agreement with the following phrase thinking about children younger than 6 years old: "the good thing about screens is that they learn the same whether or not an adult is watching together with them". |
| Screen Beliefs | Learning | Standardized variable based on a 5-point Likert scale question regarding the level of agreement with the following phrase thinking about children younger than 6 years old: "playing with screens they can learn as much as with adults" |
| Screen Beliefs | Early Start | Standardized variable based on a 5-point Likert scale question regarding the level of agreement with the following phrase thinking about children younger than 6 years old: "the sooner they learn to use screens, the better". |
| Screen Beliefs | No Screens Babies | Standardized variable based on a 5-point Likert scale question regarding the level of agreement with the following phrase thinking about children younger than 6 years old: "kids shouldn't use screens until they are one year and a half". |
| Screen Beliefs | Content | Standardized variable based on a 5-point Likert scale question regarding the level of agreement with the following phrase thinking about children younger than 6 years old: "as long as they are made for kids, the content of the shows doesn't matter". |
| Screen Beliefs | Overall Beliefs | Standardized index summaryzing six beliefs on screen exposure in early childhood including: limiting time, co-viewing, learning, early start, no screens babies, and, content. |

Notes: All variables are standardized according to baseline values for the follow-up sample, except for the beliefs unavailable at baseline: limiting time, co-viewing, no screens babies, and, content. For screen time variables, the higher score the higher screen time. For screen quality variables, the higher score the better quality of exposure. For screen beliefs varaible, the higher score the more aligned with international guidelines.

# F Balance at Baseline After Randomization

Table F.1: Balance in Household and Caregiver Attributes - Complete Sample

| Variable | Control Mean [SE] | Treatment Mean [SE] | Difference (p-value) |
|---|---|---|---|
| Living in Mdeo | 0.627 | 0.616 | -0.011 |
| | [0.484] | [0.486] | (0.598) |
| Number of People | 3.679 | 3.659 | -0.019 |
| | [0.998] | [0.963] | (0.633) |
| Internet at Home | 0.883 | 0.896 | 0.013 |
| | [0.321] | [0.306] | (0.327) |
| TV with Cable or Internet | 1.507 | 1.531 | 0.024 |
| | [0.936] | [0.935] | (0.538) |
| Number of Computers | 1.634 | 1.599 | -0.033 |
| | [0.987] | [1.037] | (0.433) |
| Number of Tablets | 0.436 | 0.488 | 0.052* |
| | [0.634] | [0.672] | (0.055) |
| Number of Smartphones | 2.198 | 2.203 | 0.004 |
| | [0.860] | [0.886] | (0.917) |
| Female | 0.893 | 0.877 | -0.018 |
| | [0.310] | [0.329] | (0.170) |
| Age | 34.266 | 34.806 | 0.562** |
| | [5.906] | [5.786] | (0.018) |
| Years of Education | 14.611 | 14.803 | 0.213 |
| | [3.395] | [3.334] | (0.108) |
| Number of Offsprings (0-5) | 1.194 | 1.190 | -0.004 |
| | [0.415] | [0.416] | (0.796) |
| Living with Couple | 0.843 | 0.833 | -0.010 |
| | [0.364] | [0.373] | (0.519) |
| Employed Caregiver | 0.852 | 0.861 | 0.010 |
| | [0.355] | [0.346] | (0.491) |
| Hrs Work Caregiver | 7.213 | 7.391 | 0.187** |
| | [1.933] | [2.019] | (0.032) |
| Belief on Child Development | 0.009 | -0.009 | -0.015 |
| | [0.991] | [1.009] | (0.707) |
| Social Desirability | 6.125 | 6.146 | 0.021 |
| | [2.037] | [1.968] | (0.801) |
| Patience | 7.693 | 7.687 | -0.004 |
| | [1.891] | [1.948] | (0.963) |
| Risk | 6.148 | 6.285 | 0.136 |
| | [2.455] | [2.478] | (0.182) |
| Observations | 1,173 | 1,168 | 2,341 |

Notes: Columns 2 and 3 report the means of baseline variables for the treatment and control group, with robust standard errors in brackets. Column 3 shows the estimated difference in means obtained from regressing the variable of interest on the treatment indicator controlling for sample origin. P-values are reported in parentheses with significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Belief on Child Development is a standardized index on the belief of malleability of child development through the caregivers' behavior. Social Desirability is a reduced form of the Marlowe-Crowne scale with 9 items. Patience is a 0 to 10 index where higher values imply higher willingness to wait. Risk is a 0 to 10 index where higher values imply higher willingness to take risks.

Table F.2: Balance in Child and Screen Exposure Attributes - Complete Sample

| Variable | Control Mean [SE] | Treatment Mean [SE] | Difference (p-value) |
|---|---|---|---|
| Girl | 0.484 | 0.484 | -0.001 |
| | [0.500] | [0.500] | (0.974) |
| Age in Months | 36.786 | 38.580 | 1.854** |
| | [19.952] | [20.068] | (0.023) |
| Cohabitation w/Parents | 0.923 | 0.908 | -0.015 |
| | [0.266] | [0.289] | (0.210) |
| Hrs with Parents | 17.729 | 17.644 | -0.093 |
| | [3.203] | [3.131] | (0.473) |
| Hrs in Kindergarten | 4.390 | 4.499 | 0.115 |
| | [2.670] | [2.623] | (0.292) |
| Hrs with Unpaid Caregiver | 1.290 | 1.242 | -0.048 |
| | [2.219] | [2.179] | (0.598) |
| Hrs with Paid Caregiver | 0.591 | 0.615 | 0.027 |
| | [1.632] | [1.704] | (0.700) |
| Number of Children Books | -0.027 | 0.027 | 0.058 |
| | [1.018] | [0.981] | (0.160) |
| Index Activities Child/Adult | 0.015 | -0.011 | -0.027 |
| | [0.976] | [1.025] | (0.621) |
| Screen Time Weekdays | 0.031 | -0.033 | -0.063 |
| | [1.045] | [0.952] | (0.125) |
| Screen Time Weekends | 0.014 | -0.015 | -0.028 |
| | [1.017] | [0.982] | (0.502) |
| Screen Time Total | 0.027 | -0.028 | -0.055 |
| | [1.040] | [0.958] | (0.186) |
| Co-viewing | -0.004 | 0.003 | 0.003 |
| | [0.988] | [1.009] | (0.937) |
| Content Quality | -0.042 | 0.042 | 0.082* |
| | [1.018] | [0.981] | (0.061) |
| Parental Controls | -0.033 | 0.036 | 0.069 |
| | [1.006] | [0.993] | (0.116) |
| Moments | -0.059 | 0.060 | 0.120*** |
| | [1.001] | [0.997] | (0.007) |
| Rules | -0.041 | 0.042 | 0.084* |
| | [1.026] | [0.974] | (0.057) |
| Background TV | 0.010 | -0.011 | -0.019 |
| | [1.011] | [0.990] | (0.654) |
| Parental Beliefs Screens | -0.008 | 0.010 | 0.017 |
| | [0.995] | [1.005] | (0.681) |
| Observations | 1,173 | 1,168 | 2,341 |

Notes: Columns 2 and 3 report the means of baseline variables for the treatment and control group, with robust standard errors in brackets. Column 3 shows the estimated difference in means obtained from regressing the variable of interest on the treatment indicator controlling for sample origin. P-values are reported in parentheses with significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Hrs with Parents, Hrs in Kindergarten, Hrs in Unpaid Caregiver and Hrs with Paid Caregiver reflect the daily hours arrengements to take care of the child including hours of sleep. Number of Children Books is a standardized variable of a three category question on the number of children books available at home. Adult Support for Learning is a standardized index on the frequency in which an adult engages with the child in activities to support learning and promote school readiness. Screen Time variables are standardized variables of daily time estimates. Co-viewing, Parental Controls, Content Quality, Moments, Rules and Background TV are standardized variables of quality of screen exposure. Parental Beliefs Screens is an index of parental beliefs on screens available at baseline, including: "playing with screens they can learn as much as with adults", and, "the sooner they learn to use screens, the better".

Table F.3: Balance in Household and Caregiver Attributes - Follow-up Sample

| Variable | Control Mean (SE) | Treatment Mean (SE) | Difference (p-value) |
|---|---|---|---|
| Living in Mdeo | 0.657 | 0.657 | -0.000 |
| | [0.475] | [0.475] | (0.998) |
| Number of People | 3.648 | 3.629 | -0.019 |
| | [0.938] | [0.925] | (0.698) |
| Internet at Home | 0.920 | 0.913 | -0.008 |
| | [0.271] | [0.282] | (0.602) |
| TV with Cable or Internet | 1.484 | 1.506 | 0.022 |
| | [0.898] | [0.870] | (0.646) |
| Number of Computers | 1.700 | 1.689 | -0.012 |
| | [0.935] | [1.045] | (0.816) |
| Number of Tablets | 0.415 | 0.497 | 0.082** |
| | [0.620] | [0.680] | (0.019) |
| Number of Smartphones | 2.191 | 2.185 | -0.006 |
| | [0.829] | [0.839] | (0.898) |
| Female | 0.897 | 0.864 | -0.033** |
| | [0.304] | [0.343] | (0.048) |
| Age | 35.018 | 35.312 | 0.292 |
| | [5.575] | [5.530] | (0.318) |
| Years of Education | 15.236 | 15.214 | -0.024 |
| | [3.322] | [3.252] | (0.887) |
| Number of Offsprings (0-5) | 1.199 | 1.191 | -0.008 |
| | [0.424] | [0.415] | (0.738) |
| Living with Couple | 0.860 | 0.855 | -0.005 |
| | [0.347] | [0.352] | (0.791) |
| Employed Caregiver | 0.889 | 0.878 | -0.012 |
| | [0.314] | [0.328] | (0.493) |
| Hrs Work Caregiver | 7.174 | 7.351 | 0.178* |
| | [1.773] | [1.949] | (0.092) |
| Belief on Child Development | 0.037 | -0.036 | -0.073 |
| | [0.989] | [1.010] | (0.172) |
| Social Desirability | 6.009 | 6.070 | 0.061 |
| | [2.004] | [1.971] | (0.565) |
| Patience | 7.727 | 7.752 | 0.025 |
| | [1.783] | [1.856] | (0.799) |
| Risk | 6.048 | 6.228 | 0.181 |
| | [2.385] | [2.429] | (0.162) |
| Observations | 679 | 711 | 1,390 |

Notes: Columns 2 and 3 report the means of baseline variables for the treatment and control group, with robust standard errors in brackets. Column 3 shows the estimated difference in means obtained from regressing the variable of interest on the treatment indicator controlling for sample origin. P-values are reported in parentheses with significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Belief on Child Development is a standardized index on the belief of malleability of child development through the caregivers' behavior. Social Desirability is a reduced form of the Marlowe-Crowne scale with 9 items. Patience is a 0 to 10 index where higher values imply higher willingness to wait. Risk is a 0 to 10 index where higher values imply higher willingness to take risks.

Table F.4: Balance in Child and Screen Exposure Attributes - Follow-up Sample

| Variable | Control Mean (SE) | Treatment Mean (SE) | Difference (p-value) |
|---|---|---|---|
| Girl | 0.471 | 0.491 | 0.020 |
| | [0.500] | [0.500] | (0.466) |
| Age in Months | 36.386 | 38.854 | 2.462** |
| | [19.909] | [20.160] | (0.021) |
| Cohabitation w/Parents | 0.927 | 0.906 | -0.021 |
| | [0.261] | [0.293] | (0.167) |
| Hrs with Parents | 17.639 | 17.625 | -0.012 |
| | [3.122] | [3.028] | (0.943) |
| Hrs in Kindergarten | 4.452 | 4.526 | 0.073 |
| | [2.689] | [2.608] | (0.608) |
| Hrs with Unpaid Caregiver | 1.230 | 1.153 | -0.077 |
| | [2.180] | [2.095] | (0.504) |
| Hrs with Paid Caregiver | 0.679 | 0.696 | 0.016 |
| | [1.730] | [1.830] | (0.867) |
| Number of Children Books | 0.031 | 0.093 | 0.062 |
| | [1.001] | [0.938] | (0.230) |
| Index Activities Child/Adult | 0.015 | -0.011 | -0.027 |
| | [0.976] | [1.025] | (0.621) |
| Screen Time Weekdays | 0.010 | -0.013 | -0.023 |
| | [1.027] | [0.978] | (0.665) |
| Screen Time Weekends | -0.022 | 0.020 | 0.043 |
| | [0.980] | [1.019] | (0.426) |
| Screen Time Total | 0.001 | -0.001 | -0.002 |
| | [1.012] | [0.990] | (0.977) |
| Co-viewing | -0.016 | 0.016 | 0.029 |
| | [1.005] | [0.996] | (0.607) |
| Content Quality | -0.040 | 0.039 | 0.077 |
| | [1.002] | [0.999] | (0.178) |
| Parental Controls | -0.025 | 0.028 | 0.053 |
| | [0.999] | [1.004] | (0.355) |
| Moments | -0.070 | 0.066 | 0.136** |
| | [1.007] | [0.989] | (0.018) |
| Rules | -0.025 | 0.025 | 0.052 |
| | [1.000] | [1.001] | (0.371) |
| Background TV | 0.012 | -0.014 | -0.025 |
| | [0.998] | [0.998] | (0.654) |
| Parental Beliefs Screens | 0.007 | -0.005 | -0.012 |
| | [0.990] | [1.010] | (0.829) |
| Observations | 679 | 711 | 1,390 |

Notes: Columns 2 and 3 report the means of baseline variables for the treatment and control group, with robust standard errors in brackets. Column 3 shows the estimated difference in means obtained from regressing the variable of interest on the treatment indicator controlling for sample origin. P-values are reported in parentheses with significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Hrs with Parents, Hrs in Kindergarten, Hrs in Unpaid Caregiver and Hrs with Paid Caregiver reflect the daily hours arrengements to take care of the child including hours of sleep. Number of Children Books is a standardized variable of a three category question on the number of children books available at home. Adult Support for Learning is a standardized index on the frequency in which an adult engages with the child in activities to support learning and promote school readiness. Screen Time variables are standardized variables of daily time estimates. Co-viewing, Parental Controls, Content Quality, Moments, Rules and Background TV are standardized variables of quality of screen exposure. Parental Beliefs Screens is an index of parental beliefs on screens available at baseline, including: "playing with screens they can learn as much as with adults" and "the sooner they learn to use screens, the better".

Table F.5: Characteristics of the Post-Follow-Up Sample

| Variable | Not in Post Follow-Up (SE) | Post Follow-Up Sample (SE) | Difference (p-value) |
|---|---|---|---|
| Treatment | 0.508 | 0.517 | 0.009 |
| | [0.500] | [0.500] | (0.742) |
| Living in Mdeo | 0.641 | 0.680 | 0.039 |
| | [0.480] | [0.467] | (0.127) |
| Female (caregiver) | 0.894 | 0.860 | -0.034* |
| | [0.309] | [0.348] | (0.062) |
| Age (caregiver) | 34.353 | 36.366 | 2.013*** |
| | [5.485] | [5.435] | (0.000) |
| Years of Education | 14.735 | 15.943 | 1.208*** |
| | [3.201] | [3.278] | (0.000) |
| Number of Offsprings (0-5) | 1.201 | 1.187 | -0.014 |
| | [0.419] | [0.421] | (0.535) |
| Social Desirability | 6.189 | 5.822 | -0.366*** |
| | [1.969] | [1.995] | (0.001) |
| Belief on Child Development | -0.055 | 0.081 | 0.136** |
| | [1.002] | [0.992] | (0.013) |
| Parental Beliefs Screens | -0.024 | 0.038 | 0.062 |
| | [0.992] | [1.011] | (0.258) |
| Age in Months (child) | 37.068 | 38.501 | 1.433 |
| | [20.011] | [20.142] | (0.192) |
| Hrs in Kindergarten | 4.424 | 4.586 | 0.161 |
| | [2.678] | [2.601] | (0.264) |
| Screen Time Total | 0.032 | -0.048 | -0.080 |
| | [0.995] | [1.008] | (0.146) |
| Observations | 827 | 563 | 1,390 |

Notes: Columns 2 and 3 report the means of baseline variables by responding or not to the post-follow-up survey, with robust standard errors in brackets. Column 3 shows the estimated difference in means obtained from regressing the variable of interest on a post-follow-up sample indicator. P-values are reported in parentheses with significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The first eight variables refer to characteristics of the caregiver, and the last three variables to characteristics of the child. Social Desirability is a reduced form of the Marlowe-Crowne scale with 9 items. Belief on Child Development is a standardized index on the belief of malleability of child development through the caregivers' behavior. Parental Beliefs Screens is an index of parental beliefs on screens available at baseline, including: "playing with screens they can learn as much as with adults" and "the sooner they learn to use screens, the better". Hrs in Kindergarten and Screen Time Total are measured in daily hours. Screen Time Total is a standardized according to baseline values.

# G Power Calculations

Table G.1: Minimum Detectable Effects

| | MDE | Mean | SD | Residual SD |
|---|---|---|---|---|
| Screen Time Total | 0.10 | -0.14 | 0.84 | 0.48 |
| Screen Time Weekdays | 0.11 | -0.15 | 0.83 | 0.50 |
| Screen Time Weekends | 0.11 | -0.11 | 0.84 | 0.54 |
| Quality of Screen Time | 0.12 | 0.07 | 0.98 | 0.64 |
| Co-viewing | 0.12 | 0.18 | 0.94 | 0.67 |
| Content Quality | 0.13 | 0.04 | 1.01 | 0.76 |
| Parental Controls | 0.14 | -0.06 | 1.01 | 0.81 |
| Moments | 0.12 | 0.06 | 0.96 | 0.59 |
| Rules | 0.13 | 0.06 | 0.97 | 0.73 |
| Background TV | 0.14 | 0.08 | 1.00 | 0.81 |
| Overall Beliefs | 0.13 | 0.00 | 1.00 | 0.73 |
| Limiting Time | 0.15 | 0.00 | 1.00 | 0.98 |
| Co-viewing | 0.14 | 0.00 | 1.00 | 0.87 |
| Learning | 0.13 | 0.14 | 0.91 | 0.72 |
| Early Start | 0.13 | -0.03 | 0.97 | 0.78 |
| No Screens Babies | 0.15 | 0.00 | 1.00 | 0.97 |
| Content | 0.14 | 0.00 | 1.00 | 0.88 |

Notes: All variables are standardized according to baseline mean and standard deviation except for those unavailable at baseline, which are standardized according to values in follow-up ('Limiting Time', 'Co-viewing', 'No Screens Babies', and 'Content'). Column 2 reports the minimum detectable effect of each variable in standard deviations in baseline. Columns 3, 4 and 5 report the mean, standard deviation and residual standard deviation of each variable in follow-up. The residual standard deviation is computed as the standard deviation of the residuals in a regression of each outcome variable on observable controls as defined in Section 5.2. Screen Time variables are daily time estimates in hours. Quality of Screen Time is a standardized index inlcuding six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. Overall Beliefs is an index of parental beliefs on screens exposure in early childhood available at follow-up, including the beliefs on: limiting time, co-viewing, learning, early start, no screens babies, and, content.

# H Control Variables

Table H.1: Control Variables

| Category | Name | Description |
|---|---|---|
| Fixed Effect | Sample Origin | Categorical variable indicating whether the observation was obtained through UDELAR sample frame, or through social media or the recruiting company historic database. |
| Caregiver | Gender | Dicothomous variable indicating female gender. |
| Caregiver | Age | Continuous variable for age in years. |
| Caregiver | Years of Education | Continuous variable for years of education starting from primary school. |
| Caregiver | Hours of Work | Continuous variable for daily hours of paid work. When not employed, hours are set to zero. |
| Caregiver | Patience | Continuous variable indicating willingness to wait on a scale from 0 to 10 following Falk et al. (2018). |
| Caregiver | Offspring | Continuous variable on number of sons or daughters living in the household. |
| Caregiver | Beliefs Screens | Index summarizing beliefs on screens collected at baseline. Each belief is measured through a 5-point Likert scales regarding the level of agreement with the following phrases: "playing with screens they can learn as much as with adults" and "the sooner they learn to use screens, the better". |
| Caregiver | Belief Child Development | Standardized variable for the belief regrading malleability of children's skills to parental investment following Bhalotra et al. (2020) . Constructed using the level of agreement on a 5-point Likert scale with the following statement: "each child learns at his/her own pace, there's nothing I can do to change that." |
| Child | Age | Categorical variable indicating the year when the survey interview took place. |
| Child | Preschool | Categorical variable indicating daily hours of preschool. When not attending preschool, hours are set to zero. |
| Child | Adult Support for Learning | Index on adult support for learning and school readiness following Cappa (2014). Constructed using 5-point Likert scale questions on the frequency of engaging with the child in the following activities: reading books to the child, telling stories to the child, singing songs to the child, taking the child outside the home, playing with the child,and, naming, counting or drawing things with the child. |
| Child | Total Screen Time | Standardized variable for total screen time in daily hours, computed as the weighted average of screen time during weekdays and weekends. |
| Child | Co-viewing | Standardized variable for the proportion of the child's screen time in which he/she is watching together with an adult. |
| Child | Content Quality | index summarizing the proportion of videos or apps that are known by the caregiver, labelled as for kids, labelled as educational, and labelled as adequate for the child's age. |
| Child | Parental Controls | Standardized variable for the use of parental control when the child is exposed to screens based on a 5-point Likert scale on the frequency of use. |
| Child | Moments of Exposure | Index summarizing the use of screens during meals, before bedtime, when the child's upset or throwing a tantrum, or while he/she is playing with other toys. |
| Child | Rules | Index summarizing the use of rules for limiting time (cannot use for more than a certain amount of hours a day), limiting moments of exposure (cannot use it at certain moments of the day), and limiting content (cannot use videos or apps without pre-approval of an adult). |
| Household | Tablets | Continuous variable indicating the number of tablets in the household. |
| Household | TV w/Cable or Internet | Continuous variable indicating the number of televisions in the household with cable or internet connection. |
| Household | Internet Connection | Categorical variable indicating availability of internet connection in the household (not including cellphones with internet connection in the household). |

Notes: All variables refer to pre-treatment measurements in the baseline survey. More details on the screen exposure variables are available in Section E in the Appendix.

# I Results

Table I.1: Changes Between Baseline and Follow-up - Treatment Group

| Variable | Mean in Baseline (SE) | Mean in Endline (SE) | Difference (p-value) |
|---|---|---|---|
| Screen Time Total | -0.001 | -0.142 | -0.141*** |
| | [0.990] | [0.815] | (0.004) |
| Screen Time Weekdays | -0.013 | -0.151 | -0.138*** |
| | [0.978] | [0.816] | (0.004) |
| Screen Time Weekends | 0.020 | -0.104 | -0.125** |
| | [1.019] | [0.807] | (0.011) |
| Quality of Screen Time | 0.052 | 0.105 | 0.053 |
| | [0.991] | [0.963] | (0.349) |
| Co-viewing | 0.016 | 0.128 | 0.111** |
| | [0.996] | [0.943] | (0.043) |
| Parental Controls | 0.028 | -0.019 | -0.048 |
| | [1.004] | [1.009] | (0.402) |
| Content Quality | 0.039 | 0.050 | 0.010 |
| | [0.999] | [0.992] | (0.854) |
| Moments | 0.066 | 0.100 | 0.034 |
| | [0.989] | [0.945] | (0.541) |
| Rules | 0.025 | 0.098 | 0.072 |
| | [1.001] | [0.950] | (0.192) |
| Background TV | -0.014 | 0.060 | 0.074 |
| | [0.998] | [0.987] | (0.168) |
| Learning (+) | 0.005 | 0.136 | 0.131** |
| | [1.000] | [0.912] | (0.011) |
| Early Start (+) | -0.015 | -0.029 | -0.014 |
| | [1.010] | [0.996] | (0.800) |
| Observations | 711 | 711 | 1,422 |

Notes: Columns 2 and 3 report the means of baseline variables for the treatment group in the baseline and follow-up survey, with robust standard errors in brackets. Column 3 shows the estimated difference in means obtained from regressing the variable of interest on a follow-up indicator. P-values are reported in parentheses with significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Screen Time variables variables of daily time estimates. Overall Quality is a standardized index of screen exposure quality including six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are standardized variables according to baseline values. More details in Section E in the Appendix.

Table I.2: Changes Between Baseline and Follow-up - Control Group

| Variable | Mean in Baseline (SE) | Mean in Endline (SE) | Difference (p-value) |
|---|---|---|---|
| Screen Time Total | 0.001 | -0.148 | -0.148*** |
| | [1.012] | [0.857] | (0.004) |
| Screen Time Weekdays | 0.010 | -0.155 | -0.166*** |
| | [1.027] | [0.846] | (0.001) |
| Screen Time Weekends | -0.022 | -0.113 | -0.091* |
| | [0.980] | [0.865] | (0.072) |
| Quality of Screen Time | -0.055 | 0.041 | 0.096 |
| | [1.007] | [1.001] | (0.106) |
| Co-viewing | -0.016 | 0.238 | 0.255*** |
| | [1.005] | [0.928] | (0.000) |
| Parental Controls | -0.025 | -0.098 | -0.074 |
| | [0.999] | [1.008] | (0.207) |
| Content Quality | -0.040 | 0.033 | 0.073 |
| | [1.002] | [1.039] | (0.219) |
| Moments | -0.070 | 0.025 | 0.095* |
| | [1.007] | [0.969] | (0.100) |
| Rules | -0.025 | 0.018 | 0.043 |
| | [1.000] | [0.999] | (0.461) |
| Background TV | 0.012 | 0.096 | 0.084 |
| | [0.998] | [1.013] | (0.131) |
| Learning (+) | -0.005 | 0.150 | 0.155*** |
| | [1.001] | [0.918] | (0.003) |
| Early Start (+) | 0.016 | -0.034 | -0.050 |
| | [0.990] | [0.947] | (0.346) |
| Observations | 679 | 679 | 1,358 |

Notes: Columns 2 and 3 report the means of baseline variables for the control group in the baseline and follow-up survey, with robust standard errors in brackets. Column 3 shows the estimated difference in means obtained from regressing the variable of interest on a follow-up indicator. P-values are reported in parentheses with significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Screen Time variables variables of daily time estimates. Overall Quality is a standardized index of screen exposure quality including six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are standardized variables according to baseline values. More details in Section E in the Appendix.

Table I.3: Treatment Effects on Screen Time Controlling for School Calendar

| | Screen Time Total | Screen Time Weekdays | Screen Time Weekends |
|---|---|---|---|
| Treatment | 0.001 | 0.006 | -0.006 |
| | (0.026) | (0.028) | (0.030) |
| P-Value | 0.955 | 0.842 | 0.834 |
| Control Mean | -0.148 | -0.155 | -0.113 |
| Observations | 1373 | 1373 | 1373 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. In this specification we include two extra controls: days since last holiday when starting the baseline survey, and a dummy variable for starting the baseline survey during easter holiday. The dependent variables are daily time estimates of screen time, standardized according to values of the follow-up sample in baseline. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.4: Treatment Effects on Screen Quality Controlling for School Calendar

| | Overall Quality | Co-viewing | Content | Parental Controls | Moments | Rules | Background TV |
|---|---|---|---|---|---|---|---|
| Treatment | -0.001 | -0.119*** | -0.012 | 0.051 | -0.020 | 0.032 | -0.063 |
| | (0.038) | (0.039) | (0.045) | (0.048) | (0.034) | (0.044) | (0.045) |
| P-Value | 0.970 | 0.002 | 0.792 | 0.290 | 0.567 | 0.464 | 0.160 |
| Control Mean | 0.041 | 0.238 | 0.033 | -0.098 | 0.025 | 0.018 | 0.096 |
| Observations | 1205 | 1223 | 1218 | 1209 | 1208 | 1209 | 1357 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. In this specification we include two extra controls: days since the start of the school year when starting the baseline survey, and a dummy variable for starting the baseline survey during easter holiday. The dependent variables indicate screen exposure quality and are standardized according to values of the follow-up sample in baseline. Quality of Screen Time is a standardized index inlcuding six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are constructed such that an increase implies an improvement in the dimension. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.5: Treatment Effects on Parental Beliefs Controlling for School Calendar

| | Overall Beliefs | Limiting Time | Co-viewing | Learning | Early Start | No Screens Babies | Content |
|---|---|---|---|---|---|---|---|
| Treatment | 0.007 | 0.017 | -0.029 | 0.000 | 0.016 | 0.118** | -0.004 |
| | (0.040) | (0.054) | (0.049) | (0.040) | (0.043) | (0.055) | (0.049) |
| P-Value | 0.868 | 0.754 | 0.554 | 0.993 | 0.703 | 0.032 | 0.939 |
| Control Mean | 0.005 | -0.006 | 0.020 | 0.150 | -0.034 | -0.067 | 0.010 |
| Observations | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. In this specification we include two extra controls: days since the start of the school year when starting the baseline survey, and a dummy variable for starting the baseline survey during easter holiday. The dependent variables are parental beliefs on screen exposure in early childhood, with increases indicating an improvement. Overall Beliefs is an index of beliefs available at follow-up including the beliefs on: limiting time, co-viewing, learning, early start, no screens babies, and, content. Beliefs on learning and early start are standardized according to baseline mean and standard deviation. The remaining variables are standardized according to values in the follow-up sample since they were not collected at baseline. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.6: Treatment Effects on Screen Time Controlling for Weather

| | Screen Time Total | Screen Time Weekdays | Screen Time Weekends |
|---|---|---|---|
| Treatment | -0.000 | 0.005 | -0.010 |
| | (0.026) | (0.028) | (0.030) |
| P-Value | 0.992 | 0.864 | 0.746 |
| Control Mean | -0.148 | -0.155 | -0.113 |
| Observations | 1373 | 1373 | 1373 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development.Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. In this specification we include extra variables considering the difference in last week's average weather conditions between the baseline and follow-up survey for each parent-child in: maximum thermal sensation, minimum thermal sensation and precipitations. The dependent variables are daily time estimates of screen time, standardized according to values of the follow-up sample in baseline. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.7: Treatment Effects on Screen Quality Controlling for Weather

| | Overall Quality | Co-viewing | Content | Parental Controls | Moments | Rules | Background TV |
|---|---|---|---|---|---|---|---|
| Treatment | 0.001 | -0.123*** | -0.013 | 0.052 | -0.017 | 0.035 | -0.059 |
| | (0.038) | (0.040) | (0.045) | (0.048) | (0.035) | (0.044) | (0.045) |
| P-Value | 0.987 | 0.002 | 0.775 | 0.283 | 0.629 | 0.419 | 0.186 |
| Control Mean | 0.041 | 0.238 | 0.033 | -0.098 | 0.025 | 0.018 | 0.096 |
| Observations | 1205 | 1223 | 1218 | 1209 | 1208 | 1209 | 1357 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. In this specification we include extra variables considering the difference in last week's average weather conditions between the baseline and follow-up survey for each parent-child in: maximum thermal sensation, minimum thermal sensation and precipitations. The dependent variables indicate screen exposure quality and are standardized according to values of the follow-up sample in baseline. Quality of Screen Time is a standardized index inlcuding six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are constructed such that an increase implies an improvement in the dimension. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.8: Treatment Effects on Parental Beliefs Controlling for Weather

| | Overall Beliefs | Limiting Time | Co-viewing | Learning | Early Start | No Screens Babies | Content |
|---|---|---|---|---|---|---|---|
| Treatment | 0.010 | 0.017 | -0.027 | 0.000 | 0.022 | 0.120** | -0.000 |
| | (0.041) | (0.054) | (0.050) | (0.040) | (0.043) | (0.055) | (0.050) |
| P-Value | 0.804 | 0.747 | 0.587 | 0.996 | 0.608 | 0.031 | 0.999 |
| Control Mean | 0.005 | -0.006 | 0.020 | 0.150 | -0.034 | -0.067 | 0.010 |
| Observations | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. In this specification we include extra variables considering the difference in last week's average weather conditions between the baseline and follow-up survey for each parent-child in: maximum thermal sensation, minimum thermal sensation and precipitations. The dependent variables are parental beliefs on screen exposure in early childhood, with increases indicating an improvement. Overall Beliefs is an index of beliefs available at follow-up including the beliefs on: limiting time, co-viewing, learning, early start, no screens babies, and, content. Beliefs on learning and early start are standardized according to baseline mean and standard deviation. The remaining variables are standardized according to values in the follow-up sample since they were not collected at baseline. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.9: Treatment Effects on Screen Time for Caregivers with Low Social Desirability

| | Screen Time Total | Screen Time Weekdays | Screen Time Weekends |
|---|---|---|---|
| Treatment | -0.002 | 0.008 | -0.022 |
| | (0.036) | (0.038) | (0.040) |
| P-Value | 0.956 | 0.836 | 0.586 |
| Control Mean | -0.226 | -0.230 | -0.182 |
| Observations | 741 | 741 | 741 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development.Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables are daily time estimates of screen time, standardized according to values of the follow-up sample in baseline. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Estimation is done on the subsample of caregviers with low social desirability, defined as those with the 9-items reduced Marlowe Crowne scale Manganelli et al. (2000) at or below the median.

Table I.10: Treatment Effects on Screen Quality for Caregivers with Low Social Desirability

| | Overall Quality | Co-viewing | Content | Parental Controls | Moments | Rules | Background TV |
|---|---|---|---|---|---|---|---|
| Treatment | 0.032 | -0.120** | 0.047 | 0.078 | -0.015 | 0.018 | -0.075 |
| | (0.052) | (0.057) | (0.063) | (0.066) | (0.047) | (0.060) | (0.062) |
| P-Value | 0.541 | 0.037 | 0.463 | 0.241 | 0.750 | 0.767 | 0.224 |
| Control Mean | -0.064 | 0.091 | -0.110 | -0.208 | 0.034 | -0.010 | 0.140 |
| Observations | 640 | 648 | 646 | 641 | 641 | 641 | 733 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables indicate screen exposure quality and are standardized according to values of the follow-up sample in baseline. Quality of Screen Time is a standardized index inlcuding six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are constructed such that an increase implies an improvement in the dimension. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Estimation is done on the subsample of caregviers with low social desirability, defined as those with the 9-items reduced Marlowe Crowne scale Manganelli et al. (2000) at or below the median.

Table I.11: Treatment Effects on Parental Beliefs for Caregivers with Low Social Desirability

| | Overall Beliefs | Limiting Time | Co-viewing | Learning | Early Start | No Screens Babies | Content |
|---|---|---|---|---|---|---|---|
| Treatment | -0.012 | -0.011 | -0.010 | -0.007 | -0.007 | 0.107 | -0.058 |
| | (0.054) | (0.082) | (0.066) | (0.056) | (0.059) | (0.076) | (0.064) |
| P-Value | 0.818 | 0.895 | 0.877 | 0.894 | 0.904 | 0.162 | 0.368 |
| Control Mean | 0.087 | 0.005 | 0.079 | 0.203 | -0.014 | -0.052 | 0.147 |
| Observations | 726 | 726 | 726 | 726 | 726 | 726 | 726 |

Notes: Estimates obtained through OLS regressions controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables are parental beliefs on screen exposure in early childhood, with increases indicating an improvement. Overall Beliefs is an index of beliefs available at follow-up including the beliefs on: limiting time, co-viewing, learning, early start, no screens babies, and, content. Beliefs on learning and early start are standardized according to baseline mean and standard deviation. The remaining variables are standardized according to values in the follow-up sample since they were not collected at baseline. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Estimation is done on the subsample of caregviers with low social desirability, defined as those with the 9-items reduced Marlowe Crowne scale Manganelli et al. (2000) at or below the median.

Table I.12: Multiple Hypothesis Testing

| | Model P-Value | Romano-Wolf P-Value |
|---|---|---|
| *Panel a: Screen Time* | | |
| Screen Time Total | 0.970 | 0.974 |
| Screen Time Weekdays | 0.852 | 0.967 |
| Screen Time Weekends | 0.817 | 0.967 |
| *Panel b: Screen Quality* | | |
| Overall Quality | 0.965 | 0.962 |
| Co-viewing | 0.002 | 0.017 |
| Content | 0.783 | 0.951 |
| Parental Controls | 0.289 | 0.744 |
| Moments | 0.582 | 0.921 |
| Rules | 0.457 | 0.862 |
| Background TV | 0.158 | 0.565 |
| *Panel c: Parental Beliefs on Screens* | | |
| Overall Beliefs | 0.863 | 0.997 |
| Limiting Time | 0.727 | 0.990 |
| Co-viewing | 0.528 | 0.965 |
| Learning | 0.975 | 0.997 |
| Early Start | 0.670 | 0.988 |
| No Screens Babies | 0.032 | 0.182 |
| Content | 0.924 | 0.997 |

Notes: The first column shows the p-values from the estimates in Tables 1, 2 and 3. The second column shows the Romano-Wolf stepdown p-values for multiple hypothesis testing (Romano and Wolf, 2016; Clarke et al., 2020).

Table I.13: Local Average Treatment Effects on Screen Time

| | Screen Time Total | Screen Time Weekdays | Screen Time Weekends |
|---|---|---|---|
| *Panel a* | | | |
| Watched Full Video | 0.001 | 0.006 | -0.008 |
| | (0.032) | (0.033) | (0.036) |
| P-Value | 0.970 | 0.851 | 0.815 |
| Control Mean | -0.148 | -0.155 | -0.113 |
| Observations | 1373 | 1373 | 1373 |
| *Panel b* | | | |
| Watched Video and Read Leaflet | 0.002 | 0.008 | -0.011 |
| | (0.042) | (0.044) | (0.048) |
| P-Value | 0.970 | 0.851 | 0.815 |
| Control Mean | -0.148 | -0.155 | -0.113 |
| Observations | 1373 | 1373 | 1373 |

Notes: Notes: Estimates obtained through 2SLS regressions controlling for pre-treatment caregiver, child and household characteristics. In each panel we present the effect of a treatment compliance variable instrumented by an indicator variable of random assignment to treatment. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables are daily time estimates of screen time, standardized according to values of the follow-up sample in baseline. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.14: Local Average Treatment Effects on Screen Quality

| | Overall Quality | Co-viewing | Content | Parental Controls | Moments | Rules | Background TV |
|---|---|---|---|---|---|---|---|
| *Panel a* | | | | | | | |
| Watched Full Video | -0.002 | -0.150*** | -0.015 | 0.062 | -0.023 | 0.040 | -0.076 |
| | (0.046) | (0.048) | (0.054) | (0.058) | (0.042) | (0.053) | (0.053) |
| P-Value | 0.965 | 0.002 | 0.781 | 0.285 | 0.578 | 0.453 | 0.154 |
| Control Mean | 0.041 | 0.238 | 0.033 | -0.098 | 0.025 | 0.018 | 0.096 |
| Observations | 1205 | 1223 | 1218 | 1209 | 1208 | 1209 | 1357 |
| *Panel b* | | | | | | | |
| Watched Video and Read Leaflet | -0.003 | -0.198*** | -0.020 | 0.082 | -0.030 | 0.052 | -0.100 |
| | (0.060) | (0.063) | (0.071) | (0.076) | (0.055) | (0.069) | (0.070) |
| P-Value | 0.965 | 0.002 | 0.781 | 0.284 | 0.578 | 0.452 | 0.155 |
| Control Mean | 0.041 | 0.238 | 0.033 | -0.098 | 0.025 | 0.018 | 0.096 |
| Observations | 1205 | 1223 | 1218 | 1209 | 1208 | 1209 | 1357 |

Notes: Notes: Estimates obtained through 2SLS regressions controlling for pre-treatment caregiver, child and household characteristics. In each panel we present the effect of a treatment compliance variable instrumented by an indicator variable of random assignment to treatment. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables indicate screen exposure quality and are standardized according to values of the follow-up sample in baseline. Quality of Screen Time is a standardized index inlcuding six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are constructed such that an increase implies an improvement in the dimension. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.15: Local Average Treatment Effects on Parental Beliefs

| | Overall Beliefs (+) | Limiting Time (-) | Co-viewing (+) | Learning (+) | Early Start (+) | No Screens Babies (-) | Content (+) |
|---|---|---|---|---|---|---|---|
| *Panel a* | | | | | | | |
| Watched Full Video | 0.008 | 0.023 | -0.037 | 0.002 | 0.022 | 0.143** | -0.006 |
| | (0.048) | (0.064) | (0.059) | (0.048) | (0.051) | (0.066) | (0.059) |
| P-Value | 0.862 | 0.724 | 0.524 | 0.974 | 0.667 | 0.030 | 0.924 |
| Control Mean | 0.005 | -0.006 | 0.020 | 0.150 | -0.034 | -0.067 | 0.010 |
| Observations | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 |
| *Panel b* | | | | | | | |
| Watched Video and Read Leaflet | 0.011 | 0.030 | -0.049 | 0.002 | 0.029 | 0.185** | -0.007 |
| | (0.063) | (0.084) | (0.076) | (0.062) | (0.067) | (0.085) | (0.076) |
| P-Value | 0.862 | 0.724 | 0.525 | 0.974 | 0.667 | 0.030 | 0.924 |
| Control Mean | 0.005 | -0.006 | 0.020 | 0.150 | -0.034 | -0.067 | 0.010 |
| Observations | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 | 1346 |

Notes: Notes: Estimates obtained through 2SLS regressions controlling for pre-treatment caregiver, child and household characteristics. In each panel we present the effect of a treatment compliance variable instrumented by an indicator variable of random assignment to treatment. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables are parental beliefs on screen exposure in early childhood, with increases indicating an improvement. Overall Beliefs is an index of beliefs available at follow-up including the beliefs on: limiting time, co-viewing, learning, early start, no screens babies, and, content. Beliefs on learning and early start are standardized according to baseline mean and standard deviation. The remaining variables are standardized according to values in the follow-up sample since they were not collected at baseline. More details in Section E in the Appendix. Robust standard errors are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.16: Heterogeneous Treatment Effects by Cost of Improving Exposure

| | Screen Time Total | Overall Quality | Overall Quality w/o co-viewing | Overall Beliefs |
|---|---|---|---|---|
| Below median | 0.059 | -0.057 | -0.051 | -0.030 |
| | (0.137) | (0.254) | (0.316) | (0.614) |
| Above median | -0.025 | 0.068 | 0.082 | 0.020 |
| | (0.556) | (0.235) | (0.153) | (0.758) |
| P-Value Equal Effects | 0.144 | 0.095 | 0.078 | 0.568 |
| Control Mean - Below median | -0.165 | 0.351 | 0.309 | -0.004 |
| Control Mean - Above median | 0.157 | -0.332 | -0.325 | -0.175 |
| Observations | 1194 | 1160 | 1160 | 1168 |

Notes: Estimates obtained through OLS regressions including a binary indicator of the tiring index at or above the median and an interaction between this variable and the treatment indicator, controlling for pre-treatment caregiver, child and household characteristics. The tiring index summarizes how tiring would it be to reduce screen time, improve co-viewing or control content. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables are: a daily time estimate of screen time; an index of quality of screen time including co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure; the same index excluding the co-viewing dimension; and an index of overall beliefs including limiting time, co-viewing, learning, early start, no screens babies, and, content. All variables are standardized according to values of the follow-up sample in baseline. More details in Section E in the Appendix. The first four rows report the treatment effects for caregivers with the tiring index below the median and for the tiring index at or above the median, with stars indicating their significance level and p-values in parentheses. The fifth row reports the p-value for the test of equal effects (interaction term). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.17: Heterogeneous Treatment Effects by Patience

| | Screen Time Total | Overall Quality | Overall Quality w/o co-viewing | Overall Beliefs |
|---|---|---|---|---|
| Below median | 0.013 | 0.035 | 0.047 | -0.016 |
| | (0.757) | (0.574) | (0.458) | (0.809) |
| Above median | -0.006 | -0.018 | -0.009 | 0.015 |
| | (0.850) | (0.703) | (0.852) | (0.765) |
| P-Value Equal Effects | 0.719 | 0.494 | 0.479 | 0.707 |
| Control Mean - Below median | -0.035 | -0.139 | -0.161 | -0.150 |
| Control Mean - Above median | -0.220 | 0.158 | 0.139 | 0.108 |
| Observations | 1360 | 1196 | 1196 | 1333 |

Notes: Estimates obtained through OLS regressions including a binary indicator of patience at or above the median and an interaction between this variable and the treatment indicator, controlling for pre-treatment caregiver, child and household characteristics. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables are: a daily time estimate of screen time; an index of quality of screen time including co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure; the same index excluding the co-viewing dimension; and an index of overall beliefs including limiting time, co-viewing, learning, early start, no screens babies, and, content. All variables are standardized according to values of the follow-up sample in baseline. More details in Section E in the Appendix. The first four rows report the treatment effects for caregivers with patience below the median and for patience at or above the median, with stars indicating their significance level and p-values in parentheses. The fifth row reports the p-value for the test of equal effects (interaction term). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.18: Heterogeneous Treatment Effects by Priors

| | Screen Time Total | Overall Quality | Overall Quality w/o co-viewing | Overall Beliefs |
|---|---|---|---|---|
| Below median | -0.034 | 0.028 | 0.040 | 0.026 |
| | (0.448) | (0.638) | (0.506) | (0.705) |
| Above median | 0.028 | -0.026 | -0.017 | 0.040 |
| | (0.362) | (0.592) | (0.720) | (0.476) |
| P-Value Equal Effects | 0.252 | 0.478 | 0.454 | 0.871 |
| Control Mean - Below median | 0.141 | -0.163 | -0.188 | -0.598 |
| Control Mean - Above median | -0.372 | 0.216 | 0.200 | 0.466 |
| Observations | 1372 | 1204 | 1204 | 1345 |

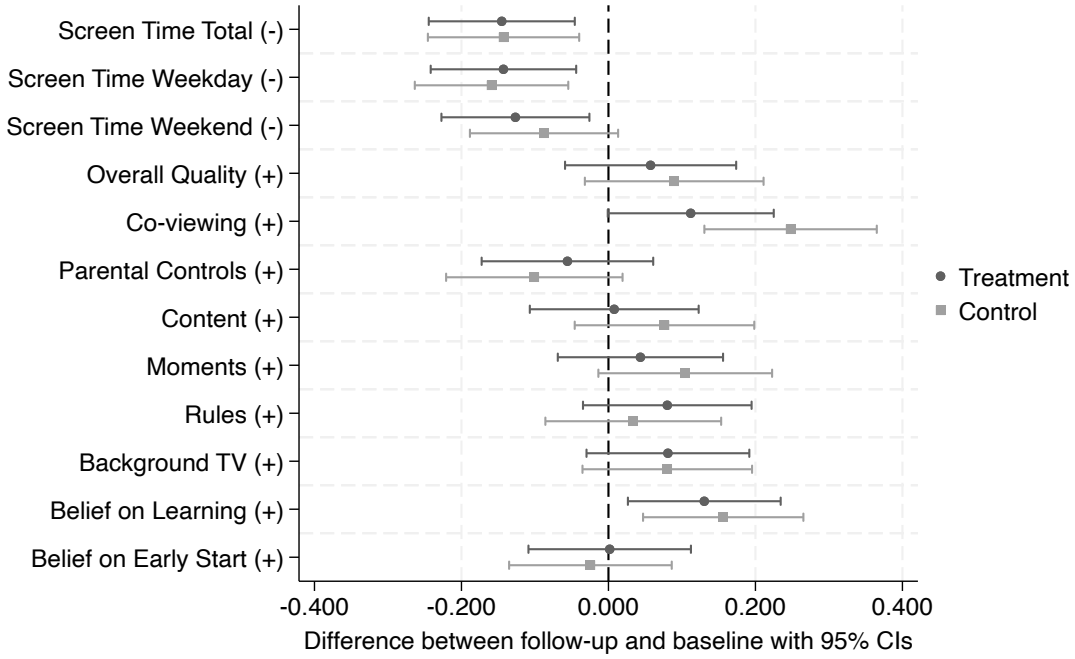
Notes: Estimates obtained through OLS regressions including a binary indicator of parental beliefs on screens at or above the median and an interaction between this variable and the treatment indicator, controlling for pre-treatment caregiver, child and household characteristics. The index of screen beliefs includes limiting time, co-viewing, learning, early start, no screens babies, and, content. Caregiver covariates include: sample origin, gender, age, years of education, hours of paid work, patience, number of offspring, beliefs on screens, belief on child development. Child covariates include: age, hours of preschool, adult support for learning, screen time, co-viewing, content quality, parental controls, moments of exposure, rules. Household covariates include: number of tablets, number of TV with cable or internet connection, internet connection. More details in Table H.1 in the Appendix. The dependent variables are: a daily time estimate of screen time; an index of quality of screen time including co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure; the same index excluding the co-viewing dimension; and an index of overall beliefs including limiting time, co-viewing, learning, early start, no screens babies, and, content. All variables are standardized according to values of the follow-up sample in baseline. More details in Section E in the Appendix. The first four rows report the treatment effects for caregivers with beliefs below the median and for beliefs at or above the median, with stars indicating their significance level and p-values in parentheses. The fifth row reports the p-value for the test of equal effects (interaction term). Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table I.19: Multiple Hypothesis Testing

| | Model P-Value | Romano-Wolf P-Value |
|---|---|---|
| *Panel a: Screen Time* | | |
| Screen Time Total | 0.000 | 0.001 |
| Screen Time Weekdays | 0.000 | 0.001 |
| Screen Time Weekends | 0.002 | 0.002 |
| *Panel b: Screen Quality* | | |
| Overall Quality | 0.072 | 0.267 |
| Co-viewing | 0.000 | 0.001 |
| Content | 0.316 | 0.354 |
| Parental Controls | 0.140 | 0.354 |
| Moments | 0.110 | 0.354 |
| Rules | 0.149 | 0.354 |
| Background TV | 0.041 | 0.194 |
| *Panel c: Parental Beliefs on Screens* | | |
| Learning | 0.000 | 0.001 |
| Early Start | 0.405 | 0.414 |

Notes: The first column shows the p-values from the estimates in Tables I.1 and I.2. The second column shows the Romano-Wolf stepdown p-values for multiple hypothesis testing (Romano and Wolf, 2016; Clarke et al., 2020).

Figure I.1: Changes Between Baseline and Follow-Up Excluding Surveys in Easter



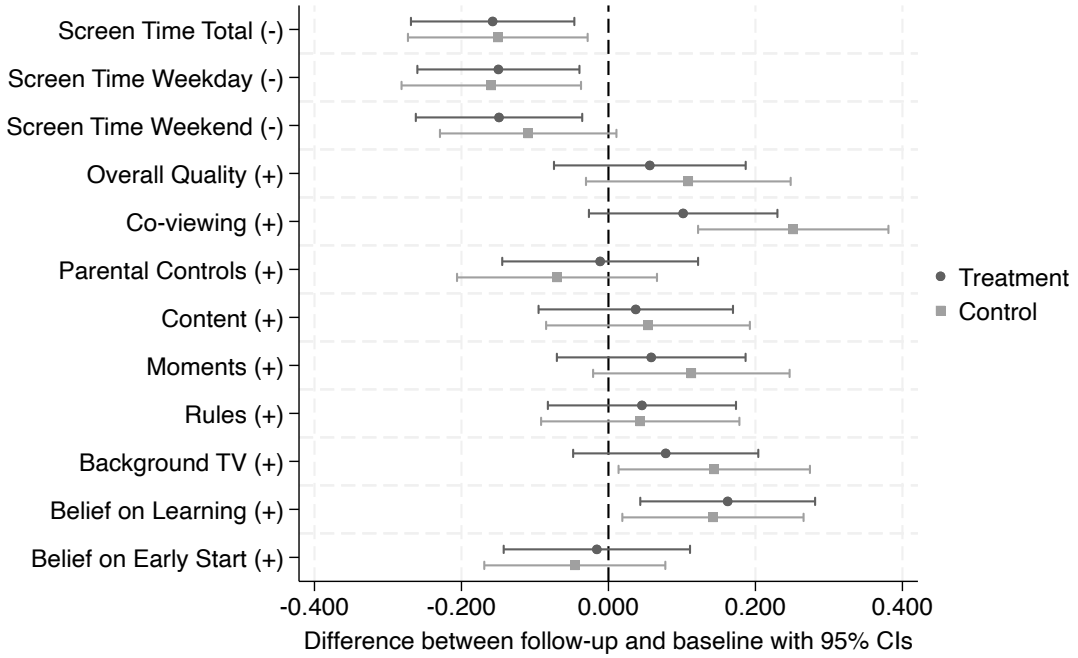

Notes: The figure depicts the estimated differences in means between follow-up and baseline for the follow-up sample by treatment status. The direction of an improvement is indicated in parentheses: (+) an increase reflects an improvement, (-) a decrase reflects an improvement. 95% confidence intervals are reported using robust standard errors. Screen Time variables variables of daily time estimates. Overall Quality is a standardized index of screen exposure quality including six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are standardized variables according to baseline values. More details in Section E in the Appendix. Estimation is done on a subsample of caregivers, excluding those who started the baseline survey during Easter holidays (N=1,261).

Table I.20: Average Weather Conditions in Baseline and Follow-up

| Variable | Mean in Baseline (SE) | Mean in Follow-up (SE) | Difference (p-value) |
|---|---|---|---|
| Maximum Thermal Sensation (C) | 23.5 | 17.4 | -6.0*** |
| | [5.7] | [4.6] | (0.000) |
| Minimum Thermal Sensation (C) | 14.8 | 9.1 | -5.8*** |
| | [4.6] | [5.2] | (0.000) |
| Average Thermal Sensation (C) | 19.0 | 13.3 | -5.8*** |
| | [4.5] | [4.3] | (0.000) |
| Average Precipitations (mm) | 1.2 | 1.2 | 0.0 |
| | [3.3] | [4.0] | (0.962) |
| Average Wind Speed (mph) | 11.7 | 11.7 | 0.0 |
| | [4.9] | [5.8] | (0.991) |
| Average Cloud Cover (%) | 60.5 | 66.9 | 6.4* |
| | [21.3] | [22.1] | (0.071) |
| Observations | 68 | 89 | 157 |

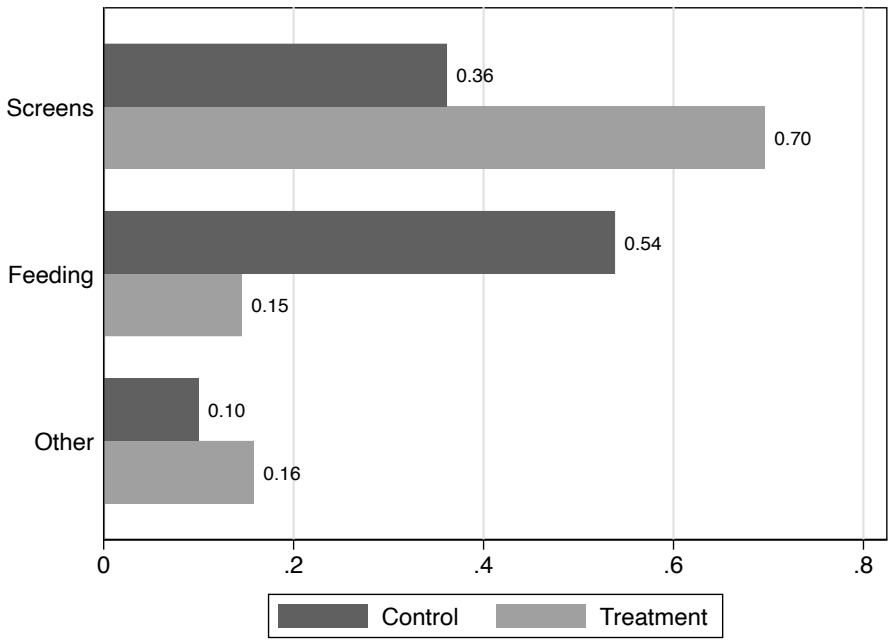
Notes: Columns 2 and 3 report the mean in average weather conditions between baseline and follow-up (each day in an observation), with robust standard errors in brackets. Column 3 shows the estimated difference in means obtained from regressing the variable of interest on a follow-up indicator. P-values are reported in parentheses with significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Data was obtained from Visual Crossing Weather by searching daily weather conditions in Uruguay between March 2023 and July 2023, available at https://www.visualcrossing.com

Figure I.2: Changes Between Baseline and Follow-Up Excluding Surveys in Hot or Cold Waves



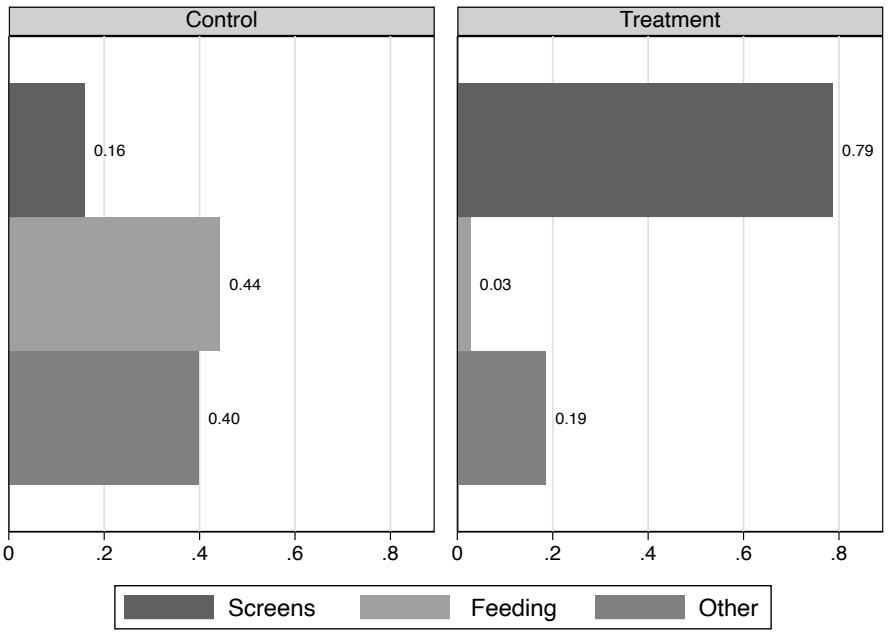

Notes: The figure depicts the estimated differences in means between follow-up and baseline for the follow-up sample by treatment status. The direction of an improvement is indicated in parentheses: (+) an increase reflects an improvement, (-) a decrase reflects an improvement. 95% confidence intervals are reported using robust standard errors. Screen Time variables variables of daily time estimates. Overall Quality is a standardized index of screen exposure quality including six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are standardized variables according to baseline values. More details in Section E in the Appendix. Estimation is done on a subsample of caregivers, excluding those who started the baseline or follow-up survey during a heat or cold wave (N=998).

Figure I.3: Study Topic by Treatment Status



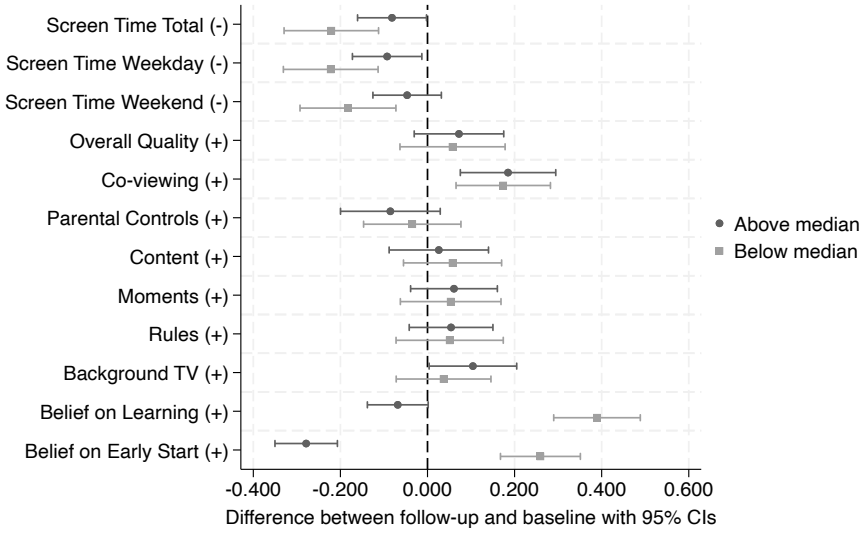

Notes: The figure depicts the proportion of respondants answering to the open question "can you name any of the topics you remember from the survey?", from those that answered yes to the question "do you remember any of the topics covered in the survey?". This question was categorized in three groups: screen exposure, feeding, or other topics. Question in post follow-up survey approximately 22 months after the beginning of the study, N=288.

Figure I.4: Video Topic by Treatment Status



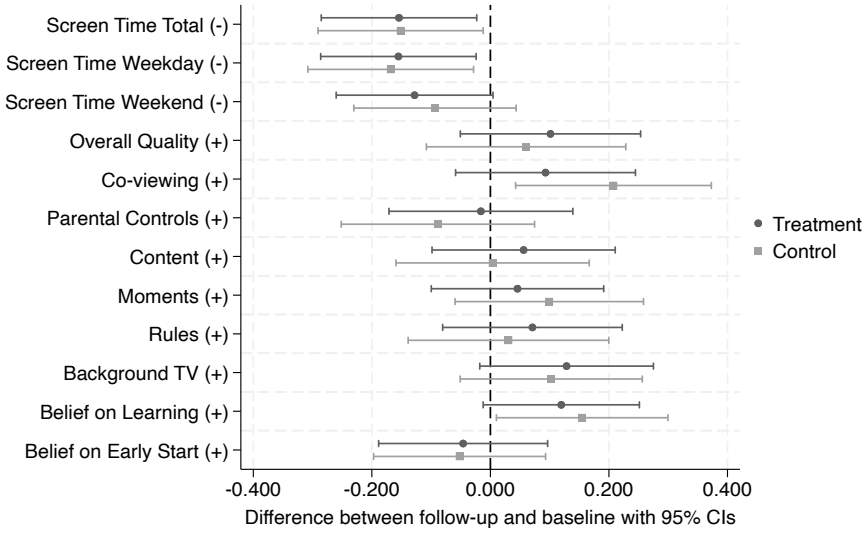

Notes: The figure depicts the proportion of respondants answering to the open question "at the end of the survey there was a video with recommendations for early childhood. Do you remember what it was about?". Question in post follow-up survey approximately 22 months after the beginning of the study, N=562.

Figure I.5: Changes Between Baseline and Follow-Up by Baseline Beliefs on Screens




Notes: The figure depicts the estimated differences in means between follow-up and baseline for the follow-up sample by an index of baseline beliefs on screens above or below the median. This index includes: "playing with screens they can learn as much as with adults" and "the sooner they learn to use screens, the better". The direction of an improvement is indicated in parentheses: (+) an increase reflects an improvement, (-) a decrase reflects an improvement. 95% confidence intervals are reported using robust standard errors. Screen Time variables variables of daily time estimates. Overall Quality is a standardized index of screen exposure quality including six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are standardized variables according to baseline values. More details in Section E in the Appendix.

Figure I.6: Changes Between Baseline and Follow-Up for Caregivers with Low Social Desirability




Notes: The figure depicts the estimated differences in means between follow-up and baseline for the follow-up sample by treatment status. The direction of an improvement is indicated in parentheses: (+) an increase reflects an improvement, (-) a decrase reflects an improvement. 95% confidence intervals are reported using robust standard errors. Screen Time variables variables of daily time estimates. Overall Quality is a standardized index of screen exposure quality including six dimensions: co-viewing, content quality, parental controls, moments of exposure, rules for screen exposure, and background TV exposure. All variables are standardized variables according to baseline values. More details in Section E in the Appendix. Estimation is done on the subsample of caregviers with low social desirability, defined as those with the 9-items reduced Marlowe Crowne scale Manganelli et al. (2000) at or below the median (N=751).