Dias, P., & Brito, R. (2021). Criteria for selecting apps: debating the perceptions of young children, parents and industry stakeholders. *Computers and Education*, *165*, [104134]. https://doi.org/10.1016/j.compedu.2021.104134

Criteria for selecting Apps: Debating the Perceptions of Young Children, Parents and Industry Stakeholders

It is indisputable that young children are exposed to digital media since birth and start using them very early. This fuels debate that engages scholars and researchers, industry and brands, policymakers, and parents. Our study aimed to contrast these different perspectives, adding the view of children, who are frequently left out of this debate. Using an exploratory qualitative approach, we conducted interviews with children under 8 years old and their parents in 81 families, and with 17 expert stakeholders in different fields. We focused on their perceptions and practices regarding digital media, and specifically on how they assess and select apps, concluding that parents value safety and learning, children enjoy entertainment, and stakeholders highlight the importance of a good user experience.

Keywords: young children, mobile media, apps, parents, stakeholders.

Highlights:

- Children, parents and industry stakeholders have different perspectives on the criteria they use for assessing and selecting apps
- Parents prefer educational apps, particularly if they afford learning of subjects and skills included in the school curricula
- Children prefer apps that afford fun, entertainment and play
- Industry stakeholders are aware that parents and children have contrasting views and struggle to please both

Introduction

The homes of most children living in developed countries are "digitally fluent" environments (Palaiologou, 2014), where they are exposed to digital devices and start using them from a very early age (Sanders, Parent, Forehand, Sullivan & Jones, 2016). This “digitization” of childhood and the unprecedented fast pace of technological

development pose new challenges to different stakeholders committed to protecting children's rights, from parents to teachers, from policymakers to businesses and brands, and, of course, to the "digitods" (Holloway, Green & Stevenson, 2015) themselves.

Parents in particular express concern and doubts about the opportunities and risks that digital media may represent for young children, as they are frequently confronted with contrasting information and opposing views in different information sources (e.g. news, books, scientific articles, user-generated content, expert opinions from paediatricians and psychologists, from educators and teachers, and also recommendations from family and friends) (Authors, 2018a). When interacting with digital media, children tend to adopt a more trial-and-error and exploratory approach and learn as they go along, but at such an early age lack some of the media literacy skills necessary to fully understand the functioning of media, the implications of algorithms and big data, and the persuasive intent often embedded in digital content (Chaudron, di Gioia & Gemmo, 2018). Stakeholders in the digital technology and content industry strive to consider different interests, to conciliate business models, technological quality and appeal to their targets with the desire to educate and entertain, and often a strong ethical orientation is missing (Mascheroni & Holloway, 2018). Academic researchers in the field have contributed to this debate about the opportunities and risks that digital media hold for young children by suggesting an update of Children's Rights to the digital age around 3 Ps - Protection, Participation and Provision (Lievens, Livingstone, McLaughlin, O'Neill, & Verdoodt, 2018).

Our study sets out to explore how decisions regarding app choice - as mobile devices are the favourites of young children - are made in the Portuguese homes, including the voices of young children, who are often absent from this debate (Mascheroni & Holloway, 2017). We conducted an exploratory qualitative study based

on interviews to young children and parents of 81 Portuguese families, and to 17 relevant experts, policymakers and industry stakeholders, in order to find out how they assess and select apps, and which features they consider requisites of a good app, or or characteristics of a bad app.

1. Theoretical Framework

1.1 Parental mediation of mobile devices and digital activities

Parents are the main mediators of digital media when it comes to young children, deciding about the presence of digital media in the home, whether children have access to them, the terms of such access, and on the content and activities which are or aren't suitable for young children (Livingstone, Mascheroni & Staksrud, 2017; Valcke, Bonte, Wener & Rots, 2010). The first approaches to studying parental mediation of digital media attempted to classify parents according to parental mediation models, which can be summarized as varying between two extremes: restrictive styles - which include establishing strict rules, limiting screen-time, using filters and blockers, monitoring and surveillance; and enabling styles - which are based in scaffolding the development of digital skills and media literacy, helping, teaching, also monitoring, dialogue, and co-use (Nikken & Schols, 2015; Valcke et al., 2010). However, recent research (e.g. Chaudron Di Gioia & Gemmo, 2018; Livingstone, Ólafsson, Helsper, Lupiáñez-Villanueva, Veltri & Folkvord, 2017; Ponte, Simões, Batista & Jorge, 2017) argues that parental mediation is a complex and fluid process, being therefore difficult to pinpoint the parental mediation style of specific families. In addition, parents often combine restrictive and enabling actions, and these are constantly negotiated with children, and changed according to perceived outcomes and effects .

Previous research has concluded that the perceptions of parents regarding digital media and their use by children play an important role in their parental mediation. Parents with predominantly positive perceptions about the educational and developmental potential of digital media tend to be more permissive and even encourage certain digital activities, while parents with predominantly negative perceptions fear risks and negative consequences of excessive screen time, and consequently tend to be more restrictive and monitor closely the digital practices of children (Author et al., 2016; Nikken & Jansz, 2006; Ponte, Simões, Batista & Castro, 2019). However, most studies report mixed perceptions, ranging from valuing the stimulation for learning and development that digital media afford to fearing online risks and negative consequences of excessive use in health and wellbeing, such as addiction, underdevelopment of social skills, sleep disorders and obesity (Livingstone, Haddon, Gorzig, & Ólafsson, 2014; Livingstone, Blum-Ross, Pavlick, & Ólafsson, 2018). An European study across 14 countries (Mascheroni & Holloway, 2018; Milosevic, Author, Mifsud, & Trueltzsche-Wijnen, 2018) has concluded that the mixed perceptions of parents are often emphasized by contradictory media discourses on the topic. News, policymakers and scientific research tend to predominantly highlight online risks and negative consequences of using digital media, while user-generated content from influencers and expert opinion-makers, as well as promotional content from brands, predominantly focus on the importance of participating in the digital world, of fully becoming citizens, of learning and preparing for a future when digital skills will be required.

The parental mediation adopted for digital technologies is, therefore, shaped by the mixed perceptions and uncertainties that parents display about the risks and benefits that such media hold for their children (Livingstone, Blum-Ross, Pavlick, & Ólafsson,

2018). It is also fluid and complex, often based on trial-and-error and learn-as-you-go approaches (Ponte, Simões, Batista & Castro, 2019). Additionally, children often negotiate with parents their access and use of digital media, thus being active participants in the parental mediation process (Nikken & Schols, 2015; Zaman, Nouwen, Vanattenhoven, de Ferrerre & van Looy, 2016).

However, there are some common trends in the parental mediation of digital media. An European study including 18 countries concluded that the most common restrictive action is limiting screen time to an average maximum of 30 minutes a day, followed by not allowing access to content that is considered violent, mostly games. On the other hand, the most common enabling action is selecting games and apps that parents consider educational and motivating the children to use those, sometimes engaging in co-using (Chaudron, Di Gioia & Gemmo, 2018). This is quite limiting for children, as parents often perceive as educational content what is similar to school curricula (e.g. activities such as puzzles, quizzes and games for learning how to read, write, count, speak a foreign language) and dismiss other formats and skills (Authors, 2018a, 2018b).

Parents focus their monitoring and restrictions around the risks that they perceive. They worry about negative consequences of excessive use for health and development, such as addiction, hyperactivity, anxiety, obesity, sleep disorders, underdevelopment of social skills, and even eyesight, and therefore limit time of use (Chaudron, Di Gioia & Gemmo, 2018). Regarding content, parents are mostly worried about what might motivate violence or improper conduct (e.g. games where the goals are stealing, fighting, killing), may scare the children, and sexual content. They are also very worried and sexual predators and the dangers of meeting others online, but they believe that these risks do not apply to young children because most of them do not use

social media yet (Ponte & Batista, 2019). The most relevant risks for young children are related to the invasion of their privacy, to the collection of data and its use for commercial purposes, and to the exposure to persuasive commercial messages that they are not fully able to identify and properly decode (Mascheroni & Holloway, 2018; Milosevic, Author, Mifsud, Trueltzsche-Wijnen, 2018). However, most parents reveal little awareness or concern about these risks, and therefore are not adopting parental mediation actions that address them, nor helping the children develop the necessary media literacy and critical skills to cope with them (Authors, 2018a, 2018b).

1.2 Why young children enjoy mobile devices and apps so much

Despite ethical and methodological challenges, researchers have, in recent years, tackled the need to include the voice of young children in research (Livingstone & Third, 2017; Nesset & Large, 2004), shedding light into why young children like digital media so much, and into their digital practices. These insights are revealing about the criteria that children use to assess and select apps.

For young children, smartphones and tablets are versatile devices that afford "endless entertainment" (OfCom, 2016; Rideout, 2017). They enjoy them because they are intuitive, easy to use, and portable. Games are challenging and engaging, as children are motivated to overcome difficulties, learn and develop skills. But when challenges become too difficult, there is a panoply of other games and different activities, so children can just abandon one and engage in another. Therefore, digital devices are very stimulating and offer instantaneous satisfaction (Chang et al., 2019).

Several studies concur that the favourite digital practices of young children are playing games and watching videos on YouTube (e.g. Kabali et al., 2015; Chaudron, Di Gioia & Gemmo, 2018). In spite of apparently doing the same, the choices of games and audiovisual content are very diverse, and usually connected to each child's

preferences in play and fandom. They enjoy including digital devices in their physical play (e.g. playing music with a tablet as background for playing with toys; watching play videos on YouTube while playing with similar toys) and using them to explore their interests (e.g. playing online a sport that they also enjoy playing offline) (Chaudron, Di Gioia & Gemmo, 2018). The degree of engagement and participation increases with age, older children (e.g. 5 to 8 years-old) are usually more participative and create content, while younger children (e.g. 0 to 3 years-old) tend to be more passive (Ponte & Batista, 2019).

Some children refer enjoying the privacy that digital devices afford as personal devices, which allows them to explore autonomously and individually, pursuing their interests and having a wide range of choice (Marsh et al., 2015; Oliemat, Ihmeideh & Alkhawaldeh, 2018; Vincent, 2015). In parallel, most children report enjoying using digital devices with their parents, mostly because they teach them and help them overcome their difficulties and achieve their goals (Kildare & Middlemiss, 2017). However, they usually dislike the digital activities that their parents propose them, finding them too similar to "schoolwork" (Broekman, Piotrowski, Beentjes, & Valkenburg, 2018). As a consequence, sometimes they prefer exploring digital devices on their own, without the monitoring and guidance of parents (Authors, 2018b; Oliemat, Ihmeideh, & Alkhawaldeh, 2018). These findings point to children and parents having different perspectives about the apps that they enjoy using or that they consider beneficial, thus making their choices based on different criteria, which we intend to explore in our research.

1.3 "Good" apps for young children

Different scientific fields have contributed to the discussion about to which extent

digital devices and content can be beneficial or harmful for the safety, development and wellbeing of young children. One aspect that is generally considered positive is the potential of digital media to scaffold learning. However, the requirements for digital content to be considered educational is debatable. In the specific case of mobile apps, Papadakis and Kalogiannakis (2017) point out that the real educational value of "self-proclaimed" educational apps needs to be discussed and assessed. In this section, we present a brief overview of established criteria for assessing the potential benefits and risks of digital content for young children.

In the field of Psychology, some scholars and professionals have expressed concern about the premature and excessive exposure of children to digital media. For example, the American Psychological Association suggests some guidelines for parents, among which is avoiding screened-media altogether before 18 months old (except for occasional video chatting) and limiting screen time to a maximum of 1 daily hour until 5 years old (APA, 2019). These concerns are grounded on studies that attest negative effects of excessive screen-time in the case of young children on their cognitive development (Anderson & Subrahmanyam, 2017), and also a correlation to sleep disorders (Wolf, C., Wolf, S., Weiss & Nino, 2018) and to an underdevelopment of social skills (Tran & Subrahmanyam, 2013). However, many studies consider a set of variables that shape the effects of digital media use on young children, among which the type of digital content and activities and the participation of parents are particularly relevant (Pempek & Lauricella, 2017). Thus, digital media hold the potential of being beneficial or harmful for the development of children, depending on how and for how long they are used. Hirsh-Pasek, Zosh, Golinoff, Gray, Robb and Kaufman (2015) argue that educational apps are the ones that promote active, engaged, meaningful and socially interactive learning. The authors suggest a matrix for evaluating the "learning

value" of apps, based on the stimulation of these four "pillars" of learning. Another important contribution is the acknowledgement that apps can be oriented to educational goals or not, and that even those who are not can scaffold learning if they rely on these four "pillars" of learning.

One of the main contributions of Education studies is the centrality of the development of the child - quality digital content should be adequate to the age and both cognitive and psychomotor development of children. For example, the interface should be adequate to capabilities and skills, and the content and activities should address the interests of children in order to scaffold their development (Guernsey & Levine, 2015). But this is not always the case: Crescenzi-Lanna and Grané-Oró (2016) analysed over 100 educational apps for young children and found poor quality and adaptation to child development, complex design and user experience with unnecessary features, a hegemony of curricular content in detriment of learning dimensions linked to socio-affective, artistic, creative and knowledge-building aspects, as well as stereotypes. Papadakis and Kalogiannakis (2017) highlight that, considering the overwhelming quality of apps for children available and the *ad hoc* way in which they are often categorised in digital stores, parents (and teachers) struggle to make critical and informed selections. Guernsey and Levine (2015) suggest 4 dimensions to consider when assessing a mobile app, organized as 4 Cs: 1) child - should have fun and identify with the content; 2) content - should be appropriate for the child and provide learning; 3) community - should reflect the child's context; and 4) context - should ensure that the child balances the time spent online and offline. The authors add that the top 3 elements to avoid online are: 1) violence; 2) gender and ethnic stereotypes; and 3) pop-up advertising and sales promotion. Papadakis, Kalogiannis and Zaranis (2017) worked on a tool for Preschool teachers to evaluate mobile apps, considering four areas:

content, design, functionality and technical quality (each with several subsectors). This work later evolved into an Evaluation Tool for Educational Apps (ETEA) (Papadakis, Vaiopoulou, Kalogiannakis & Stamovlasis, 2020), which includes 13 criteria organized in four main categories: usability, efficiency, parental control and security. Features that are considered harmful, such as urging children to make in-app purchases, intrusive ads, and the omission of information about data collection, are quite common in apps for children.

In the field of Media Studies, based on the EU Kids Online project (Hasebrink, Livingstone & Haddon, 2008), Livingstone (2008) proposed a model for evaluating positive online content that considered two criteria: a) promoting the development of children in several dimensions such as learning, creativity, participation and identity; and b) promoting the participation of children, who could be receivers of content, interact with content or create content. Thus, for content to be classified as positive it should present development opportunities for children. On the contrary, the criteria for classifying content as harmful are jeopardizing the safety of children, exploiting them, or being false or misleading. Livingstone (2008) also acknowledges that, even if it is possible to agree on abstract criteria for identifying positive content for young children, their application to specific cases is complex, and sometimes inconclusive. Subsequently, an European Network for the Promotion of Positive Online Content (POSCON) was formed and carried out further research on the criteria for creating and selecting "good" content (de Reese, Pijpers, Behrens, Klahn, & Tatsch, 2014), leading to a new systematization by Livingstone (2014), this time considering three main criteria: a) generating benefits from children (supporting imagination, self-expression, participation, development; not having harmful characteristics); b) attractiveness (quality, creative, enriching, representative of the children's perspective

and experiences; not being boring, stereotypical of representative of the norms of adults); and c) usability (navigation, user experience, accessible, design, transparent, available in mother tongue of children). The diversity of criteria, perspectives and approaches involved in the discussion of this topic have been synthesized in a reformulation of the UN's Convention on Children's Rights (1989) that adapts them to the digital age proposed by Third, Bellerose, Dawkins, Keltie and Pihl (2014), claiming that it is necessary to achieve and nurture a balance between the rights to be protected from online dangers, to participate in the online world, and to be provided with the information and skills necessary to act responsibly in that online world. Several other Media Studies researchers specialized in children and digital media agree with this framework and have been disseminating it to the industry and to policymakers. Despite these efforts, digital platforms continue to evolve using business models that are based in data collection, surveillance, and the tailoring of very persuasive personalized offers (Lupton & Williamson, 2017; van Djick, Poell, & van Waal, 2018; Zuboff, 2019). The industry of digital content production and broadcasting for children is no exception, and it is vital to promote an ethical conduct among the diverse industry stakeholders, one that is respectful and child-centred, promoting wellbeing.

Concluding on which features are requisites of a "good" app and which are harmful or pose risks is, therefore, complex, and often frustrating. This endeavour calls for a holistic approach, one that confronts the perspectives of parents, children and industry stakeholders, exploring which criteria they use to assess certain features of apps as positive and negative.

2. Methodology

The project "hAPPy kids: Criteria for assessing and selecting beneficial and safe apps"

was developed in Portugal between 2017 and 2019, and explored the perspectives of parents, children and industry stakeholders on the characteristics of "good" apps and the criteria that each of these groups uses for selecting them.

The framework suggested by Livingstone (2008, 2014) was selected as grounding for our empirical work, as it is the broadest among the several models discussed: it considers digital content in general, and not just educational content; it displays a broad acknowledgement of the benefits that digital content can afford to children, encompassing different forms and dimensions of learning, highlighting the importance of children being active and engaged - as do Hirsh-Pasek, Zosh, Golinoff, Gray, Robb and Kaufman (2015); and it values safety and usability - as do Papadakis, Vaiopoulou, Kalogiannakis & Stamovlasis (2020). We also followed Livingstone's (2008) methodology, based on interviews to different stakeholders.

Our study is exploratory and qualitative. It encompassed two empirical stages, following a research design that aimed to include all stakeholders involved and triangulate the results (Emmel, 2013). The first stage included visits to a purposive sample of 81 families with children under 8 years old (including separate interviews to parents and children) and the second stage consisted of in-depth interviews to a purposive sample of 17 industry stakeholders and experts connected to the development and production of digital content for young children.

In this article, we report findings on the following research question: What are the criteria used by parents, children and industry stakeholders to assess apps for children - which features are considered positive and negative?

2.1 Data collection

2.1.1 Study 1: Visits to families

The first stage of our research included visits to families, during which we collected data on the perspectives of parents and children.

For interviewing the parents, we developed a semi-structured script with 15 questions, covering the following topics: a) the digital practices of the children (questions 1-3); b) the parental mediation of digital media (questions 4-6); c) the general perceptions of parents about the use of digital media by children (questions 7-9); and d) the features of mobile apps that parents find positive and negative and the criteria they use to assess them (questions 10-15), following Livingstone (2014).

For interviewing the children, we developed a protocol that included different tools to collect data without being intrusive, making sure they were adapted to the children's age. We used: i) observation guidelines applied to what we called a "digital tour", consisting of asking the child to show us the favourite digital device and the content installed, motivating the child to talk about digital practices; ii) an activity which we called "emojis game", consisting of asking the child to relate different emojis (e.g. happy, sad, angry, confused, frustrated, laughing, frightened, etc.) to the favourite apps or digital activities previously mentioned, which prompted a conversation about the features that they like and dislike in apps, and their criteria for assessing and selecting them; and iii) a shorter and more open interview script (with 6 questions), which covered the parental mediation style and the children's perceptions about positive and negative aspects of digital media. During the time with children, we observed them, particularly the non-verbal communication, and adapted the use of our tools to signs of

boredom and unwillingness to participate. Although we tried to motivate children to participate, we followed strict ethical guidelines and respected their will, stopping when necessary (Authors, 2017).

The visits and the data collection occurred in the following sequence:

1) Arrival at the home (greetings, explanation about the project, the interview and the use of the data collection, obtaining informed consent (parents and children together, and separated at this point for simultaneous but separate interviews);
2) Interview to parents, and simultaneously but separately, "digital tour", "emoji game" and interview to children;
3) Thanking the family and goodbye (parents and children together again).

In the beginning, all participants were informed about the research goals and protocol, and were asked permission to collect some personal data (gender and age for all, education and income of the parents, name and job of the industry stakeholders) and to record the audio of the interviews, ensuring them that the raw data would be deleted after transcription and coding and used only for academic purposes. These permissions were registered in a signed consent form. We made a special informed consent form for the children, which made them feel important and enthusiastic to participate (Authors, 2017).

The visits to families were conducted between February and April 2018, lasting about 2 hours. Our research protocol is summarized in Table 1.

Table 1

Research protocol for visits to families.

Stages of the protocol	**Research tools**	**Participants**	**Research questions/topics**	**Theoretical grounding**
1 - Greetings and explanations	Informed consent form for parents	Parents	Does not apply	Authors (2017)

	Informed consent form for children	Children		
2A - Interview to parents	Semi-structured script	Parents	Digital practices of children Parental mediation Perceptions about use of digital media by children Positive and negative aspects of mobile apps; criteria for assessing and selecting mobile apps	Chaudron, Di Gioia & Gemmo (2018) Ponte, Simões, Batista & Jorge (2017) Livingstone, Blum-Ross, Pavlick, & Ólafsson (2018) Livingstone (2014)
2B - Interview to children	"Digital Tour" "Emoji game" Interview script	Children	Digital practices of children Positive and negative aspects of mobile apps; criteria for assessing and selecting mobile apps Parental mediation Perceptions about use of digital media by children	Chaudron, Di Gioia & Gemmo (2018) Livingstone (2014) Ponte, Simões, Batista & Jorge (2017) Livingstone, Blum-Ross, Pavlick, & Ólafsson (2018)
3 - Thank you and goodbye	Does not apply	Parents Children	Does not apply	Does not apply

2.1.2 Study 2: Interviews to stakeholders

The interviews to the stakeholders also followed a semi-structured script with 18 questions) that covered similar topics: a) the digital practices of children and the features that they value in mobile apps (questions 1-4); b) the parental mediation and the features that parents value in mobile apps (questions 5 to 9); c) the features of

mobile apps that the stakeholder considers positive and negative (questions 10 to 14) - following Livingstone (2014); and d) the action of the stakeholder in relation to the promotion of the development and wellbeing of children (questions 15 to 18).

The interviews to the industry stakeholders were conducted face to face in May 2018, lasting about 45 minutes.

2.2 Data analysis

As data analysis technique, we used thematic analysis (Boyatzis, 1998; Creswell & Poth, 2017; Guest, McQueen, & Namey, 2011; Miles, Huberman, & Saldaña, 2013), with three phases:

a) First, we conducted a preliminary reading of the interviews and coded as units of analysis all the excerpts that mentioned characteristics that were valued in an app, and also features that were undesired or considered negative - we obtained a total of 2114 units of analysis;

b) Next, we synthesized all the characteristics mentioned in categories, grouping them according to the use of the same keywords, synonyms and similar meaning (e.g. expressions such as “nice colours”, “attractive design”, “good design” and “good aesthetics” were grouped into the category “design”), in order to produce a final set of coding categories - we converted an initial total of 576 categories in 29 categories for parents, 30 categories for children and 26 categories for stakeholders; and

c) Then we compared our coding categories with the criteria for evaluating apps that are proposed by Livingstone (2008, 2014), considering four dimensions: 1) learning; 2) participation; 3) safety; and 4) UX.

For this analysis, we used NVivo Software, version 12.

For ensuring data quality control, we used intercoder validity (Creswell & Poth, 2017) in the following way: we randomly selected about 10% excerpts (211) and they were coded according to the categories obtained at the end of stage b), obtaining a validity of 99%.

2.3 Sampling and sample

For this study, we selected a purposive sample of families and of industry stakeholders and experts (Emmel, 2013), aiming to obtain a variety of narratives and perspectives on our topic.

We recruited families including at least one child aged up to 8 years old who used digital technologies regularly. Within this selection, we searched for diversity in: a) gender of the child; b) family composition (e.g. single-child, with older or younger siblings, living with one parent, both parents, alternated weeks and recombined families); and c) socioeconomic status. We were also not able to consider geographical diversity due to lack of resources for travelling, so the 81 families that participated in this study live in the Metropolitan Area of Lisbon.

We selected the first four families among our personal contacts and then asked them to refer us to two other families, thus using the "snow-balling" sampling technique (Emmel, 2013). We chose this sampling method because visiting the homes of families requires trust and proximity, so it was easier to obtain their agreement when we were referenced by someone they know and trust. Unfortunately, this method prevented us from obtaining the diversity desired, as most referred families were middle-income and highly-educated. We recruited a few different families concerning their socioeconomic status with the help of private schools and community centres, but the majority of our

sample is highly educated and middle-income. We present a summary of our sample on Table 2.

Table 2.

Brief characterization of the sample of families with at least one child under 8 years old.

Gender of respondent	N=84 Mothers: 73% (61) Fathers: 27% (23)
Gender of children	N=88 Boys: 43% (38) Girls: 57% (50)
Age of children	N=88 0-2 years old: 0% (0) 3-5 years old: 37% (33) 6-8 years old: 63% (55)
Area of residence	N=81 Lisbon: 100% (81)
Education	N=84 Higher Education (University degree): 96% (81) Not Higher Education: 4% (3)
Socioeconomic status (income)	N=81 Low (below 635 euros, minimum wage in Portugal): 2% (2) Medium (between 636 and 1463 euros, as the average wage in Portugal is 1049 euros): 74% (60) High (over 1464 euros): 24% (19) Note: In the case of double-income families, we classified them according to the average income of the two adults.
Family composition	N=81 One child lives with both parents: 40% (32) More than one child lives with both parents: 42% (34) One child, parents separated (shared custody, some living in recombined families): 14% (11) More than one child, parents separated (shared custody, some living in rebuilt families): 4% (4)

Regarding stakeholders, we considered what we labelled as “internal” stakeholders, that is, developers of digital hardware, software and content, producers and broadcasters of

digital content. We tried to complement their perspective with contributions from what we labelled "external" stakeholders, that is, experts from contiguous fields and activities, who play an important role in this phenomenon, namely governmental entities with regulatory role, other policymakers, children's rights activists, and experts from relevant academic fields such as paediatrics, psychology, education and media literacy. We describe our sample on Table 3.

Table 3. *Description of the purposive sample of industry stakeholders.*

Internal Stakeholders		**External Stakeholders**	
Name	**Job and Expertise**	**Name**	**Job and Expertise**
Hugo Ribeiro	CEO of MagikBee; Expert in digital content for young children	Teresa Pombo	Ministry of Education; Expert in K12 Education
Rodrigo Carvalho	CEO of NutriVentures; Expert in digital content for young children	Guilhermina Miranda	Psychologist; Scientific researcher on child development
Inês Lourenço	Digital Marketing, Communication and PR Manager of Science4You; Expert in Children's Marketing	Tomás Lacerda	Police Officer of the programme Safe Schools; Expert in online safety
Lígia Azevedo	Division of Technological Educational Resources of the Ministry of Education; Expert in online safety	Paulo Dias	Police Officer of the programme Safe Schools; Expert in online safety
Susana Tavares	Division of Technological Educational Resources of the Ministry of Education; Expert in online safety	Sara Teixeira	Police Officer of the programme Safe Schools; Expert in online safety
Fernando Franco	Division of Technological Educational Resources of the Ministry of Education; Expert in digital educational resources	Pedro Teixeira	CEO of coding school Happy Code; Expert in teaching coding to young children
Tito de Morais	CEO and founder of an online safety promotion website; Children's rights activist	Ivone Patrão	Psychologist; Expert in young children's addiction to digital media
Pedro Marques	Governmental agency Safe Internet Centre; Expert in digital resources for promoting online safety	Joana Batista	Coordinator of the 1st cycle of Basic Education at Park International School
Jorge Ruano	Programming Director of Children's TV Channel Panda;		

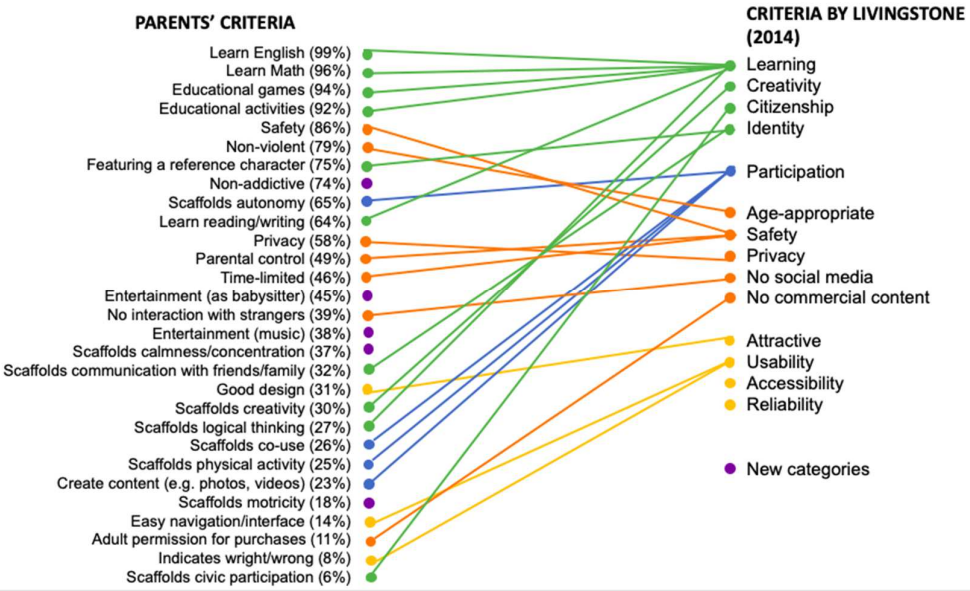
	Expert in broadcasting and programming (TV and digital)		

3. Findings

On this section, we present the final list of categories resulting from the synthesis of all the topics that emerged from the data – phase b) of the thematic analysis (Boyatzis, 1998) – organized according to the percentage of participants that mentioned each of them; and its correspondence to the criteria for assessing positive digital content suggested by Livingstone (2014) – phase c) of the thematic analysis. The categories are coded as follows: 1) learning is coded in green; 2) participation is coded in blue; 3) safety is coded in orange; and 4) UX is coded in yellow.

3.1 Parents

Figure 1. Criteria for selecting "good" apps that are most valued by parents.



The features that are considered most positive by parents are related to learning. Although Livingstone (2014) considers four dimensions of child development, the parents in our sample showcase a more restricted understanding of learning, associating

it to topics that are part of the school curricula (e.g. English, maths) - *"I selected an app for painting and drawing, and my daughter has learned the colours in English. I really love that she is learning English at the age of 4."* (mother, family 32). In addition, parents value formats that are familiar to them (e.g. puzzles, quizzes, building blocks, school-like activities).

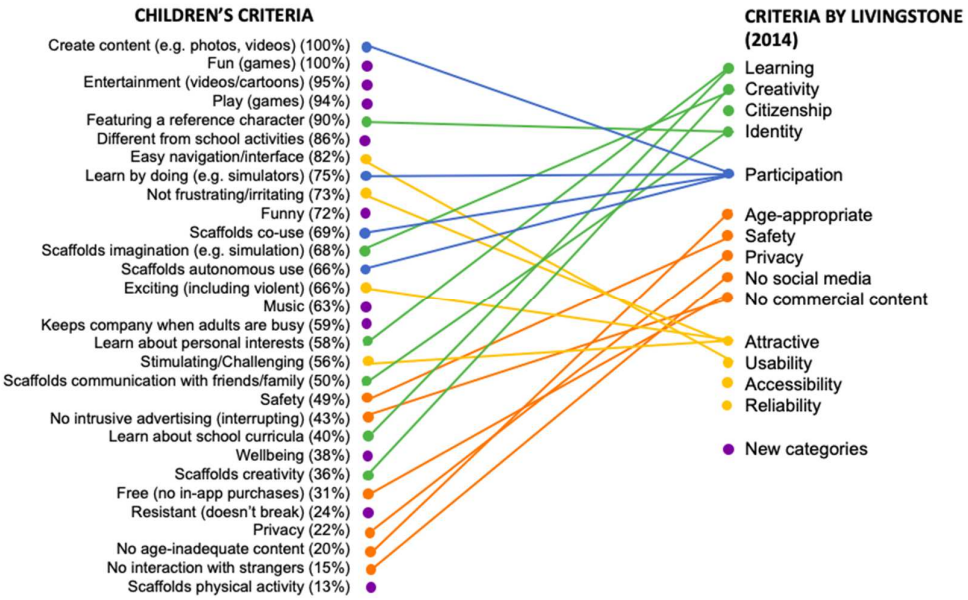
The parents in our sample also value safety, particularly if content is adequate to age, worrying specifically about violent content - "*I don't let him play violent games. I check his tablet from time to time and when I find games in which the goal is to kill others, I delete them.*" (mother of a 7 year old boy, family 27). They are also concerned with possible negative effects of excessive screen time, such as addiction (74% of the parents in our sample value that apps are "non-addictive"), hyperactivity, sleep disorders, underdevelopment of social skills and even obesity. In addition, they value apps that help them in the restrictive actions that they adopt in parental mediation, such as limiting screen-time and using parental control filters.

The participation of children is valued, but mostly as a way of engaging them, as 65% of the participant parents value apps that scaffold autonomous use, and only 26% value apps that scaffold co-use. This is consistent with 45% of the participant parents valuing apps that afford entertainment, not because of what they afford to children, but because they are effective "baby-sitters" - "*I really don't have time to play with my daughter. Part of the reason she sometimes uses her tablet longer than I would like is because I have to keep her entertained while I cook dinner or finish some important work-related task.*" (father of a 5 year old girl, family 55).

The less valued features are technical aspects of user experience, such as design and interface.

3.2 Children

Figure 2. Criteria for selecting "good" apps that are most valued by children.



The children in our sample prefer apps that scaffold their active participation. All the interviewed children enjoy creating content (particularly taking photos and making videos and editing them, but also recording songs, painting and drawing, creating constructions with building blocks). In addition, 75% of the children enjoy learning, but not through school-like activities – 86% of the children in our sample values that apps are not similar to school activities; instead they describe examples of "learning-by-doing", particularly related to simulators for playing sports, taking care of pets, role-playing of professions, trying out outfits, make-up and hair-cuts - "*I have fun when I learn new things. I have this game where you have to march clothes and equipment to jobs, and I learn about those jobs.*" (5 year old girl, family 77).

Next, we found a set of emerging categories that we were unable to match to the theoretical model adopted (Livingstone, 2014) that are highly valued by the children in our sample: 100% mentions "fun" in relation to games, 95% value the entertainment

afforded by videos, movies and cartoons, and 94% enjoy playing games, and 72% value apps that are "funny" - *"The tablet is my best friend. Whenever, wherever, I can always turn to it to have fun."* (7 year old girl, family 13). Thus, having fun is one important motivation for children to engage with digital media, a dimension that is overlooked by the parents in our sample, and also fairly absent from the research on positive digital content.

The children in our sample enjoy learning, and this is often related to having fun – as long as the activities differ from schoolwork - "*My mother is always trying to make me play with apps that are for doing math, for writing words. I hate it. I do that at school the whole day. When I come home and finish my homework, I just want to play and have fun!*" (7 year old boy, family 44). The interviewed children showcase a broader understanding of learning and development, mentioning different dimensions such as identity (90%), creativity (68%), and personal interests (58%). Nevertheless, citizenship is not mentioned.

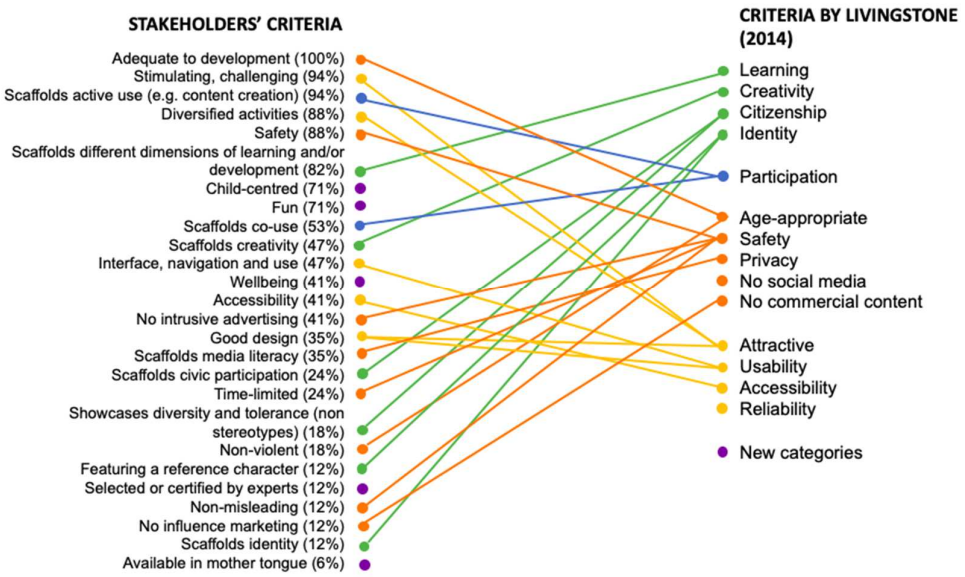
In their own words, they express awareness about the importance of technical features for an enjoyable user experience – 82% value apps that are "easy to use", 72% like apps that are "not frustrating" and "not irritating", and 56% enjoy stimulating and challenging activities.

Some of the children are not aware of online risks, but 49% mention safety as a feature that they value in apps, justifying this claim with conversations that parents and teachers had with them about this topic - "*My parents have talked to me about how the internet can be dangerous. So I try to be careful. If I see a video that I don't like on YouTube, I tell them.*" (6 year old girl, family 6). They also value many of the topics related to safety and UX, such as not including intrusive advertising (43%) - "*I hate it when I am playing a game and those ads interrupt. I just want to go back to the game!"*

(5 year old boy, family 61) - and in-app purchases (31%), not asking for personal information (22%), being adequate to their age (20%) and not including interaction with strangers (15%).

3.3 Industry stakeholders

Figure 3. Criteria for selecting "good" apps that are most valued by industry. stakeholders.



So far, our research shows that parents and children have different criteria for selecting apps and give different priorities to specific features. As a consequence, industry stakeholders face the challenge of pleasing them both.

All the industry stakeholders agree that digital content should be adequate to the developmental stage of their target audience, and 88% mention safety as an important feature. However, 71% elaborate on this, explaining that this can only be achieved from a "child-centred" perspective - "*When we are developing our products, we go through several stages in which we do research with children and test our products with the target audience. This is key to our success.*" (Rodrigo Carvalho, Nutriventures) - that

combines learning with "fun" – "*I know that often, for parents, learning and fun are two different things. They couldn't be more wrong. Children learn better when they are having fun. And we try to apply this insight to all the apps that we make. They are educational but they have to be fun for the children.*" (Hugo Ribeiro, Magikbee).

They are also aware that safety is not only indispensable for ensuring the wellbeing of children, as it is also the key for pleasing parents (88%), associated to features such as "no intrusive advertising" (41%), "scaffolding media literacy" (35%), "time-limited" (24%), "non-violent" (18%), "non-misleading" (12%) and "no influence marketing" (12%). Teresa Pombo (Ministry of Education) works for "*promoting an ethical approach in the industry, which is absolutely necessary to ensure the safety and wellbeing of the younger children*". Also, the active participation of children is highly valued in their perspective (94%), namely the scaffolding of content creation.

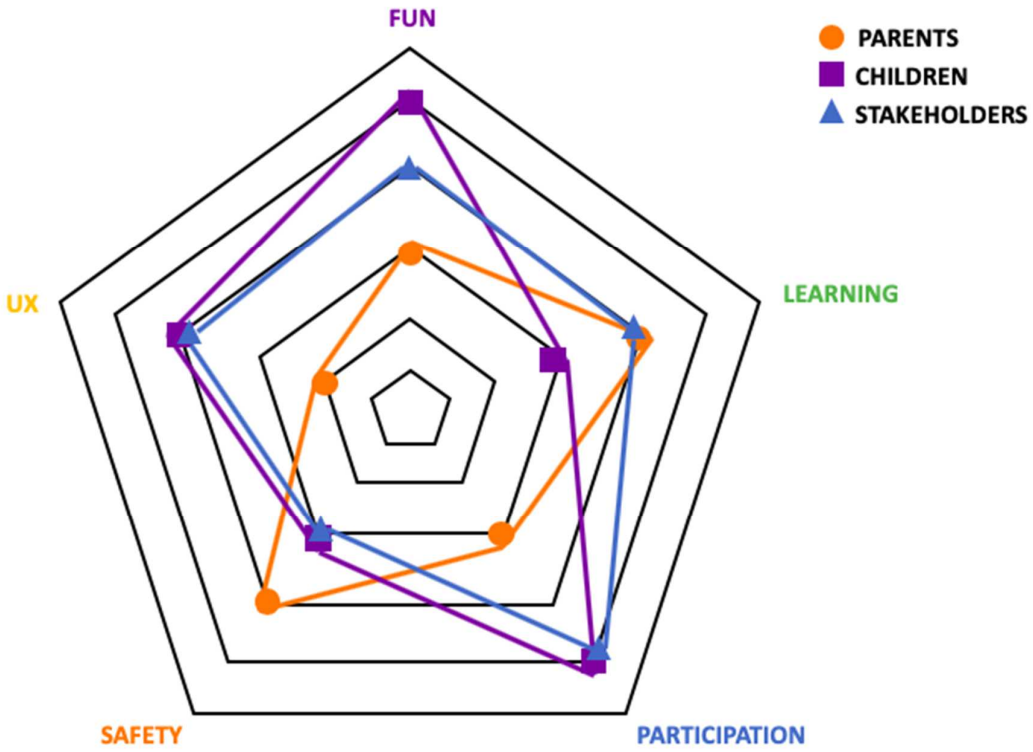
As developers, they highlight the importance of a good user experience for affording the "fun" that is so desired by children, and this is a result of diversified (88%), stimulating and challenging (94%) activities, supported by an intuitive interface (47%), accessibility (41%) and good design (35%). These diversified activities should scaffold the development of different dimensions of the child, with 82% of the interviewed stakeholders mentioning "learning", 47% "creativity", 24% "citizenship" and 12% "identity".

4. Discussion

To compare the perspectives of parents, children and industry stakeholders regarding the features that they value the most in apps, we decided to group the topics resulting from our thematic analysis according to Livingstone (2014): 1) learning; 2) participation; 3) safety; and 4) UX. Considering the new categories that emerged from our fieldwork, we added the topic "fun". For each of these topics, we calculated the average percentage of

mentions among our different groups of participants and converted this average to a scale from 0 to 5. This way, we were able to build a "spiderweb model", presented in Figure 4.

Figure 4. Comparison of the criteria for selecting "good" apps that are most valued by parents, children and industry stakeholders.



This analysis shows that all of the topics are considered by parents, children and industry stakeholders, but with different priorities and weights.

The perspective of parents is consistent with previous research, as they value the educational value of apps the most (Papadakis & Kalogiannakis, 2017) and one of the main drivers of their parental mediation actions is the protection of their children from risks that they associate to screened and internet-connected devices (Livingstone, Ólafsson, Helsper, Lupiáñez-Villanueva, Veltri & Folkvord, 2017). The perspectives of

young children and industry stakeholders are more coincident, with children valuing "fun" a bit more and "learning" a bit less, while industry stakeholders are convinced that learning is facilitated by fun. They both acknowledge the importance of participating actively in the digital world (Hirsh-Pasek, Zosh, Golinoff, Gray, Robb & Kaufman, 2015; Livingstone, 2014). Industry stakeholders highlight the importance of technical aspects of UX for the quality of apps, and children, using their terms, also value many of such aspects (Chang et al., 2019).

This analysis emphasizes that the differences in the perspectives of parents, children and industry stakeholders underlie some of the challenges that they face when assessing and selecting apps. For parents, one of such challenges is determining exactly what "educational" means (Crescenzi-Lanna and Grané-Oró, 2016; Papadakis & Kalogiannakis, 2017). In our sample, many parents display a lack of media literacy in order to understand and question the categorization of apps in app stores, media discourses about the risks and opportunities of digital media (Milosevic, Author, Mifsud, Trueltzsche-Wijnen, 2018), and the commercial exploitation of data as a threat to children's safety (Lupton & Williamson, 2017). In addition, their overall perspective about learning is very restricted, focusing on topics and abilities related to Pre-school and School curricula, being unaware or undervaluing aspects of learning that apps can scaffold - such as active participation, engagement, meaningfulness and social interaction (Hirsh-Pasek, Zosh, Golinoff, Gray, Robb, & Kaufman, 2015), as well as different dimensions of learning, such as identity, creativity and citizenship (Livingstone, 2008, 2014).

The contrast in the perspectives of parents and children about learning and fun is at the root of challenges in parental mediation. Parental mediation of digital devices is a complex and fluid process, in which children also participate. They often disagree about

the apps that they rate as "good" and want to use because they are applying not only different criteria in their assessment, but also different understandings of the same criteria (Broekman, Piotrowski, Beentjes, & Valkenburg, 2018). Consequently, children are usually bored with the apps that the parents choose and parents often do not recognize interest or usefulness in the apps that the children choose. As a result, co-use is not very frequent, in spite of being advised in the literature as the best strategy for parental mediation of digital media (Ponte, Simões, Batista, & Castro, 2019). This is also reflected in the action of industry stakeholders, who are aware of the needs and preferences of children and parents, and try to conciliate them by strongly associating learning and fun.

Some limitations of our study need to be taken into account when reflecting upon our findings. First of all, it is a qualitative study, and therefore our purposive samples are not representative, although they enable us to spot relevant trends and insights (Creswell & Poth, 2017). The 81 families that participated in our study are not diverse geographically nor concerning their socioeconomic status. One possible explanation for this, apart from the use of the snowballing sampling technique, is that, for the last decade, the minimum wage has increased in Portugal, but the average wage has decreased. Thus, most Portuguese families do, in fact, fall into the middle-income category that we considered in this study. Another common limitation to qualitative research, and particularly to interviews, is the social desirability bias of participants, that is, they answer according to what they believe is the expectation of the researcher or the most socially accepted view (Nederhof, 1985). In order to minimize this effect, we conducted the interviews to parents and children separately, we designed different tools to collect data from the children - the "digital tour" and the "emoji game" - and we emphasized to the children that there were no "right or wrong" answers to our

questions, we were interested in their opinions (Authors, 2017). In addition, we designed our research to allow the triangulation of the perspectives of parents, children and industry stakeholders (Creswell & Poth, 2017).

Our research contributes to the debate about the criteria for assessing apps for children precisely by highlighting the different perspectives of parents, children and industry stakeholders on the matter. Our findings point to the need of promoting the media literacy of children and parents (and of teachers) as a strategy for empowering them to make informed and critical choices. In addition, policy-makers and regulators should promote an ethical conduct among industry stakeholders, in order to achieve Protection, Participation and Provision for young children in the digital environment (Third, Bellerose, Dawkins, Keltie, & Pihl, 2014).

Conclusion

Our research contrasts the perspectives of different agents in the phenomenon studied – children (the users, whose voices are less present in research), parents (the main mediators of digital technologies in the case of young children) and industry stakeholders (responsible for the apps available in the market). Our findings reveal that parents and children have contrasting perspectives on the features of a "good" or "bad" app, and industry stakeholders struggle to please them both. Families are not harvesting the full potential of apps for the development of children because parents are only focused on learning related to Pre-school and School curricula and do not consider other types of learning and development nor acknowledge the important role of play.

With our research, we hope to help families reflect on the use of technologies and adopt best practices, both in pedagogy and safety. We also hope to provide relevant elements to industry stakeholders, promoting an ethical conduct. Above all, we expect to help all of these entities – parents, children, industry stakeholders, and others such as

teachers and other caregivers, policy-makers and regulators – find a balance between the children's rights to Protection, Participation and Provision in the digital society we live in (Third, Bellerose, Dawkins, Keltie & Pihl, 2014).

Funding details and acknowledgements

This research was fully supported by *Universidade Católica Portuguesa*.

Disclosure statement

The authors do not have any conflicts of interest.

References

Anderson, D. & Subrahmanyam, K. (2017). Digital Screen Media and Cognitive Development. *Pediatrics*, *140*(2), pp. 53-74. https://doi.org/10.1542/peds.2016-1758C

APA (2019). *Digital guidelines: Promoting healthy technology use for children*. APA. Retrieved from https://www.apa.org/topics/healthy-technology-use-children

Author & Author (2017). A participação ética de crianças com menos de 8 anos em investigação qualitativa. *Edapeci* – Volume Especial "Ética em Pesquisa em Contextos Educativos", *17*(2), 16-29. Retrieved from https://doi.org/10.29276/redapeci.2017.17.26516.16-29

Broekman, F., Piotrowski, J., Beentjes, H., & Valkenburg, P. (2018). App features that fulfill parents' needs in apps for children. *Mobile Media & Communication*, *6*(3), pp. 367–389.

Boyatzis, R. (1998). *Transforming Qualitative Information: Thematic Analysis and Code Development*. London: Sage.

Chang, F.-C., Chiu, C.-H., Chen, P.-H., Chiang, J.-T., Miao, N.-F., Chuang, H., & Liu, S. (2019). Children's use of mobile devices, smartphone addiction and parental mediation in Taiwan. *Computers in Human Behavior*, *93*, pp. 25-32. Retrieved from https://doi.org/10.1016/j.chb.2018.11.048

Chaudron, S., Di Gioia, R., & Gemmo, M. (2018). *Young Children (0-8) and Digital Technology. A qualitative study across Europe*. EUR 29070. Publication Office of the European Union.

Connell, S. L., Lauricella, A. R., & Wartella, E. (2015). Parental Co-Use of Media Technology with their Young Children in the USA. *Journal of Children and Media*, *9*(1), pp. 5-21. DOI: 10.1080/17482798.2015.997440

Crescenzi-Lanna, L., & Grané-Oró, M. (2016). Análisis del diseño interactivo de las mejores apps educativas para niños de cero a ocho años. *Comunicar*, *46*(24), pp. 77-85.

Creswell, J.W., & Poth, C.H. (2017). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. London: Sage.

Author & Author (2018a). *Aplicações seguras e benéficas para crianças felizes. Perspetivas de famílias*. Lisboa: Centro de Estudos em Comunicação e Cultura, Universidade Católica Portuguesa. Retrieved from https://goo.gl/8LfR4T.

Author & Author (2018b). *Aplicações seguras e benéficas para crianças felizes. Perspetivas dos pais*. Lisboa: Centro de Estudos em Comunicação e Cultura, Universidade Católica Portuguesa. Retrieved from https://goo.gl/PKdWU5.

Author, Author, Ribbens, W., Daniela, L., Rubene, Z., Dreier, M. & Chaudron, S. (2016). The Role of Parents as 'Gatekeepers' of Digital Technologies: Exploring the tension between the rights of access and protection. In V. Coppock V, & J. Gillett-Swan (ed.), *Children's Rights in a 21st Century Digital World: Exploring Opportunities and Tensions*. *Global Studies of Childhood*, Special Issue, *4*(6), pp. 414-427. Retrieved from https://doi.org/10.1177/2043610616676024

Van Dijck, J., Poell, T., & de Wall, M. (2018). *The Platform Society: Public Values in a Connective World*. Oxford: Oxford University Press.

Emmel, N. (2013). *Sampling and Choosing Cases in Qualitative Research: A Realist Approach*. London: Sage.

Guernsey, L., & Levine, M. (2015). *Tap, Click, Read: Growing readers in a world of screens*. New York: Jossey-Bass.

Guest, G., McQueen, K.M., & Namey E.E. (2011). *Applied Thematic Analysis*. London: Sage.

Hasebrink, U., Livingstone, S., & Haddon, L. (2008) *Comparing Children's Online Opportunities and Risks across Europe: Cross-national Comparisons for EU Kids Online* (2nd edition, 2009). London: LSE.

Hirsh-Pasek, K., Zosh, J. M., Golinkoff, R. M., Gray, J. H., Robb, M. B., & Kaufman, J. (2015). Putting education in "educational" apps: Lessons from the science of learning. *Psychological Science in the Public Interest*, *16*(1), 3-34.

Holloway, D., Green, L., & Haddon, K. (2015). Digitods: Toddlers, Touch Screens and Australian Family Life. M/*C Journal*, *18*(5). Retrieved from http://journal.media-culture.org.au/index.php/mcjournal/article/view/1024

Kabali, H.K., Irigoyen, M.M., Nunez-Davis, R., Budacki, J.G., Mohanty, S.H., Leister, K.P., & Bonner, R.L. (2015). Exposure and Use of Mobile Media Devices by Young Children. *Pediatrics*, *136*(6), pp. 1044-1050. doi:10.1542/peds.2015-2151

Kildare, C., & Middlemiss, W. (2017). Impact of parents mobile device use on parent-child interaction: A literature review. *Computers in Human Behavior*, *75*, 579-593. Retrieved from https://doi.org/10.1016/j.chb.2017.06.003

Lievens, E., Livingstone, S., McLaughlin, S., O'Neill, B., & Verdoodt, V. (2018). Children's rights and digital technologies. In U. Kilkelly & L. Ton (eds.), *International Human Rights of Children*, pp. 1–27. Singapore: Springer. Retrieved from https://lib.ugent.be/catalog/pug01:8561031

Livingstone, S. (2008). A rationale for positive online content for children. *Communication Research Trends*, *28*(3), 12-16.

Livingstone, S. (2014). What does good content look like? Developing great online content for kids. In L. Whitaker (eds.), *Children's Media Yearbook, Milton Keynes: The Children's Media Foundation*, pp. 66-71.

Livingstone, S., Haddon, L., Görzig, A., & Ólafsson, K. (2014). *EU Kids Online II: A large scale quantitative approach to the study of European children's use of the internet and online risks and safety*. London: Sage Publications.

Livingstone, S., Mascheroni, G., & Staksrud, E. (2017). European research on children's internet use: Assessing the past, anticipating the future. *New Media & Society*, *20*(3), 1103-1122.

Livingstone, S., Ólafsson, K., Helsper, J., Lupiáñez-Villanueva, F., Veltri, G.A., & Folkvord, F. (2017). Maximizing Opportunities and Minimizing Risks for Children Online: The Role of Digital Skills in Emerging Strategies of Parental Mediation. *Journal of Communication*, *67*(1),82-105. Retrieved from https://doi.org/10.1111/jcom.12277

Livingstone, S., & Third, A. (2017). Children and young people's rights in the digital age: An emerging agenda. *New Media & Society 19*(5), 657–670. Retrieved from https://doi.org/10.1177/1461444816686318

Livingstone, S., Blum-Ross, A., Pavlick, J., & Olafsson, K. (2018). *In the digital home, how do parents support their children and who supports them?* LSE. Retrieved from http://bit.do/fvr7y.

Lupton, D., & Williamson, B. (2017). The datafied child: The dataveillance of children and implications for their rights. *New Media & Society*, *19*(5), 780–794. Retrieved from https://doi.org/10.1177/1461444816686328.

Marsh, J., Plowman, L., Yamada-Rice, D., Bishop, J., Lahmar, J., Scott, F., & Winter, P. (2015). *Exploring play and creativity in pre-schoolers' use of apps*. Retrieved from http://techand-http://techand-play.org/reports/TAP_Final_Report.pdf.

Mascheroni, G., & Holloway, D. (2017). *The Internet of Toys: A Report on Media and Social Discourses around Young Children and IoToys*. COST Action IS1410 DigiLitEY. Retrieved from http://digilitey.eu/wp-content/uploads/2017/01/IoToys-June-2017-reduced.pdf.

Mascheroni, G. & Holloway, D. (2018). *The Internet of Toys: Practices, Affordances and the Political Economy of Children's Smart Play*. London: Palgrave Macmillan. https://doi.org/10.1007/978-3-030-10898-4.

Miles, M.B., Huberman, A.M., & Saldaña, J. (2013). *Qualitative Data Analysis: A Methods Sourcebook*. London: Sage.

Milosevic, T., Author., Mifsud, C., & Trueltzsche-Wijnen, C. (2018). Media Representation of Children's Privacy in the Context of the Use of "Smart Toys" and Commercial Data Collection. *Media Studies*, *9*(18), 6-26. DOI: 10.20901/ms.9.18.1

Nederhof, A.J. (1985). Methods of camping with social desirability bias: A review. *European Journal of Social Psychology*, *15*(3), pp. 263-280.

Nesset, V. & Large, A. (2004). Children in the information technology design process: A review of theories and their applications. *Library & Information Science Research*, *26*, 140–161.

Nikken, P. & Jansz, J. (2006). Parental mediation of children's videogame playing: a comparison of the reports by parents and children. *Learning, Media & Technology*, *31*(2), 181-202. Retrieved from https://doi.org/10.1080/17439880600756803

Nikken, P. & Schols, M. (2015). How and why parents guide the media use of young children. *Journal of Child and Family Studies*, *24*(11), 3423–3435.

OfCom (2016). *Children and parents: media use and attitudes report*. Retrieved from https://www.ofcom.org.uk/__data/assets/pdf_file/0034/93976/Children-Parents-Media-Use-Attitudes-Report-2016.pdf

Oliemat, E., Ihmeideh, F., & Alkhawaldeh, M. (2019). The use of touch-screen tablets in early childhood: Children's knowledge, skills, and attitudes towards tablet technology. *Children and Youth Services Review*, *88*, 591-597. Retrieved from https://doi.org/10.1016/j.childyouth.2018.03.028.

Palaiologou, I., (2014). Children Under Five and Digital Technologies: Implication for Early Years Pedagogy. *The European Early Childhood Research Journal*, *24*(1). doi:10.1080/ 1350293X.2014.929876.

Papadakis, St., & Kalogiannakis, M. (2017). Mobile educational applications for children. What educators and parents need to know. *International Journal of Mobile Learning and Organisation*, *11*(3), 256-277.

Papadakis, S., Kalogiannakis, M., & Zaranis, N. (2017). Designing and creating an educational app rubric for preschool teachers. *Education and Information Technologies*, *22*(6), 3147-3165.

Papadakis, St., Zaranis, N., & Kalogiannakis, M. (2019). Parental involvement and attitudes towards young Greek children's mobile usage. *International Journal of Child-Computer Interaction*, *22*(2019) 100144, https://doi.org/10.1016/j.ijcci.2019.100144

Papadakis, S., Vaiopoulou, J., Kalogiannakis, M., & Stamovlasis, D. (2020). Developing and Exploring an Evaluation Tool for Educational Apps (E.T.E.A.) *Targeting Kindergarten Children, Sustainability*, *12*, 4201.

Pempek, T. & Lauricella, A. (2017). The Effects of Parent-Child Interaction and Media Use on Cognitive Development in Infants, Toddlers, and Preschoolers. In *Cognitive Development in Digital Contexts* (pp. 53-74). Elsevier. Retrieved from ,https://doi.org/10.1016/B978-0-12-809481-5.00003-1

Ponte, C., Simões, J.A., Batista, S., & Jorge, A. (2017). *Crescendo entre Ecrãs: Uso de meios eletrónicos por crianças (3-8 anos).* Lisboa: ERC – Entidade Reguladora para a Comunicação Social. Retrieved from http://www.erc.pt/documentos/Crescendoentreecras/mobile/index.html#p=1.

Ponte, C. & Batista, S. (2019). *EU Kids Online Portugal. Usos, competências, riscos e mediações da internet reportados por crianças e jovens (9-17 anos)*. EU Kids Online e NOVA FCSH. Retrieved from http://bit.do/fvr7L.

Ponte, C., Simões, J.A., Batista, S., & Castro, T.S. (2019). Implicados, intermitentes, desengajados? Estilos de mediação de pais de crianças de 3-8 anos que usam a internet. *Sociologia: Problemas e Práticas*, *91*, 39-58.

de Reese, L., Pijpers, R., Behrens, U., Klahn, S., & Tatsch, I. (2014). *POSCON Checklist and Concrete Criteria for Positive Content*. POSCON Network. Retrieved from https://goo.gl/pi82xQ

Rideout, V. (2017). *The Common Sense census: Media use by kids age zero to eight*. San Francisco, CA: Common Sense Media. Retrieved from https://www.commonsensemedia.org/sites/default/files/uploads/research/csm_zerotoeight_fullreport_release_2.pdf.

Sanders, W., Parent, J., Forehand, R., Sullivan, A., & Jones, D. (2016). Parental perceptions of technology and technology-focused parenting: associations with youth screen time. *Journal of Applied Developmental Psychology, 44*, pp. 28-38.

Third, A., Bellerose, D., Dawkins, U., Keltie, E., & Pihl, K. (2014). *Children's Rights in the Digital Age: A Download from Children Around the World*. Retrieved from http://www.uws.edu.au/__data/assets/pdf_file/0003/753447/Childrens-rights-in-the-digital-age.pdf

Tran, P. & Subrahmanyam, K. (2013). Evidence-based guidelines for the informal use of computers by children to promote the development of academic, cognitive and social skills. *Ergonomics*, *56*(9), pp. 1349-1362. https://doi.org/10.1080/00140139.2013.820843

Valcke, M., Bonte, S., De Wever, B., & Rots, I. (2010). Internet parenting styles and the impact on internet use in primary school children. *Computers & Education*, *55*, 454-464.

Vincent, J. (2015). *Mobile Opportunities: Exploring positive mobile media opportunities for European Children*. London: LSE. Retrieved from http://eprints.lse.ac.uk/61015/1/__lse.ac.uk_storage_LIBRARY_Secondary_libfile_shared_repository_Content_POLIS_Vincent_Mobile-Opportunities_2015.pdf.

Wartella, E.A. & Jennings, N. (2000). Children and computers: new technology – old concerns. *The Future of C*hildren, *10*(2), 31-43.

Wolf, C., Wolf, S., Weiss, M. & Nino, G. (2018). Children's Environmental Health in the Digital Era: Understanding Early Screen Exposure as a Preventable Risk Factor for Obesity and Sleep Disorders. *Children 5*(2), pp. 31-39. https://doi.org/10.3390/children5020031

Zaman, B., Nouwen, M., Vanattenhoven, J., de Ferrerre, E., & Van Looy, J. (2016). A Qualitative Inquiry into the Contextualized Parental Mediation Practices of Young Children's Digital Media Use at Home. *Journal of Broadcasting and Electronic Media*, *60*(1). Retrieved from https://doi.org/10.1080/08838151.2015.1127240.

Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. New York: Public Affairs.