The Complexities of the Role of Children in the Process of Technology Transmission Among Disadvantaged Families: A Mixed-Methods Approach

TERESA CORREA[1]
Universidad Diego Portales, Chile

ISABEL PAVEZ
Universidad de Los Andes, Chile

JAVIER CONTRERAS
Universidad Diego Portales, Chile

Using mixed methods that triangulated survey data with interviews and focus groups, this study explores the complexities of the process of technology transmission from children to parents in vulnerable contexts, such as rural communities in Chile. The findings suggest that among Internet users, about one-fourth learned from their children and a similar percentage relied on them to perform different tasks. Both the quantitative and qualitative results suggest that in many families, both processes are closely intertwined and are more likely to occur among people of a similar profile—women, older people, and less educated people. In addition, they are significantly associated with parents' improved digital skills, but not with more online activities.

Keywords: Internet, children, family, socialization, proxy use, rural, Chile

Although parents are one of the most important agents of their children's learning processes, children can also act as brokers or intermediaries in their families by facilitating their parents' understanding of a new culture, language, or topic, particularly in disadvantaged contexts. For example, this occurs among immigrant families, where children facilitate their parents' insertion into a new community (Katz, 2014), or, in lower socioeconomic contexts, children can influence their parents' acquisition of political knowledge (McDevitt & Chaffee, 2000). One relevant domain where children can play a role is new technologies because, for many parents, the Internet represents a new culture, a new language, and a new topic (Correa, 2014).

Teresa Correa: teresa.correa@udp.cl
Isabel Pavez: mipavez@uandes.cl
Javier Contreras: javier.contrerasu@gmail.com
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The literature has suggested that because children have greater access to technologies through their networks (e.g., school, friends) they may influence their parents' acquisition of new technologies and learning processes (e.g., Barrantes & Cozzubo, 2019; Nelissen & Van den Bulck, 2018), particularly among mothers and families from disadvantaged socioeconomic contexts (Correa, 2014; Tripp & Herr-Stephenson, 2009). However, this technology transmission process has several complexities and occurs through different routes that are important to investigate and disentangle. For instance, some literature has suggested that the role of children as technology brokers is related to a reduction of digital inequality. Specifically, in families where children act as technology brokers by teaching their parents, the socioeconomic gaps in computer and Internet use are smaller than in families where children did not play that role (Correa, 2015). However, other evidence shows that this process is not necessarily associated with greater digital inclusion. Correa, Straubhaar, Chen, and Spence (2015) found that it was not related to more online activity. In addition, other scholars have explored the presence of children in the household and have argued that rather than influencing parents' learning processes and digital skills acquisition, children's presence is negatively related to digital inclusion because it may reduce their parents' online engagement by acting as proxy users—that is, not using the Internet by themselves, but asking other family members to perform online activities for them (e.g., Dolničar, Grošelj, Hrast, Vehovar, & Petrovčič, 2018; Dutton, Gennaro, & Hargrave, 2005; Galperin & Arcidiacono, 2019; Hargittai, 2003). We argue that the previous studies show some inconsistencies because the process of transmission is complex and encompass different routes, so they have tackled different aspects of it. For instance, the mere presence of children in the household is different from being actively taught by the children or acting as a proxy user.

Therefore, using a mixed-methods approach, the purpose of this study is to investigate some of the complexities and the different layers of the technology transmission process from children to adults. First, it explores the role played by the mere presence of children on household Internet adoption and digital engagement (e.g., digital skills and amount of online activities). Then, it examines two different processes of transmission: actively learning from children as well as acting as proxy users. Finally, we investigate to what extent these two processes are related to parents' digital engagement (i.e., digital skills and amount of online activities). Because brokering activities from children to adults occurs more often among lower socioeconomic populations (e.g., Correa, 2015; McDevitt & Chaffee, 2000; Tripp & Herr-Stephenson, 2009), we will explore this phenomenon in a disadvantaged context: families from isolated rural communities in Chile that received Internet connection infrastructure in 2010–11 through a public–private initiative.

Technology, Children, and Rurality: The Chilean Context

Chile is a developing country that has carried out a consistent digital agenda in the past three decades. As a result, seven of 10 inhabitants are Internet users (International Telecommunication Union, 2016), and Chile has one of the highest penetrations of Internet service in Latin America (Poushter, 2016). However, Chile navigates many challenges, including its rugged geography, which has translated into a persistent urban–rural gap of 20%, with only 55% of rural households having Internet access (Subsecretaría de Telecomunicaciones, 2016). Between 2011 and 2015, the Chilean governments advanced a public–private initiative that provided broadband connection to rural isolated areas that lacked Internet infrastructure (Subsecretaría de Telecomunicaciones, 2016). Other initiatives target vulnerable children by providing laptops with Internet access for one year to well-performing students (Ministerio de Educación,

n.d.). This policy context implies that in rural settings, Chilean children are in a more advantaged position than are older inhabitants because they are in daily contact with ICTs from a younger age and on a daily basis, at least for educational matters. Also, families with children that received those laptops would also be in a slightly more privileged position because of their exposure to their children's devices. For instance, 87% of the children stated that the laptop helped the family as well (Ministerio de Educación, 2013). A similar study showed that 65% of siblings, 50% of mothers, and 38% of fathers accessed these laptops either for work, study, entertainment, or communication (García, Zúñiga, Caro, & Aguilar, 2009). Although these initiatives can be seen as an improvement, these communities face different challenges, such as a lack of infrastructure in educational, health, and other services as well as negative attitudes toward digital technologies (Correa, Pavez, & Contreras, 2017). Thus, it is necessary to take a closer look to the nuances and tensions that are part of the digital inclusion process and, in particular, to the Internet brokering process in rural families.

Theoretical Framework

Bidirectional Socialization, Digital Inclusion, and Technology Domestication

Although the processes of learning, influence, and social inclusion in a community tend to take a top-down perspective, where older people such as teachers or parents include younger generations in a new environment with a set of values, codes, and language (Swinarski, Parente, & Noce, 2010), current socialization approaches challenge this unidirectional argument. Scholars (e.g., Kuczynski & De Mol, 2015) have proposed a bidirectional socialization model, in which parents have an influencing role, and children are also active brokers in the transmission process of ideas, expectations, and language in the family. For instance, among immigrant families, young people often introduce their parents to a new community and language (Katz, 2014). In political socialization, children can increase their parents' political knowledge and news interests (McDevitt & Chaffee, 2000). Communication and technology studies have also found that young people may have an influence on digital media use (e.g., Nelissen & Van den Bulck, 2018; Thorne, Black, & Sykes, 2009; Van den Bulck & Van den Berg, 2005) or be part of a collaborative (Pina et al., 2018) or participatory learning process. Parents become listeners and/or cocreators, whereas young people serve as leaders and guides in areas such as gaming, mobile phones, and social networking sites (Clark, 2011, p. 335). As a result, children can act as brokers of social inclusion in a new community or topic, including ICTs. Furthermore, from a digital inclusion perspective, this phenomenon is relevant because it combines technical aspects, such as digital skills and types of Internet uses, with social and cultural contexts that shape the experience, including family dynamics (Berker, Hartmann, Punie, & Ward, 2006).

In this sense, domestication offers a fruitful theoretical perspective to understand the digital inclusion process within families. It focuses on the cultural insertion of technologies and proposes that the moral economy of the household is key to understanding technological adoption within the family because it reflects practices and daily routines, as well as the beliefs, values, and life histories, of those in the family group and their social networks (Silverstone, Hirsh, & Morley, 1992). In short, domestication provides concepts and elements that allow for a careful analysis of both the complexities in the process of technology

appropriation in a community and in a family, and how the environmental elements and family dynamics might influence their significance and engagement with information technologies.

Bottom-Up Technology Transmission Processes

Children can have a passive or an active role in the process of technology diffusion (Van den Bulck & Van den Berg, 2005). The fact that households with children are more likely to have adopted the Internet (e.g., Kennedy, Smith, Wells, & Wellman, 2008) may be related to a more passive role in the transmission process because parents may feel forced to buy new digital technologies for their children's benefit (Van den Bulck & Van den Berg, 2005). Although this passive role does not necessarily mean that adults will become active users by the mere presence of a computer or a mobile phone, evidence shows that teenagers were active in teaching and helping other members of the family when the computer and the Internet were being introduced in the household (Kiesler, Zdaniuk, Lundmark, & Kraut, 2000; Van Rompaey, Roe, & Struys, 2002; Wheelock, 1992).

Other investigations have suggested a similar phenomenon. For instance, an ethnographic study (Ito et al., 2009) found that in some families, children triggered an interest in technology. Survey-based research confirmed that trend: Older people asserted that, after self-experimenting by themselves, sons and daughters were the most relevant source on how to use the Internet (Correa et al., 2015). In addition, Dolničar and colleagues (2018) found that the presence of children and grandchildren increased the chances for proxy Internet use. Investigations based on parent–child dyads conducted both in Europe (Nelissen & Van den Bulck, 2018) and Latin America (Barrantes & Cozzubo, 2019) found that children guide their parents in using digital media.

This process, however, has several complexities and nuances: First, although it occurs across all social classes, it is more evident and meaningful among families from disadvantaged contexts (Correa, 2015; Katz, 2010). Because families with low SES experience a larger generational digital divide and parents are less likely to be digitally engaged than are families with high SES (Mascheroni, Livingstone, Dreir, & Chaudron, 2016), young people from lower SES backgrounds are more likely to bring new technological ideas and knowledge to their homes and, many times, transmit them to their parents. This is mainly because minors have been exposed to technology from an earlier age than their parents have. Furthermore, they have more extensive social networks and opportunities to develop experiences and to build knowledge with peers and other socialization agents (Quintelier, 2015).

This process also triggers resistance, tensions, and is strongly shaped by gender roles. For instance, children said they had more influence on their parents' technology learning than their parents admitted (Correa, 2014). It is possible that this disconnect is because children try to teach, but their parents forget (Ribak, 2001) or show distress (Fortunati & Taipale, 2012). In addition, fathers tended to express uneasiness, resisted help from their children, or did not acknowledge their help or influence (Kiesler et al., 2000). On the contrary, mothers were more likely to receive and show appreciation for their children's help (Ribak, 2001; Wheelock, 1992). These family dynamics, in which some parents express resistance or distress, may explain why this process is related to family conflicts about media (Nelissen & Van den Bulck, 2018).

The evidence also shows that the socioeconomic digital divides in parents' computer and Internet use were smaller in families where children acted as technology brokers than in families where children did not play that role (Correa, 2015). Nevertheless, evidence from the U.S. shows that having children act as Internet learning sources was not related to higher levels of online activities performed by adults (Correa et al., 2015).

In a similar vein, Hargittai (2003) found that the presence of children in the household was related to slower online searching, which suggests fewer digital skills. Also, using secondary data analyses of national surveys in countries from Latin America, Galperin and Arcidiacono (2019) found that, although the presence of children in the household is associated with better chances of having a household Internet connection, having children at home is negatively correlated with adults' Internet use. Based on these results, the authors conclude that the presence of children discourages adults from engaging in online activities and assume that this occurs because adults rely on the children to do so. A similar study based on large-scale surveys in three Latin American countries (Barrantes & Cozzubo, 2019) found that minors play a relevant role in the adoption process of adults, but not the amount of use. Although this issue could be part of the complex process involved in technology diffusion within families, these studies examined the presence of children as a predictor, but they could not delve into the black box and disentangle the processes of adults learning from children or acting as proxy users by relying on them. The studies that have explored the phenomenon of proxy use have found that the presence of children increases the odds of proxy use (Dolničar et al., 2018). Similarly, Courtois and Verdegem (2016) found that family was the most dominant support resource for asking and receiving help online. However, using in-depth interviews in Australia, Selwyn, Johnson, Nemorin, and Knight (2016) found that among proxy users, only some of them developed Internet skills to become autonomous users.

Therefore, this study first explores the role of the mere presence of children on household Internet adoption and digital engagement (i.e., digital skills and different uses of the Internet). Thus, we pose the following research question:

RQ1:   *What is the role of the presence of children on household Internet adoption and parents' digital engagement (i.e., digital skills and amount of online activities)?*

Then, the literature has found that children act as guides or brokers by teaching their parents (e.g., Correa, 2014; Katz, 2010; Nelissen & Van den Bulck, 2018), which is related to lower digital inequality (Correa, 2015). However, it has also suggested that children increase the chance of proxy use (e.g., Dolničar et al., 2018), in which parents rely on them, but they do not gain skills (e.g., Galperin & Arcidiacono, 2019; Selwyn et al., 2016). Thus, this study goes beyond the presence of children in the household and tries to understand the technology transmission processes of both actively learning from children as well as acting as proxy users. In addition, it explores to what extent these two processes are related to parents' digital engagement. In this study, digital engagement will be conceptualized as digital skills and amount of online activities because these are two key dimensions of the digital inclusion process. Digital skills include the ability to respond to and take advantage of the opportunities provided by the Web (DiMaggio, Hargittai, Celeste & Shafer, 2004), whereas a more online activity use allows the attainment of different goals (Hargittai & Hinnant, 2008).

Therefore, we will answer the following research question:

RQ2:   *What are the similarities and differences between the processes of learning from children versus relying on them by acting as proxy users in terms of people's profiles and how these two processes are related to parents' digital engagement (i.e., digital skills and amount of online activities)?*

Method

This study relies on a mixed-methods research approach (Creswell & Plano Clark, 2007; Tashakkori & Teddlie, 2003). Specifically, it triangulates data from a three-phase project that combined interviews, a probabilistic face-to-face survey, and focus groups conducted in isolated rural communities in Chile.

Interviews

Between September 2010 and December 2011, isolated communities throughout the country received 3G wireless connection with Internet access. In 2014, we visited 10 villages from northern to southern Chile that had been part of the program. We conducted 48 unstructured in-depth interviews with ethnographic elements that included the particularities of these communities (Brunt, 2001). Interviewees ranged in age from 14 years to over 50 (five of them were adolescents, and the rest were adults).

Survey

This study also relied on a face-to-face random survey of people 14 to 75 years of age, from 22 communities throughout Chile, who benefited from the program. It was conducted in March and April 2015. Because the households tended to be geographically dispersed and there were no sampling frames available, the random routes method was employed to select households (for more details on the method, see Häder & Gabler, 2003). The sample of 1,000 people represented an 82% response rate. The results indicated that 63% of the isolated population had never used the Internet. Thus, for most of the analyses of this study, we focused on the subsample of Internet users ($n = 370$). The following variables were used for the survey analyses.

Sociodemographics

Respondents were asked about their gender (recoded as 0 = men; 1 = women). Age was measured as a continuous variable. Level of education was calculated with six categories from "incomplete primary or less" to "complete college degree." This variable was also recoded into three categories: primary education (23%), high school education (59%), and technical/college education (18%). Income was measured with "household income in a typical month," and the options were divided into five categories ranging from "less than CLP 200,000" (less than US$300) to "between CLP 901,000 and 1,600,000" (between US$1,300 and US$2,400).[2] This variable was recoded into three categories: low income ("less than CLP 350,000"), middle income ("CLP 351,000–550,000") and middle upper ("more than CLP 551,000").

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[2] The last category (more than US$2,400) had only two cases, which were considered as missing cases in the statistical analyses, given that they were extreme outliers.

Internet Adoption

The Internet adoption variable was measured both at the household level (Does this household have Internet connection either through broadband or mobile access? Yes = 1; No = 0) and at the individual level (Have you used the Internet? Yes = 1; 0 = No). Most of the analyses rely on the individual level.

Presence of Children

Respondents described the members of the household, according the relationship of each member with the head of household and his or her age. Then, we created the variable "presence of children younger than 18" (Yes = 1; No = 0).

Proxy Use by Relying on Children

The proxy use by relying on children variable was measured with the question, "Who of the following people have you asked to do something for you on the Internet (son/daughter)" (Yes = 1; 0 = No).

Learning From Children

Respondents were asked: Who taught you how to use the Internet (son/daughter)? (Yes = 1; 0 = No).

Digital Skills

Based on a scale proposed by Hargittai and Hsieh (2012), this variable aggregates responses to seven items about people's knowledge of computer- and Internet-related terms. On a scale from 1 to 5 (1 = *no understanding*; 5 = *full understanding*), respondents were asked, "How familiar are you with the following computer and Internet-related items?" The items were advanced search, PDF, spyware, wiki, favorites, JPEG, and blog. The items were averaged (Cronbach's α = .89, *M* = 2.32, *SD* = 1.13).

Amount of Online Activities

On a scale from 1 (*never*) to 5 (*all the time*), respondents were asked how frequently they performed 18 different types of Internet uses, including information seeking (e.g., about job, education, health), communication (e.g., use social networking sites, chat through Skype), entertainment (e.g., online videogaming and download music/movies), and e-commerce/e-banking (e.g., online transactions). The 18 items were dichotomized into 0 (i.e., "*never*" or "less than once a month") and 1 ("two to three times a month" to "all the time"). Then, they were added to create an index that ranged from zero to 18, so people who performed more activities would get a higher score (*M* = 4.86, *SD* = 4.12).

Focus Groups

We sought to disentangle aspects that, according to the survey, influenced digital engagement in isolated areas, including the role of children as technology brokers. We conducted six focus groups in November and December 2015, with an average of 10 participants, from three communities (Los Maquis, La Población and Puerto Fuy) with different levels of Internet use. Fifty-eight people, between the ages of 15 and 72 years, participated (11 were younger than 18 years; the rest were adults). In each community, one focus group was composed of nonusers and the other of users.

Analytic Strategy

The transcripts from both the interviews and focus groups were analyzed using a hybrid approach that combined deductive and inductive thematic analyses (Fereday & Muir-Cochrane, 2006), where we developed macrocodes based on the research questions and emerging themes. Using NVivo, we assigned specific codes and then selected the best quotes, which were translated into English. For the survey, we calculated descriptive statistics, bivariate analyses (i.e., chi-squared tests) and multivariate analyses (logistic regressions and ordinary least squares [OLS] regressions).

Results

Of the total sample (N = 1,000), 39% of respondents had household Internet connection and 37% were Internet users. Because most of the analyses are based on the subsample of Internet users (n = 370), we will describe this group in more detail. More than half of users (54%) were women, their mean age was 34.7 years (SD = 12.82 years). Almost one-fourth of Internet users (23%) had primary education, 59% had high school education, and 18% had college education. In addition, 60% were low income, 25% were middle income, and 15% had a relatively high income, although the midpoint monthly household income was between US$300 and US$550 (M = 2.37, Mdn = 2.00, SD = 1.01). In these isolated rural communities, more than 80% of Internet users relied on mobiles phones to access the Internet, and half (49.3%) were mobile-only users. Regarding presence of children, almost two-thirds of Internet users (63%) had children younger than 18 years in their household.

Presence of Children

The first research question asked about the role the presence of children had on household Internet adoption and parents' digital engagement (i.e., digital skills and different types of Internet use). To explore the role of the presence of children on household Internet adoption, we employed the entire sample and relied on hierarchical logistic regression. As Table 1 shows, presence of children in the household is a relevant predictor of Internet adoption in the household. Households with children under 18 years of age have higher odds of adopting than Internet than those that do not have children.

Table 1. Logistic Regression: The Role of the Presence of Children on Household Internet Adoption in Isolated Communities.

	Model 1	Model 2
	Wald (odds ratio)	Wald (odds ratio)
Sociodemographics		
Gender (woman = 1)	.001 (1.00)	.69 (.86)
Age	126.91 (.93)***	62.61 (.95)***
Middle income (low income = reference)	17.63 (2.53)***	17.75 (2.64)***
Upper income (low income = reference)	8.03 (2.55)***	6.91 (2.43)**
High school education (primary = reference)	16.58 (2.06)***	18.33 (2.21)***
College education (primary = reference)	33.02 (8.95)***	38.04 (10.84)***
Presence of children in the household		
Presence of children in the household (Yes = 1)	–	4.246 (3.33)***
N	958	958
ΔR^2	–	.037
Nagelkerke's R^2	.444	.481

Note. **p < .01. ***p < .001.
Dashes (−) = variables not included in the regression.

However, we conducted hierarchical OLS regressions to analyze the role of children on digital engagement, measured as digital skills and amount of online activities. The results revealed that the mere presence of children in the household is not associated with higher levels of digital skills and is negatively associated with amount of online activities (see Table 2), which suggests that parents with children at home perform fewer activities on the Web.

In interviews and focus groups, participants mentioned some of the limitations of living in disadvantaged contexts. For example, in rural communities, the educational infrastructure is weak, often relying on one-teacher schools, and there are long distances between households and the educational institutions. Therefore, families with school-aged children try to compensate for the disadvantages by providing technology, particularly computers and the Internet. In many cases, children in seventh grade would receive a laptop from the Ministry of Education with one year of free Internet. Then, parents would invest in Internet access so children could shorten the disadvantage of being far away from school and in a precarious system. As one student explains in a focus group,

> I have several schoolmates that their parents put the Internet and everything so that they can study and do their work [for the school] and all . . . but for mobiles it is different, it's obviously [that we end up using it] more for social network sites and such things. (Student, Los Maquis)

Table 2. Hierarchical OLS: The Role of the Presence of Children on Digital Engagement (Digital Skills and Different Types of Internet Uses).

	Digital skills		Amount of online activities *B*	
	Model 1	Model 2	Model 1	Model 2
	B (*SE*)	*B* (*SE*)	*B*(*SE*)	*B* (*SE*)
Sociodemographic controls				
Gender (woman = 1)	−.20 (.11)	−.17 (.12)	−.74 (.40)	−.59 (.41)
Age	−.020 (.00)***	−.02 (.00)***	−.07 (.02)***	−.08 (.02)***
Middle income	.10 (.14)	.10 (.14)	.03 (.47)	−.01 (.47)
(low income = reference)				
Middle upper income	.47 (.17)**	.49(.17)**	.11(.57)	−.05 (.57)
(low income = reference)				
High school education	.54 (.18)***	.54 (14)***	2.05 (.49)***	2.00 (.49)***
(primary = reference)				
College education	1.15 (.18)***	1.11 (.18)***	6.07 (.62)***	5.84 (.62)***
(primary = reference)				
Presence of children in the household				
Presence of children in the	–	−.18 (.13)	–	−.97 (.43)*
household (Yes = 1)				
N	315	315	320	320
Δ*R*^{2}	–	.005	–	.01
R^2	.209***	.214***	.290***	.301***

Note. *p* < .05. **p* < .01. ***p* < .001.
Dashes (−) = variables not included in the regression.
B = unstandardized coefficient (standard error).

These children are in better circumstances because the Internet allows them to do schoolwork and also explore other interests, be part of social media, and connect with other young people. Yet many tensions and resistance arise among parents from disadvantaged contexts, which may affect their level of digital engagement. As this student explains, parents make the effort to provide access to the Internet at home with a clear focus on education, but often they do not have prior experience with it. Therefore, they tend to be skeptical and resist social consequences. Parents express fear that users may become addicted as the online world is described as "a place with no rules or police" or "where anything could happen." The following example show the fears, negative discourses, and tensions that may prevent parents' digital engagement:

> [Trying to learn] was a bad experience. My son has patience, but I am the one who doesn't really wanna learn, because I see them [the kids] and I say, "If I fall into the game, I will end up just like them [referring to Internet addiction], and I don't want to." (Adult man, Los Maquis)

When parents and older members of the household overcome some of their reluctance, the road to digital inclusion is not easy. It is a slow process of appropriation facilitated by the presence of the

technology and the children. However, tensions among parents arise because they lack the ability to use digital technologies and they fear what they, as adults, may encounter on the Internet when they become part of the digital world. Therefore, from the results, it is possible to claim that to have the Internet at home is certainly an advantage, but it does not necessarily mean that every member of the household becomes an Internet user.

Disentangling Learning from Children vs. Relying on Children

The second research question went beyond the presence of children in the household and asked about the dynamics of learning from children versus relying on them by acting as proxy users, and how they are related to parents' digital engagement (i.e., digital skills and amount of online activities). We first calculated frequencies and conducted bivariate analyses. The results showed that one-fourth (25.3%) of Internet users in these rural communities said that they learned from children how to use the Internet. A similar percentage (27.3%) said they had asked their children to do something for them on the Internet. The descriptive analyses also revealed that almost one-fifth (18.9%) of respondents said that they both learned from their children as well as relied on them to perform tasks. A description of the respondents' characteristics showed that both types of dynamics of the technology transmission process share a similar profile: A higher proportion of women, older, and less educated respondents were more likely to learn from their children as well as ask for help. In this sample of Internet users of already deprived communities, there were no differences by income (see Tables 3 and 4).

Table 3. Descriptive Statistics About Learning to Use the Internet From Children and Relying on Children to Use Internet by Gender and Age.

	Gender			Age				
	Total (%)	Men (%)	Women (%)	18–29 (%)	30–39 (%)	40–49 (%)	50–65 (%)	≥66 (%)
Learned Internet from children	25.3	19.4	30.3	2.8	20.9	49.4	49.0	100
Statistical difference	$\chi^2 = 5.74, p = .02$			$\chi^2 = 90.49, p < .001$				
Relied on children as proxy Internet use	27.3	19.4	34.0	4.6	21.3	51.8	51.0	25.0
Statistical difference	$\chi^2 = 9.86, p = .002$			$\chi^2 = 79.56, p < .001$				
N	368	170	198	109	91	85	40	4

Table 4. Descriptive Statistics about Learning to Use the Internet From Children and Relying on Children to Use the Internet by Education.

	Socioeconomic status					
	Education			Income		
	Primary (%)	High school (%)	College (%)	Low (%)	Middle (%)	Middle upper (%)
Learned Internet from children	45.2	23.0	6.1	24.1	26.4	22.0
Statistical difference	$\chi^2 = 31.36$, $p < .001$			$\chi^2 = .34$, $p = ns$		
Relied on children for proxy Internet use	40.5	26.5	13.6	26.3	27.6	28.0
Statistical difference	$\chi^2 = 13.61$, $p = .001$			$\chi^2 = .08$, $p = ns$		
N	27	57	91	126	42	23

The OLS regression models that explored these two types of dynamics on digital engagement, measured as digital skills and amount of online activities, demonstrated that both learning from children and relying on them are significantly associated with parents' improved digital skills (see Table 5 for the role of learning and Table 6 for proxy use). However, in the case of amount of online activities, these associations were not significant, although they were positive.

Table 5. Hierarchical OLS: The Role of Learning From Children on Digital Engagement (i.e., Digital Skills and Amount of Online Activities).

	Digital Skills		Amount of Online Activities	
	Model 1	Model 2	Model 1	Model 2
	B (SE)	B (SE)	B (SE)	B (SE)
Sociodemographic variables				
Gender (woman = 1)	−.21 (.12)	−.19 (.12)	−.74 (.40)	−.73 (.41)
Age	−.02 (.01)***	−.02(.01)***	−.06 (.02)***	−.06 (.02)***
Middle income (low income = reference)	.12 (.14)	.11 (.14)	.03 (.47)	.03(.47)***
Middle upper income (low = reference)	.48 (.17)**	.48 (.17)**	−.11 (.58)	−.11 (.58)
High school (primary = reference)	.54 (.15)***	.49 (.15)***	2.04 (.49)***	2.03 (.50)***
College education (primary = reference)	1.16 (.18)***	1.04 (.19)***	6.05 (.62)***	6.02 (.65)***
Learned from children				
Yes = 1	–	.36 (.16)*	–	.11 (.55)
N	313	313	318	318
ΔR^2	–	.012*	–	.000
R^2	.209***	.222***	.219***	.219***

Note. **$p < .01$. ***$p < .001$.
Dashes (−) = variables not included in the regression.
B = unstandardized coefficient (standard error).

Table 6. Hierarchical OLS: The Role of Relying on Children (Proxy Use) on Digital Engagement (i.e., Digital Skills and Amount of Online Activities).

	Digital Skills		Amount of Online Activities	
	Model 1	Model 2	Model 1	Model 2
	B (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*)
Sociodemographic Controls				
Gender (woman = 1)	−.20 (.11)	−.16 (.12)	−.74 (.40)	−.71 (.41)
Age	−.020 (.00)***	−.02 (.00) ***	−.07(.02)***	−.06 (.02)***
Middle income (low income = reference)	.11 (.14)	.09 (.14)	.03 (.47)	.02(.47)***
Middle upper income (low income = reference)	.47 (.17)**	.49 (.17)**	−.11 (.57)	−.09 (.57)
High school education (primary = reference)	.54 (.15)***	.53 (.15)***	2.05 (.49)***	2.04 (.49)***
College education (primary = reference)	1.16 (.18)***	1.07 (.18)***	6.06 (.62)***	6.01 (.62)***
Relying on children				
Relying on children for Internet proxy use (Yes = 1)	–	.41 (.15)**	–	.25 (.51)
N	315	315	320	320
ΔR^2	–	.02	–	.001
R^2	.209***	.228***	.290***	.291***

Note. **p < .01. ***p < .001.
Dashes (−) = variables not included in the regression.
B = unstandardized coefficient (standard error).

Participants' experiences also show that once the computer and Internet arrive at home, it is possible to see opportunities of bidirectional socialization, in which children play an active role in the transmission process: Families engage in dynamics that open up spaces for learning, but also for relying on children. For example, a farmer recounts this process when her daughter arrived home with a laptop for the first time:

> When she came in, we did not know anything . . . [it was] a box that she already knew how to turn on and everything, but we did not know anything about how to install the Internet . . . but little by little she learned it and taught me. (Adult woman, Malihue)

For this mother, the computer, at the beginning, was similar to a black box. She expresses that although both she and her daughter started with similar levels of knowledge, her daughter acquired more experience from school and ended up teaching her. Over time, the mother became familiar with the device and sometimes asked the girl to teach her things about her small business of raising sheep. In this case, she had the incentive to learn. The girl taught her about search engines, and sometimes the woman felt confident enough to carefully follow the steps:

> At school, she [the daughter] had been taught a little [about the Internet]. After she already knew a little, she told me how she had done it and everything. It was sheep's things [for my business], so I wanted to learn . . . Rather than ask for help, [I search for] things like sheep's diseases or stuff about food, forage, all that. (Adult woman, Malihue)

As in this case, parents' ventures represented an opportunity for bidirectional socialization or participatory learning, where parents would be receptive to their children's brokering role because they would have both the need and the interest to take advantage of digital technologies. For example, participants in southern villages rented cabins or produced wood handcrafts. In both cases, the children suggested Facebook and also taught them how to use it as a way to promote their products and services. For example, a wood artisan would connect with clients and also learn about fairs in other cities. In their testimonies they expressed how grateful they were for the insights of their children, but they also recognized that the learning process was slower than they expected. The learning experience was also intertwined with instances where adults relied on the child and repeatedly asked them how to perform the tasks, like this woman on the social networking site:

> In my case, I had no previous knowledge. I was taught by my daughters. They told me, "Mom, it's like this—you put a picture and that's it." It cost me, like, a month to learn, but they kept telling me. I even had it written on a piece of paper how I had to do it, and there I think I learned. (Adult woman, Los Maquis)

It was relevant for her to share pictures on Facebook, and she was keen to learn the steps, and to not continue asking for help, which led to the written paper with instructions. This is an interesting example of the different gradations in this process and shows that relying on the children and learning from them cannot be easily disentangled, as it can be seen in the follow testimony:

> Yes [I use the computer], but, like, only for learning, nothing more. I like to get into webpages. If I want to know something or learn something, such as to make clothes, make *huaso* suits, I have to be with him [the son], because he is very careful with his things [referring to the laptop], so he tells me what page he wants me to visit, . . . and he tells me to press here, to go there. (Adult woman, La Laguna)

In this case, the child has an active role as a teacher, but also distrusts her mother's capabilities with the device. As a result, she may develop some skills, but this constraint may also hamper her possibilities to explore the Web more frequently, and for different uses. This is linked to another layer of the multiple aspects that can be found in children–adult participatory learning experiences—in many cases parents, despite their lack of digital confidence or skills, continue advising their children on how to be careful online. This shows how parents have the opportunity to learn and to ask for help, but also to guide their children while on the computer, as this woman in Malihue showed:

I also got Facebook, but it's hard for me to upload photos. When I want to upload a photo, I say to Sarah [the daughter], "Sarah, help me upload a photo," something like that, because it is hard for me . . . but when she is on Facebook, I always tell her, for example, to talk to people she knows, not strangers because it is dangerous. I am always aware of that. (Adult woman, Malihue)

These examples show patterns of bidirectional socialization in which adults were guided by their children, but also aware about the dangers they might encounter. These interactions are sometimes perceived as the adults learned. In others, the constant child-monitoring process constrained the ability to explore and go beyond the particular ability just acquired. Furthermore, they show how different processes occur in the technology appropriation process within families. To face a laptop for the first time, to start using the Internet without previous experience, and to acknowledge that you are disadvantaged (digitally and otherwise) is not an easy scenario, yet it was the trend for adults in these communities. Consequently, in this context, children have a dual role—they broker technology and are confident about their use and teach and help parents and seniors. Yet the teaching role is intertwined with a monitoring process, where children perform some of the task for their parents as well.

Discussion and Conclusion

Using a mixed-methods approach that triangulated survey data with interviews and focus groups, this study explored the complexities and nuances of the process of technology transmission from children to parents. Although the role of children in their parents' digital inclusion has been explored in different contexts and regions (e.g., Barrantes & Cozzubo, 2019; Correa, 2014; Correa et al., 2015; Dolničar et al., 2018; Ito et al., 2009; Katz, 2010; Nelissen & Van den Bulck, 2018), we argue that previous results show some inconsistencies because they have focused on different aspects of the process of technology transmission within families. Therefore, we sought to disentangle the different layers and routes that encompass the process of technology transmission, such as distinguishing the role of the mere presence of children from the children actively teaching or acting as proxy users.

The literature has also suggested that this process is more prevalent in disadvantaged contexts (e.g., Correa, 2015; Tripp & Herr-Stephenson, 2009). Therefore, this investigation is based on isolated rural communities in Chile that received Internet access in 2010, five years before the fieldwork.

As expected, the presence of children under the age of 18 in the household is associated with household Internet adoption. That is, having children increases the odds of living in a more connected household, but it does not necessarily lead to parents' improved digital engagement. The association between presence of children and digital skills was not significant, and it was negatively related to the amount of online activities. These results show that adults who have children at home perform fewer Internet activities by themselves than those who do not have children, which is somewhat similar to previous research (e.g., Galperin & Arcidiacono, 2019; Hargittai, 2003), although we did not find that the presence of children impeded skills or related to fewer skills. The qualitative findings showed that rural families acquire household connection for the sake of their children's education. This does not necessarily mean that the parents and household's seniors will engage with the Internet and develop digital skills. Many issues

intervene in the process, particularly in isolated contexts. First, parents may spend less time online because they have household workloads (Hargittai, 2003). In addition, the Internet domestication process (Silverstone et al., 1992) in these communities is complex: it usually starts in schools and then diffuses to the family, where parents access it, usually for the first time, with their children's help. Yet the nature of the relationships between children and parents influenced the process in terms of the quantity and quality of the help provided, or the determination of some parents to not ask for help. As other research has suggested (Kiesler et al., 2000; Ribak, 2001), parents, and particularly fathers, tended to express uneasiness when they confronted the learning process. This relate to other intangible aspects that are implicit in these digital and nondigital encounters, such as gender roles. In a vulnerable context such as an isolated community, lack of digital experience and fears toward the Internet usually find fertile terrain, making the adults of the household perhaps more fearful and unwilling to embrace and explore the opportunities of the Web. On the other hand, when parents have a business to promote or a specific gain from going online, they are more open to learning, but usually at their children's directions. In sum, children act as brokers of digital inclusion (Quintelier, 2015), being the ones that bring the device to the household, which can be understood as a passive role (Van den Bulck & Van den Berg, 2005). This increases the chances of people's connection, but not with engagement. It is also possible that a reciprocal process occurs, in which parents who are less digitally engaged tend to rely on their children.

However, children also have a role in the process of their parents' learning as well as their acting as proxy users by relying on the minors' confidence and experienced use. Both processes can be understood as an interactive, bidirectional, and participatory experience. This is why it is necessary to untangle the different layers of the process by going beyond the presence of children and exploring the dynamics of the interaction. When children are present, the transmission process takes several paths: A group of parents can learn from their children, but they also rely on them to perform tasks online. The findings suggest that among users, about one-fourth learned from their children, and a similar percentage acted as proxy user. Both the quantitative and qualitative results suggest that in many families (one-fifth of Internet users), both processes occur at the same time, and both are more likely to occur among people of a similar profile: women, older people, and less educated people. Furthermore, both learning from children and acting as proxy users by relying on them are significantly associated with better digital skills, although not with the amount of online uses (the relationship was positive, but not significant). These results suggest that, contrary to the passive role, when children have an active role by being involved in the process of technology diffusion, and parents are willing to receive this information or help, they tend to be more digitally engaged. They also reveal that the presence of children cannot be easily compared with the transmission process from children to parents, because the results are different, suggesting they are distinct phenomena.

The qualitative analyses showed that parents who needed to learn because they had a small business or wanted to communicate, share photos, or find information online were more receptive to this bidirectional socialization process and to the active role played by children. However, the qualitative results also suggested that sometimes this process of transmission may be closely monitored by children. As a result, through the learning process, adults may acquire some digital skills. However, if adults are closely monitored by their children, which constrain their autonomy of use and self-experimentation, then they have more limited possibilities to explore the Web and use it for different reasons. Hence, the complexity of the transmission of knowledge and skills, and how it is experienced by parents, also relies on the context,

such as the nature of their relationship and the households' values, which should not be ignored. This means the transmission processes are complex and should be understood as a collaborative, interactive, and participatory experience rather than as a unidirectional phenomenon.

This study relies on three different techniques that help explain the complexities of the appropriation and transmission process. However, it has some limitations: The data collections were not specifically designed to investigate the transmission process in the first place, but they yielded sufficient information to explore the research questions by reanalyzing the transcripts and the survey data. This explains why the focus groups were divided into users and nonusers, but not into old and young people. Similarly, the survey measures of learning from children and proxy use are based on one item only, because of the same reason. In the future, it is necessary to explore these issues by separating younger and older people because they play different roles in the process. In addition, further investigations should develop more precise measures that examine the continuous process of learning. It is also relevant to explore, for example, whether this access to help (i.e., children) becomes a boost for older people to explore their interests online or restrains them from fully developing digital autonomy and learning how the reciprocal process occurs. That is, to what extent do children help engage their parents, but also to what extent do less engaged parents rely on their children as digital media brokers. It is necessary to rely on panel data to explore how the adoption process evolves over time within families. Finally, although this study focused on parents, this process of bidirectional socialization also includes other older members of the family, such as grandparents (Dolničar et al., 2018). Future research should start exploring these interactions as well.

References

Barrantes, R., & Cozzubo, A. (2019). Age for learning, age for teaching: The role of inter-generational, intra-household learning in Internet use by older adults in Latin America. *Information, Communication & Society*, *22*(2), 250–266. doi:10.1080/1369118X.2017.1371785

Berker, T., Hartmann, M., Punie, Y., & Ward, K. (Eds.). (2006). *Domestication of media and technology*. Maidenhead, UK: Open University Press.

Brunt, L. (2001). Into the Community. In P. Atkinson, A. Coffey, S. Delamont, J. Lofland, & L. Lofland (Eds.), *Handbook of ethnography* (pp. 80–91). London, UK: SAGE Publications.

Clark, L. (2011). Parental mediation theory for the digital age. *Communication Theory*, *21*(4), 323–343. doi:10.1111/j.1468-2885.2011.01391.x

Correa, T. (2014). Bottom-up technology transmission within families: Exploring how youths influence their parents in the usage of digital media with dyadic data. *Journal of Communication, 64,* 103–124. doi:10.1111/jcom.12067

Correa, T. (2015). The power of youth: How the bottom-up technology transmission from children to parents is related to digital (in)equality. *International Journal of Communication*, *9*, 1163–1186, doi:1932–8036/20150005

Correa, T., Pavez, I., & Contreras, J. (2017). Beyond access: A relational and resource-based model of household Internet adoption in isolated communities. *Telecommunications Policy*, *41*(9), 757–768. doi:10.1016/j.telpol.2017.03.008

Correa, T., Straubhaar, J. D., Chen, W., & Spence, J. (2015). Brokering new technologies: The role of children in their parents' usage of the Internet. *New Media & Society*, *17*(4), 483–500. doi:10.1177/1461444813506975

Courtois, C., & Verdegem, P. (2016). With a little help from my friends: An analysis of the role of social support in digital inequalities. *New Media & Society*, *18*(8), 1508–1527. doi:10.1177/1461444814562162

Creswell, J., & Plano Clark, V. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: SAGE Publications.

Dimaggio, P., Hargittai, E., Celeste, C., & Shafer, S. (2004). Digital inequality: From unequal access to differentiated use. In K. Neckerman (Ed.), *Social inequality* (pp. 355–400). New York. NY: Russell Sage Foundation.

Dolničar, V., Grošelj, D., Hrast, M. F., Vehovar, V., & Petrovčič, A. (2018). The role of social support networks in proxy Internet use from the intergenerational solidarity perspective. *Telematics and Informatics*, *35*(2), 305–317. doi:10.1016/j.tele.2017.12.005

Dutton, W. H., Gennaro, C., & Hargrave, A. (2005). *Oxford Internet Survey 2005 report: The Internet in Britain.* Oxford, UK: Oxford Internet Institute. Retrieved from https://www.oii.ox.ac.uk/archive/downloads/research/oxis/oxis2005_report.pdf

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, *5*(1), 80–92. doi:10.1177/160940690600500107

Fortunati, L., & Taipale, S. (2012). Women's emotions toward the mobile phone. *Feminist Media Studies, 12*(4), 538–549. doi:10.1080/14680777.2012.741870

Galperin, H., & Arcidiacono, M. (2019). Learning from or leaning on? The impact of children on Internet use by adults. *New Media & Society*, *21*(2), 483–506. doi:10.1177/1461444818799996

García, R., Zúñiga, A., Caro, J., & Aguilar, T. (2009). *Evaluación de proyecto Yo Elijo mi PC: Computadores para estudiantes de 7º básico* [Project Evaluation I Choose My PC: Computers for

7th-grade students]. Santiago, Chile: Centro de Informática Educativa, Pontificia Universidad Católica de Chile. Enlaces, Ministerio de Educación, Gobierno de Chile.

Häder, S., & Gabler, S. (2003). Sampling and estimation. In J. Harkness, F. van de Vijver, & P. Mohler (Eds.), *Cross-cultural survey methods* (pp. 117–136). New York, NY: Wiley.

Hargittai, E. (2003). Informed Web surfing: The social context of user sophistication. In P. Howard & S. Jones (Eds.), *Society Online I* (pp. 257–274). Thousand Oaks, CA: SAGE Publications.

Hargittai, E., & Hinnant, A. (2008). Digital inequality: Differences in young adults' use of the Internet. *Communication Research*, *35*(5), 602–621. doi:10.1177/0093650208321782

Hargittai, E., & Hsieh, Y. (2012). Succinct survey measures of web-use skills*. Social Science Computer Review*, *30*(1), 95–107. doi:10.1177/0894439310397146

International Telecommunication Union. (2016). *World telecommunication/ICT indicators database*. Geneva, Switzerland: Author.

Ito, M., Horst, H., Bittanti, M., Boyd, D., Herr-Stephenson, B., Lange, P. . . . Tripp, L. (2009). *Living and learning with new media: Summary of findings from the Digital Youth Project.* Cambridge, MA: MIT Press.

Katz, V. (2010). How children of immigrants use media to connect their families with the community. *Journal of Children and Media*, *4*(3), 298–315. doi:10.1080/17482798.2010.486136

Katz, V. (2014). *Kids in the middle: How children of immigrants negotiate community interactions for their families.* New Brunswick, NJ: Rutgers University Press.

Kennedy, T., Smith, A., Wells, A., & Wellman, B. (2008). *Networked families.* Retrieved from http://www.pewInternet.org/2008/10/19/networked-families/

Kiesler, S., Zdaniuk, B., Lundmark, V., & Kraut, R. (2000). Troubles with the Internet: The dynamics of help at home. *Human-Computer Interaction, 15,* 323–351. doi:10.1207/S15327051HCI1504_2

Kuczynski, L., & De Mol, J. (2015). Dialectical models of socialization. *Handbook of Child Psychology and Developmental Science,* 1–49. doi:10.1002/9781118963418.childpsy109

Mascheroni, G., Livingstone, S., Dreir, M., & Chaudron, S. (2016). Learning versus play or learning through play? How parents' imaginaries, discourses and practices around ICT shape children's (digital) literacy practices. *Media Education, 7*(2), 261–280. doi:10.14605/MED721606

McDevitt, M., & Chaffee, S. (2000). Closing gaps in political communication and knowledge: Effects of a school intervention. *Communication Research*, *27*(3), 259–292. doi:10.1177/009365000027003001

Ministerio de Educación. (n.d.). *Me conecto para aprender* [I get connected to learn]. Retrieved from http://meconecto.mineduc.cl

Ministerio de Educación. (2013). Evaluación de programas de educación: Compendio 2000–2013 [Evaluation of education programs: Compendium 2000–2013]. Retrieved from https://biblioteca.digital.gob.cl/bitstream/handle/123456789/324/EvaluacionProgramasEducacion Compendio_2014.pdf?sequence=1&isAllowed=y

Nelissen, S., & Van den Bulck, J. (2018). When digital natives instruct digital immigrants: Active guidance of parental media use by children and conflict in the family. *Information, Communication & Society*, *21*(3), 375–387. doi:10.1080/1369118X.2017.1281993

Pina, L., Gonzalez, C., Nieto, C., Roldan, W., Onofre, E., & Yip, J. C. (2018). How Latino children in the U.S. engage in collaborative online information problem solving with their families. *Proceedings of the ACM on Human-Computer Interaction 2*(CSCW), 1–26. Retrieved from doi:10.1145/3274409

Poushter, J. (2016, February 22). *Smartphone ownership and Internet usage continues to climb in emerging economies* (Global report). Retrieved from http://www.pewresearch.org/wp-content/uploads/sites/2/2016/02/pew_research_center_global_technology_report_final_february _22__2016.pdf

Quintelier, E. (2015). Engaging adolescents in politics: The longitudinal effect of political socialization agents. *Youth & Society, 47*(1), 151–169. doi:10.1177/0044118X13507295

Ribak, R. (2001). "Like immigrants": Negotiating power in the face of the home computer. *New Media & Society*, *3*(2), 220–238. doi:10.1177/1461444801003002005

Selwyn, N., Johnson, N., Nemorin, S., & Knight, E. (2016). *Going online on behalf of others: An investigation of "proxy" Internet consumers.* Retrieved from http://eprints.lse.ac.uk/id/eprint/83436

Silverstone, R., Hirsch, E., & Morley, D. (1992). Conceptual and thematic issues. In R. Silverstone & E. Hirsch (Eds.) *Consuming technologies: Media and information in domestic spaces* (pp. 15–31). London, UK: Routledge.

Subsecretaría de Telecomunicaciones. (2016*). Séptima encuesta sobre acceso, usos y usuarios de Internet en Chile* [Seventh survey on access, uses and Internet users in Chile]. Retrieved from http://www.subtel.gob.cl/wp-content/uploads/2016/05/Resumen_7ma_encuesta _de_uso_y_acceso.pdf

Swinarski, M., Parente, D., & Noce, K. (2010). A study of gender differences with respect to Internet socialization of adolescents. *Journal of Business & Economics Research, 8*(6), 23–30. doi:10.19030/jber.v8i6.730

Tashakkori, A., & Teddlie, C. (2003). *Handbook of mixed methods in social and behavioral research.* Thousand Oaks, CA: SAGE Publications*.*

Thorne, S., Black, R., & Sykes, J. (2009). Second language use, socialization, and learning in Internet interest communities and online gaming. *Modern Language Journal, 93*, 802–821. doi:10.1111/j.1540-4781.2009.00974.x

Tripp, L., & Herr-Stephenson, R. (2009). Making access meaningful: Latino young people using digital media at home and at school. *Journal of Computer-Mediated Communication*, *14*(4), 1190–1207. doi:10.1111/j.1083-6101.2009.01486.x

Van den Bulck, J., & Van den Bergh, B. V. (2005). The child effect in media and communication research: A call to arms and an agenda for research. *Annals of the International Communication Association*, *29*(1), 35–48. doi:10.1080/23808985.2005.11679043

Van Rompaey, V., Roe, K., & Struys, K. (2002). Children's influence on Internet access at home: Adoption and use in the family context. *Information, Communication & Society, 5*(2), 189–206. doi:10.1080/13691180210130770

Wheelock, J. (1992). Personal computers, gender, and an institutional model of the household. In R. Silverstone & E. Hirsch (Eds.), *Consuming technologies: Media and information in domestic spaces* (pp. 97–112). London, UK: Routledge.