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Intergenerational Online Health Information Searching and Brokering: Framing Health Literacy as a Family Asset

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ABSTRACT

Latino populations are disproportionately impacted by health disparities and face both connectivity and health literacy challenges. As evidenced by the current global pandemic, access to reliable online health-related information and the ability to apply that information is critical to achieving health equity. Through a qualitative study on how Latino families collaborate to access online health resources, this work frames health literacy as a family-level mechanism. Interviews with parent-child dyads combined with online search tasks reveal how families integrate their individual skillsets to obtain, process, and understand online information about illnesses, symptoms, and even medical diagnoses. As they engage in intergenerational online health information searching and brokering, families creatively navigate information and communication technologies (ICTs) to address a range of health needs. Bilingual children help immigrant parents obtain urgent and non-urgent health information needed to care for other family members. When children are tasked with addressing a health need critical to their parent's wellbeing, they collaborate with their parents to obtain, interpret, and apply online health information. Intergenerational online health information searching and brokering thus reveals family-level strengths that can be leveraged to promote both health and digital literacy among marginalized populations.

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To manage linguistic barriers, immigrant and ethnic minority families often depend on bilingual children to act as intermediaries by translating communication interactions or finding and interpreting information (Katz, 2014a; Orellana, 2009; Orellana et al., 2003). Close to 8 million of the 51.3 million U.S. children ages 5–17 live with at least one English-language learner (ELL) parent, and 80% of the U.S. ELL population identifies as Hispanic or Latino (Zong & Batalova, 2015). Many U.S. Latino children are thus growing up in bilingual households and are likely to help bridge their family's access to a range of resources. In our current media landscape, this requires engagement with information and communication technologies (ICTs), which children can broker on behalf of their parents (Katz, 2014b; Nelissen & Van den Bulck, 2018; Yip et al., 2016). A recent national survey found that Latino immigrant parents with lower-SES status, limited English-language proficiency, and without a high school degree rely more on their children to broker technology compared to parents of other backgrounds (Katz et al., 2018). We define this process of children helping their adult family members find and make sense of information online as online searching and brokering (Pina et al., 2018).

When family members work together to address health-related goals that are often critical for family wellbeing, the nature of their collaboration can involve various information-seeking and problem-solving strategies that shape a unique process of family communication. Children help their ELL parents navigate patient-provider interactions, fill out medical forms, or read prescription labels, and often do so during emergencies (Banas et al., 2017; Katz, 2014b). Access to health information becomes even more critical during moments of uncertainty or times of crisis. As the COVID-19 pandemic has brought to light, health literacy is a severely underestimated problem across the globe (Paakkari & Okan, 2020). Limited access to reliable online information (e.g., COVID-19 symptoms or prevention techniques) or limited ability to apply information and adjust behavior quickly (e.g., proper mask wearing or quarantine strategies) can contribute to striking racial health disparities. Access to information and resources can compound the impact of social and structural inequities (e.g., racism, employment sector, health insurance, housing conditions, etc.) that make marginalized communities more vulnerable during a public health crisis (Hooper et al., 2020). To date, Latino and African American U.S. residents are three times as likely to become infected with COVID-19 as their white counterparts, and nearly twice as likely to die from the virus (Oppel et al., 2020).

Public health scholars are now advocating for a greater understanding, appreciation, and application of health literacy as a community asset that is critical to achieving health equity (Sentell et al., 2020). Health literacy has most frequently been defined as the ability to obtain, process, and understand health information (Nielsen-Bohlman et al., 2004). Health literacy can directly impact wellbeing, often compounding the inequalities that result in critical health disparities (Batterham et al., 2016). With the rise of digital connectivity and a trend toward individualized medicine worldwide, the internet has become a key element to increasing health literacy and bridging access to health resources (Nutbeam, 2000). In the U.S., 72% of adult Internet users report they have searched online for information on different health issues, most often for specific diseases and treatments (Pew Research Center, 2013). This trend is even more prevalent among U.S. teens (ages 13–18), who report that the Internet is their primary source for health information among all other media (CMHD, Center on Media and Human Development School of Communication, Northwestern University, 2015). Almost a third (27%) of U.S. teens have looked for information about health conditions affecting family or friends (CMHD, 2015).

In this work we argue that an intergenerational analysis of how online health information is accessed, interpreted, and applied can inform the practice of public health communication and expand health communication theory by contributing with a family-level conceptualization of health literacy. We focus on Latino families for a few important reasons. First, this growing demographic has historically been disproportionately affected by health disparities. Latinos experience excess mortality from preventable causes such as diabetes, cervical cancer, and liver disease (Vega et al., 2009). Second, after a long-standing digital divide, Latinos have been driving smartphone adoption in the U.S., and are now going online at equivalent or higher rates than other ethnic groups (Lopez et al., 2013). Because the spectrum of digital inclusion includes access and use, the nature of this connectivity is important; 35% of Latino U.S. adults (compared to 14% White and 24% Black adults) are smartphone dependent – that is they rely on smartphones as their primary means of online access at home (Pew Research Center, 2018). Mobile-only households face unique information challenges that often impact their access to critical resources. According to the Centers for Disease Control and Prevention (CDC), mobile-only households are more likely to experience significant barriers to health care (Blumberg, 2017).

Access to ICTs has the potential to connect Latino families with resources that can help mitigate health

disparities. However, our understanding of how family members work together to access online health information is limited. Therefore, this study builds on prior work on parent-child technology engagement by contextualizing intergenerational online health information searching and brokering as a family asset. This intersectional lens considers the mechanisms that prompt health-related communication between parents and children when information needs are addressed collectively. As health resources continue migrating online, particularly during times of crisis, information-seeking and decision-making processes will become more collaborative within households with varying language and technical proficiencies.

Literature review

To situate this research at the intersection of health and digital equity, we review existing scholarship on health literacy and technology brokering in the digital age. Placing these two areas of communication research in dialogue with each other allows for an intersectional perspective on the theoretical and applied implications of intergenerational online search and brokering.

Health literacy in the digital age

Over the last 20 years, health literacy has become a growing concern for practitioners and scholars alike due to the breadth of research linking low health literacy with poor health outcomes (for review, see: Berkman et al., 2011). Lower-SES, ethnic minority, English-language learner, and immigrant populations are the most vulnerable to health literacy challenges due to inadequate access to relevant health information (Kreps & Sparks, 2008). Historically, health literacy has been defined as the ability to understand (based on reading and numerical comprehension) printed health material provided by medical practitioners – this definition emerging from an initial and predominant focus on literacy measurement (Nutbeam, 2000). That definition has been expanded to encompass the knowledge, skills, relationships, and resources involved in the process of finding, understanding, and applying health-related information (Aldoory, 2017; Mackert et al., 2015).

eHealth, or the use of ICTs for health, has been heralded as a path toward more equitable delivery of care and improved health outcomes (Bickmore & Paasche-Orlow, 2012; Gazibara et al., 2019; Kreps, 2017). However, Gutierrez et al. (2014) point out that, as health services keep moving toward the use of e-Health technologies, patients with limited health literacy and/or limited digital literacy may experience an augmentation in the lack of communication skills necessary to engage with their providers to understand and make appropriate decisions about their health. In other words, the existence of online health platforms and content is not enough for people to make appropriate health-related decisions. eHealth literacy, which is the capacity to access, receive, discern, understand and appraise adequate online health related content is also critical (Norman & Skinner, 2006). One obstacle for increasing eHealth literacy skills is that online health information and services require a certain level of English proficiency and digital literacy that is often limited among marginalized populations (Choi & DiNitto, 2013; Knapp et al., 2011).

Qualitative studies on online health searching have employed observations, interviews, and prompted search tasks to better understand the process of forming a search query and processing the multitude of search results (Fiksdal et al., 2014; Pang et al., 2015). Macias et al. (2018) offer a typology of online health searchers in an effort to narrow the research gap between what adults say they do online, and *how* they actually search. Using the think-aloud method, which prompts participants to narrate what they are thinking and doing as they search for health-related content, the authors found that search outcomes vary based on

users' technical and information processing skills. While much of the research on eHealth has focused on comprehension and measurement at the individual level, a family-level analysis can reveal strengths that are important for health communication. We propose that an examination of how health-related information is accessed in the digital age through intergenerational online searching and brokering can inform both communication theory and digital health literacy interventions. In addition, we posit that this examination is also an important entry point for communication research to examine the multilevel barriers that impact access to health resources.

Intergenerational technology and information brokering

Concerns about how communication technology can impact family life have dominated much of the public agenda. Uncertainties about appropriate engagement can make it difficult for parents to understand and mediate their family's relationship with emerging technologies (Clark, 2011; Lauricella et al., 2015). Communication researchers have documented how ICTs have helped strengthen family relationships, and how they have inadvertently cultivated distance and conflict (Bruess, 2015; Clark, 2013). Examinations of how intergenerational family members interact through and with technology can provide rich contextual insight into more complex family communication processes (Gee et al., 2018). While this body of work contributes to our understanding of how families engage ICTs, researchers caution that the overrepresentation of parents with high incomes and education levels in such studies may limit generalizability (Rudi et al., 2015). This calls for further investigation into how generational dynamics shape technology engagement, particularly among diverse parents who are not active online. Parents with more technological expertise may manage technologically assisted family communication quite differently than those who are novice, or even hesitant, users.

Nelissen and Van den Bulck (2018) address a cognitive bias based on the assumption that parent-child socialization is a top-down process, with parents guiding the way as children develop cognitively. The authors found convergent perceptions of how children act as "active agents," guiding their parents' use of smartphones, tablets, and apps. In lower-SES families specifically, interviews and surveys with both parents and children have revealed a "bottom-up technology transmission," during which children help their parents adopt and troubleshoot new devices (Correa et al., 2019; Katz & Gonzalez, 2016). Offering a counter-perspective, Galperin and Arcidiacono (2019) posit that the intergenerational transfer of skills from children to adults is outweighed by "leaning effects" – decreased online engagement by adults due to proxy use by children. These authors call for further examination of children's roles in Internet adoption among low-income families specifically, and research on how digital inclusion initiatives can promote intergenerational co-engagement and skills transfer. This is the call to action that we respond to in the present study. By framing online health information searching and brokering as a family asset, we can identify ways in which both digital and health literacy skills can be strengthened.

Prior research has examined the role of Latino youth as health brokers. For instance, Banas et al. (2017) found that 58% of Latino high school students assisted their family with healthcare tasks such as reading prescription labels, talking to medical practitioners, and looking up health information on the Internet. The youth described scenarios such as explaining the reasons for an injection, identifying symptoms associated with certain medications, and researching anatomy information to better understand a cancer diagnosis. Similarly, Katz (2010) documented how children as young as age 11 helped their parents manage their diabetes care, translate provider interactions regarding a sibling's epilepsy, or negotiate health insurance

obstacles. Scholars across disciplines have documented how child brokering can manifest in both beneficial (e.g., parent-child bonding, better academic performance), and detrimental (e.g., unhealthy role reversals, stressful interactions) ways (Orellana, 2009; Roche et al., 2015). For instance, research on how young people translate in medical settings has found that while they might feel proud to be able to help family members, children can also feel embarrassed when learning private details, get frustrated with the translation process, or become acutely concerned about their loved ones' health (Banas et al., 2017; Green et al., 2005; Guntzviller et al., 2017). Beyond the medical setting, bilingual children are also tasked with more complex health-related information gathering and problem solving, such as navigating the intricacies of health insurance coverage (Martinez et al., 2017). Children's roles in health information seeking can thus extend beyond online search to position them as informal health care advocates – such a dynamic can disrupt privacy boundaries and complicate family communication processes (Petronio et al., 2004).

To extend communication research on health literacy and technology brokering, we pose the following research question: How do bilingual immigrant families use information and communication technologies to address their health needs?

Method

We conducted in-person qualitative interviews and online search tasks with immigrant families living in a metropolitan city in the Pacific Northwest region of the U.S. This research was conducted with, at minimum, one focal parent and one focal child from each family. The parent-child dyad approach has been a valuable method in research on families and technology because it allows different family members' perspectives to be in conversation with one another (Barrantes Cáceres & Cozzubo Chaparro, 2019; Barrie et al., 2019; Clark, 2011; Nelissen & Van den Bulck, 2018). Correa (2014), for example, found that children report having more influence on their parents' tech learning than their parents admit – separate interviews thus help reveal incongruent perceptions. Throughout multiple home visits, we asked parent-child dyads to reflect on how they engage technology to access online information.

Participant characteristics

A purposive sample was utilized to focus the study only on families who have experienced collaborative Internet search. We used two different recruitment methods. Researchers attended five different Latino-specific community events to recruit participants in person. The project's community partner, a nonprofit organization, identified additional families who might be interested in the study and the research team followed up with a recruitment phone call. A flyer detailing the study, eligibility criteria, and contact information was distributed to aid recruitment. We invited families to participate if they met the following criteria: the parent self-identified as Hispanic/Latino and was born in Latin America [1] ; had a child between the ages of 10 to 17 [2] ; and reported that their child helped them search for and/or translate online information. Each participating family member was compensated for each home visit; adults received 25 USD cash and youth received 15 USD cash per visit.

Theoretical saturation was reached after engaging 24 families (50 individuals). The multiple home visits with each family yielded a substantive volume of data; the research team began to identify recurring themes during weekly research meetings. A majority of the participating families consisted of parent-child dyads; three were grandparent-grandchild dyads (F14, F16, F17). [3] In two of the families (F5, F10), both parents

were welcomed to participate in the study at their request. Among the children, 63% identified as female with a median age of 13. Among the adults, 79% identified as female with a median age of 41. The oversampling of female participants can be explained by our recruitment method and cultural dynamics. Firstly, mothers were more likely to be active members of the community organization that assisted in recruitment. Secondly, cultural gender roles have been found to impact how household responsibilities are allocated; information-related tasks seem to follow such patterns with mothers and daughters taking the lead (Correa et al., 2019; Kiesler et al., 2000; Valenzuela, 1999). Most of the participating adults were born in Mexico (83%), not college-educated (88%), and were either unemployed or worked in service industries. In an attempt to be culturally sensitive amidst a tense political climate [4] where Latino immigrant families felt vulnerable, we did not explicitly ask more intrusive information such as household income. We are confident that the education level, place of birth, and occupation of our participants correlate with lower household incomes (Saegert et al., 2006). Table 1 provides demographic information on the participants.

Table 1. Participant Characteristics (Table view)

	Parent & Child Age	Parent Occupation	Parent Place of Birth	Parent & Child Education Level
F1	Mother (41) Daughter (13)	Housekeeping	Mexico	Secondary 8th grade
F2	Mother (39) Daughter (10)	Hospitality	Mexico	Primary 4th grade
F3	Mother (45) Daughter (16)	Housekeeping	Mexico	Secondary 11th grade
F4	Mother (39) Daughter (17)	Student	Peru	Secondary 12th grade
F5	Mother (51) Father (50) Daughter (16)	Homemaker Dry Cleaning	Mexico	Primary Primary 11th grade
F6	Mother (36) Son (13)	Hospitality	Mexico	Secondary 8th grade
F7	Mother (41) Daughter (11)	Homemaker	Mexico	Secondary 6th grade
F8	Mother (41) Daughter (10)	Food Industry	Mexico	Secondary 5th grade
F9	Father (46) Daughter (10)	Gardener	Mexico	Primary 5th grade
F10	Father (36) Mother (32) Daughter (14)	Cook Homemaker	Mexico	Secondary Primary 8th grade
F11	Father (40) Daughter (15)	Food Industry	Mexico	Secondary 9th grade
F12	Mother (55) Daughter (14)	Unemployed	Mexico	Bachelors 9th grade

F13	Mother (26) Son (11)	Childcare	United States	Secondary 6th grade
F14	Grandmother (63) Grandson (10)	Unemployed	Peru	College 5th grade
F15	Mother (48) Daughter (19)	Homemaker	Mexico	Primary 12th grade
F16	Grandfather (56) Grandson (8)	Food Industry	Honduras	College 2nd grade
F17	Grandfather (62) Grandson (12)	Food Industry	Mexico	Secondary 7th grade
F18	Mother (41) Daughter (16)	Social Worker	Mexico	College 10th grade
F19	Mother (52) Son (11)	Unemployed	Mexico	Secondary 5th grade
F20	Mother (38) Son (11)	Homemaker	Mexico	Secondary 5th grade
F21	Mother (42) Daughter (15)	Housekeeping	Mexico	Secondary 10th grade
F22	Mother (40) Daughter (16)	Housekeeping	Mexico	Secondary 10th grade
F23	Mother (33) Daughter (13)	Unemployed	Mexico	Secondary 7th grade
F24	Mother (40) Son (13)	Housekeeping	Mexico	Secondary 8th grade

Study design

This study consisted of multiple home visits per family. Home studies on internet searching are important because they help participants feel comfortable, use their own technologies, and access contextual resources (Rzeszotarski et al., 2014). Home visits also allow researchers to examine technology practices as they occur within the family's home digital infrastructure, which includes connectivity dimensions such as internet bandwidth and mobile phone reception (Katz & Gonzalez, 2016). The study design combined semi-structured interviews and observations of prompted search tasks. Two members of the research team visited each home. Four out of the six research team members were bilingual native Spanish speakers with Latin American heritage. At least one bilingual researcher attended each home visit to ensure that the language needs of the participants were met.

The first home visit (V1) consisted of a consent process and separate interviews with the parent-child dyads. We conducted a total of 48 individual interviews: 24 with the parents (in Spanish), and 24 with the children (in English). The V1 methodology was adapted from Katz and Gonzalez's (2016) in-home media studies and Foss et al.'s (2012) and Foss et al. (2013) search interviews. We used a semi-structured interview protocol to focus on the study's research goals while allowing for more nuanced themes to emerge (Lindlof & Taylor, 2012). Interview questions focused on demographics, familiarity with technology and online

searching, challenges addressing family information needs, and experiences with brokering. To asses confidence with using the Internet, participants were asked to rate themselves as beginner (N = 13), intermediate (N = 8), or expert (N = 2). Interview prompts that elicited health-specific conversations with children included questions such as "What kind of things do you look up online?" or "Are there certain kinds of searches you find difficult to explain to your parents?" Similarly, interview prompts that elicited health-specific conversations with parents included questions such as "Are there certain kinds of searches you find difficult to do with your child?" and "Are you comfortable with your child helping you find or translate online information?" To the extent possible, we conducted the separate parent and child interviews in different rooms of the home (e.g., kitchen and living room) to minimize interaction between the participants or noise contamination. While privacy concerns and space limitations made this a challenge, conducting the home visits in teams of two helped researchers establish two different "workstations" to conduct interviews simultaneously and with limited interruptions. Interviews lasted between 45 to 60 minutes and they were audio recorded, and professionally transcribed and translated.

The second home visit (V2), conducted 1–3 weeks after V1, focused on observations of directed Internet search tasks between the parent-child dyads, a method operationalized in prior search research (Foss et al., 2013; Kim et al., 2017). These observations allowed us to triangulate data from V1 in order to understand how parent-child collaboration manifested during a particular information-seeking scenario. The search prompts consisted of imposed and historical tasks. Imposed tasks allowed us to observe search skills and identify the extent to which the dyads collaborate. Historical tasks prompted a retrospective demonstration of how the dyads have collaborated in the past. The health-specific task varied between historical and imposed based on the dyad's experience with online health information seeking. Our goal was to get as close as possible to understanding everyday co-searching processes by prompting both hypothetical and retrospective interactions. We encouraged the parent-child dyads to engage in the prompts collaboratively, to the extent they would naturally. They were also instructed to use their own device, particularly one they would more frequently use for online searches. As they performed the tasks, the researcher would prompt the participants to narrate or clarify their steps as needed, in a similar fashion as the think-aloud method employed in prior work on online health search (Macias et al., 2018). The search prompts were structured according to the following scripts; the focus of the current analysis will be on prompt four:

1. Let's pretend that [parent] needs to call [child]'s school. Can you [child] show us how you would find the school's phone number and share it with your parent? (imposed task)
2. Can you [dyad] show us how you would find something fun for your family to do on the weekend? (imposed task)
3. Can you [dyad] show us how you have found online information for something [parent] has requested before? (historical task)
4. Can you [dyad] show us how you have found online information for something related to health that [parent] has requested before? (historical task) *For those who have never done this type of search before, ask*: Let's pretend that [parent] or someone in the family wasn't feeling well and wanted to know why, what online information might they request and how would you find it? (imposed task)

We conducted these search tasks with 20 different dyads. The remaining 4 families from the V1 did not

report sufficient collaborative practices during their interviews to warrant participation in the V2 search tasks. [5] Search tasks were facilitated in a combination of English and Spanish depending on the dyad's preferences, and they lasted between 30 to 60 minutes. We video recorded the search tasks. We used one camera to record the search results through the dyad over shoulder and another camera placed in front of the dyad used to capture the dyad interactions. Finally, we annotated our observations according to a thematic analysis process described in the following section.

Thematic analysis

One advantage of our study design are the varied methods deployed during multiple home visits. In V1 interviews, parents described health-related online searching and brokering in more depth than children, presumably because many of the participating children were accustomed to brokering across a spectrum of contexts without differentiating between tasks. During V2 search tasks, we were able to capture retrospective and hypothetical scenarios during which children helped their parents navigate a health-related query. The second visit allowed for the triangulation of findings across distinct methods and at different time points.

Following an iterative and collective thematic analysis approach (Braun & Clarke, 2006), each V1 transcript dyad (parent and children) was read and coded by two researchers, identifying any instance when a health-related context emerged (e.g., child helped parent search for symptoms, parent expressed difficulty with medical language). Each coder acted as a primary and secondary coder. The primary coder was the first to review and code the transcripts. The secondary coder reviewed the codes, identified additional data points to code as appropriate, and suggested new codes to include in the analysis – a process used in thematic analysis involving multiple coders (DeCuir-Gunby et al., 2011). The first round of coding resulted in quotes that described how parents used the Internet to search for health information and how children helped their parents perform the searches.

V2 search tasks involved a more collective analysis; in teams of two (with at least one Spanish speaker), we annotated the observational videos and developed analytic memos describing the results of each search task. We then coded moments during V2 tasks when health-related collaborative search occurred. The research team examined all of the coded data together during several group meetings where we iteratively grouped together codes to suggest possible overarching themes within the health context (Evans & Lewis, 2018). All but two of the team members who participated in the thematic analysis also participated in data collection; two additional bilingual students were invited to join the coding process. Having interviewers coding helped to keep the transcriptions in context; having non-interviewers coding allowed us to analyze the data through diverse perspectives.

To identify the most salient exemplars that helped answer our research question, we selected interactions that were most explicitly health related, included some form of collaborative searching and brokering, and allowed for triangulation across V1 and V2 data. We allowed for a broad definition of health-related interactions, which most often operationalized as searches regarding physical ailments, chronic illness, general wellbeing, diet and exercise, health insurance, providers and locations, and self-care. When reporting findings, we use pseudonyms for the participants, using Name^{P} to indicate parents and Name^{C} to indicate children.

Findings

Our research question asked how bilingual immigrant families use ICTs to address their health needs.

Consistent with prior research on media and technology engagement in Latino households (Gee et al., 2018; Katz & Gonzalez, 2016), families in our study described rich media environments at home. During the V2 search tasks, parent-child dyads used smartphones (N = 9), tablets (N = 7), laptops (N = 4), and desktop computers (N = 1) to complete the prompted tasks. One family (F5) switched from a smartphone to a laptop because the father felt more comfortable doing the activity on a laptop; three families (F12, F15, F17) used a combination of devices to demonstrate how their co-searching sometimes requires various tools. For example, if a mobile device were running too slowly or the wireless internet connection was not stable, there would usually be an alternate device available for the search process. V2 search tasks also allowed us to observe the ways in which different Internet browsers (e.g., Chrome, Safari, Internet Explorer), search platforms (e.g., Google, Bing, Yahoo), and mobile applications (e.g., Google Translate, WhatsApp, Google Maps) are used during collaborative online searching and brokering.

In general, we learned from V1 interviews that children help their adult family members access and interpret online information on a variety of topics, ranging from weather and directions, to financial and health issues. Our research question asks how families with diverse language and technical skills use ICTs to address their health needs. The prompted V2 search tasks revealed that the process of accessing health-related online information requires collaborative strategies beyond internet searching, suggesting that health literacy interventions should consider how family communication processes can complement individual skills. In other work (Pina et al., 2018), we present the socioecological factors that shape online searching and brokering across a range of information needs. Families described the challenges of searching online for employment opportunities or finding deals during online shopping. While these tasks required collaboration and a range of skills and knowledge, there are two notable differences that emerge during health-specific tasks: 1) the sharing of personal, and sometimes sensitive, health information (either of a parent or a family member), and 2) the often necessary, and sometimes critical, trajectory of information retrieval to health decision making.

In this thematic analysis, we focus on examining health-specific collaborations to enrich understandings of how parents and children in immigrant families engage ICTs together to find, interpret, understand, and apply health information. In the following sections, we demonstrate how intergenerational collaboration varies across the health literacy spectrum. Health literacy can be conceptualized as the "evolving skills and competencies needed to find, comprehend, evaluate, and use health information and concepts to make educated choices, reduce health risks, and improve quality of life" (Zarcadoolas et al., 2003). When children help their parents address a family member's health concern, they mostly focus on obtaining, and sometimes processing, health information. When they help their parents address their own wellbeing, children often have to obtain, process, *and* use health information to help their parents make decisions. This distinction between obtaining and applying information is helpful for framing health literacy as a family-level asset.

Bilingual children help immigrant parents obtain online health information for family wellbeing

During individual V1 interviews, many parents described their efforts to search online for health information that would help them care for other family members. This included information on general nutritional guidance, health care access, and specific ailments or symptoms. While some queries were manageable and parents were able to navigate online searches on their own, they often requested assistance from their children. It is important to note that 13 out of the 24 participating parents rated themselves as "beginners" in

terms of their confidence using the Internet (and only 2 considered themselves experts) – while we did not assess self-efficacy in regard to information seeking specifically, parents' digital literacy emerged as a driving factor for intergenerational collaboration. Some parents reflected on how their technology skills limited their ability to address health queries on their own time and in a more private manner (e.g., on their smartphone during a bus ride), particularly when the focus of their online health information seeking involved personal or sensitive information. Parents' reflections on technology brokering thus suggest that leaning effects – decreased online engagement by adults due to proxy use by children (Galperin & Arcidiacono, 2019) – might manifest when parents opt to wait for their children's assistance rather than attempt an online search on their own. It is difficult to parse out the intentions behind such decisions, as co-searching can emerge both out of necessity and because of an inclination for collective problem solving. This is where V2 search tasks revealed that collaboration can yield mutual learning about technology and health. A few notable exemplars help illustrate how bilingual children help their parents navigate ICTs and find health-related online information to support family wellbeing.

The case of Claudia^{P} (age 40), a mother of two from Mexico, and her daughter Melissa^{C} (age 16) (F22) helps to illustrate how a parent's desire to address the health needs of a family member prompts collaborative search. In her individual V1 interview, Claudia^{P} described how she wanted to understand a relative's recent diabetes diagnosis in order to prevent it from affecting other family members. At the time, Claudia^{P} found it difficult to search online because she described herself as someone who "doesn't know much about technology." [6] She did not have consistent Internet service at home (at the time of the study, the family used a mobile hotspot that they won at a community event) and accessed the Internet through her smartphone. Claudia usually searched for this type of information in Spanish and mentioned that she had difficulty understanding medical terms. To manage this challenge, Claudia^{P}, like many other interviewed parents, turned to her daughter for help. During the V2 health search task, Claudia^{P} asked Melissa^{C} to help her search for information about how to prevent diabetes.

To begin the search task, Melissa^{C} opened a web browser on her mother's smartphone and first changed the keyboard language to Spanish. She then started typing, "how to prevent … " in Spanish, but handed over the phone to her mother because she was not sure how to spell "prevent". When Claudia^{P} typed the full query, a list of recommended searches appeared, with "*como prevenir la diabetes* – how to prevent diabetes" as the first suggestion – Claudia^{P} selected this query to proceed with the search. On the results page, Claudia^{P} clicked on "images" and explained to her daughter that she preferred to see information in the form of infographics. While they explored diabetes infographics, Claudia^{P} had difficulty with technical details such as understanding the difference between links and normal text – her daughter explained that the blue or underlined text is usually a link that leads to another page. For Claudia^{P} and Melissa^{C}, obtaining information about diabetes involved a process shaped by their individual language and technical skills. This collaboration reflects an interactive form of bottom-up technology transmission (Correa et al., 2019) that ends in information retrieval, but not full application.

Our research question focuses on engagement with technology and the process of collaborative search; we found that such collaborations can carry both logistical challenges and learning opportunities. During her V1 interview, Melissa^{C} described how for urgent health topics, she prefers to help her mother search directly in Spanish to make sure she is finding *reliable* information. For less urgent topics, Melissa^{C} navigates the search in English and quickly finds, interprets, and relays the information back to her mother. Melissa is aware that she is to some extent responsible for the accuracy of the information, a critical aspect of health

literacy. While this process is not always seamless, it often becomes an opportunity for the type of brokering that facilitates co-learning, as Melissa[C] described:

> [My mom] doesn't know how to use technology a lot. So, I help her out when she needs me to, like especially when she doesn't know how to write a word. I help her, and I teach her how to use [the phone] … then I give it to her so she can try it out.

Like Melissa, other participating children described how they would teach their parents how to use ICTs and how to search online.

In another family, Laura[P] (age 39), a mother of two from Peru, and her daughter Emily[C] (age 17) (F4) recalled a time when Emily's[C] younger sister seemed to be suffering from heat stroke. When Laura[P] learned that her younger daughter was not feeling well, she quickly turned to Emily[C] to help figure out what to do. Emily[C] reenacted her steps during this historical search task. Using her smartphone, Emily[C] first typed in symptoms that she thought could help identify what her sister was experiencing. She clicked on a WebMD link that described those symptoms as a heat stroke. Emily[C] tried to explain this to her mother, but she did not know how to say "heat stroke" in Spanish. Emily[C] then used *Google Translate* to determine that it means "*golpe de calor"*. To further calm Laura's[P] concern, Emily[C] then also called a hospital and spoke with a nurse about how to manage her sister's symptoms, simultaneously translating the nurse's suggestions for her parents.

We found that intergenerational interactions that involved online and offline information seeking strategies were more prevalent within families with teenage children. These exemplars illustrate a fluid process of information retrieval, and to some extent information processing, that many of our participating families described. Critical concerns related to the wellbeing of family members prompted a quicker response and more collaboration. Less urgent concerns or interests, such as the need for healthy recipes or questions about a general health issue, prompted less structured searches. While this form of collaboration, prompted by the needs of a third party, required the parent-child dyads to be sensitive to each other's limitations, we found that communicative strategies were different when the information need was related to a parent's own health and wellbeing.

Immigrant families collaborate to obtain and apply online health information for parents' wellbeing

The health-specific focus of our research question helps to illustrate how online health information seeking and problem solving manifests among immigrant families with varying levels of both digital and health literacy. When children are tasked with addressing a health need that is directly related to their parent's wellbeing, the collaborative online searching and brokering process complicates traditional notions of caregiving. Across both V1 and V2, children described researching specific symptoms that their parent was experiencing, interpreting a medical diagnosis, or identifying specific medication, all while navigating a host of online health resources. As prior research has documented, being present for a parent's medical visit can be a taxing experience for a child, particularly when translation is required (Banas et al., 2017; Guntzviller et al., 2017). Intergenerational online health information searching and brokering operates as an extension of these challenging clinical experiences. Rather than mediating information exchange between patient and provider, children are tasked with both understanding their parents' immediate health needs and helping them access the appropriate resources to address those needs. In this way, the collaborative use of ICTs to

address a parent's health need involves practices that cut across the health literacy spectrum, as exemplified by the cases that follow.

Teresa[C] (age 16), for example, described in her V1 interview how she finds it very easy to do quick online searches on behalf of her parents, Juan[P] (age 50) and Lidia[P] (age 51) (F5). However, when her parents have asked her to search for specific health symptoms, she has trouble understanding what they are asking or explaining what she finds online:

> Like, my dad's shoulder pain. He's giving me descriptions to put it, there's so many things that it could go with. So I'm like, I don't really know what's wrong with your shoulder. It might be like a nerve. I don't know what it's called, but there's a lot of remedies that can help you with it. I can never tell him, oh it's this specific one … Then where there's hard words in English to Spanish, sometimes I don't know how to describe them all that well, and I don't know the word in Spanish. So that's when it gets hard translation-wise, any sort of like medical word and terminology.

For this process, Juan needed to be very specific when describing his shoulder pain to his daughter, much like he would when interacting with a medical provider. The difference here is that Teresa[C] needed to simultaneously process her father's request, ask the appropriate follow up questions, search for possible diagnoses or treatments, and ultimately provide medical advice based on information gathered online. And Teresa had to do so while navigating two languages, a task that in itself can be daunting (Orellana, 2009). Many parents described this same process during their V1 interviews, and we were able to directly observe such interactions during the V2 search tasks. The focus of these collaborative searches ranged in nature and urgency, notably more complex and challenging when they involved self-diagnosis.

Teresa's[C] challenge was not lost on her parents – in their collective V1 interview they acknowledged that they rely on their children quite often to answer health questions that range in complexity. But, as other parents in our study expressed, they were also aware that the Internet provides easy and free access to information, and that their children were better situated to navigate everyday queries, as Lidia[P] (Teresa's mom) reflected:

> For [my daughters] it is very easy. It would take me … all day to find some information. But for them: 'Look, mom, you just click on this and search for it here and it will tell you what the symptoms are.' Or what [the diagnosis] might be. We depend on them. Now it's actually codependency. [7]

Teresa's[C] role as a health information broker parallels the experience of other children in our study – particularly those in their teenage years who have taken on the role of "searcher" as an extension of family and household responsibilities. When children like Teresa[C] are tasked with researching specific symptoms, they become involved in their parents' self-diagnosis processes, which requires the retrieval, processing, and application of health information. While Lidia[P], Teresa's[C] mother sees this "codependency" as a family asset, there are times when she worries about how much personal health information her children are privy to: "I wish I could [search] on my own. Sometimes there are more serious things that they shouldn't know about, they shouldn't have to get that information." [8] Parents are thus aware of their vulnerability during health-related online searching and brokering, but often have nowhere else to turn for such guidance.

Another example of a more direct health-related search with a higher degree of sensitivity is the case of Alicia[P] (age 45), a mother of four from Mexico, and her daughter Cristina[C] (age 16) (F3). Alicia[P] returned from a doctor's appointment uncertain about her diagnosis because the doctor used a medical phrase in English she was not familiar with. While Alicia[P] would normally take Cristina[C] to medical appointments,

this particular provider did not allow children to be in the room acting as interpreters. During their V2 search task, Cristina[C] recreated what it was like to help Alicia[P] understand her diagnosis. Using her mom's smartphone, Cristina[C] started typing the phrase that came up during Alicia's[P] doctor visit, and eventually discerned that her mom was trying to pronounce "liver" in English. Because Cristina[C] did not have extensive anatomy knowledge, she searched for "liver translation into Spanish" to explain the organ to her mom. Cristina[C] continued to discern that the phrase her mom was using was "inflammation of the liver," and she began helping Alicia[P] search for causes of liver inflammation in Spanish. The mother-daughter dyad navigated the search together, passing the smartphone back and forth when they got stuck spelling the keywords used in their queries.

An online search for what caused inflammation of the liver yielded numerous results that Cristina[C] and Alicia[P] had to navigate together. The volume of information did not make the search any easier, a challenge Alicia reflected on during her V1 interview: "There are many options and sometimes you click on things, and end up being another [unrelated], or one thing that you should not see" [talking about inappropriate information]. [9] At the end of the search, Cristina[C] described how she has a set of skills that help facilitate this process: "My dad taught me to look at where the links come from. For example, this one I can see is coming from the Cancer Society." While Christina was helping her mom with a health information need, she tapped into eHealth literacy skills that her father had instilled in her (Norman & Skinner, 2006). In this particular case, family-level skills and strengths helped to bridge access to critical information, and to ultimately impact health behavior.

Discussion

Our findings indicate that Latino immigrant families regularly use ICTs to collaboratively access online health information. Health literacy skills and strategies are engaged and shared by parents and children as they collaborate to find, comprehend, and use health information to make informed choices. Urgent health information needs regarding the wellbeing of family members often require quick information retrieval, while health concerns regarding a parent's wellbeing often involve a more complex process of information retrieval and application. We also captured intergenerational online health information searching and brokering in less urgent situations. One family recalled the need to find a clinic that allowed walk-ins for a young child. The older brother searched "walk-in clinics near me," found the clinic the mother wanted, put the address in the phone GPS, and the family drove there together. In another family, the daughter searched for healthy smoothy recipes for her father in Spanish, found a site, read through the recipes together, and later bookmarked it for her father. Regardless of the health topic, level of urgency, family member of focus, or technologies engaged, the phenomenon of intergenerational online health information searching and brokering highlights strengths and capacities within the family unit. As information access becomes increasingly critical for health promotion and prevention, understanding *how* marginalized communities access health information and make health decisions is an important element of health communication research and health literacy interventions.

Methodologically, our approach builds on efforts in health communication research to better understand how individuals access and process online health information without relying on self-reports (Macias et al., 2018). By observing parent-child dyads, we were able to contribute a family-level perspective on technology engagement and health literacy. In this way, our findings suggest a promising line of inquiry that intersects health and technology research. Health communication scholars have posited that the convergence of mass

and interpersonal communication channels has dramatically changed consumer-provider communication and health decision making. Type 1 convergence reflects the process of patients actively searching for online information and using that information in their discussions with health providers (Kreps, 2017). Our findings reveal this same form of communication convergence that occurs when families access online information and discuss it interpersonally. During prompted health search tasks, the parent-child dyads demonstrated how they merge their individual skill sets to retrieve information about specific illnesses, symptoms, and even diagnoses. Once this information is retrieved and processed, parents and children engage in a bi-directional process of interpretation and application. This suggests that in a health context that involves an information need, immigrant families may actually collaborate much more than has been documented in the literature on child brokering.

Our findings also suggest that further research on collaborative search (among family, friends, or peers) can contribute valuable insights to the study of eHealth literacy. We observed families addressing complex health issues and questions using a variety of digital tools and skills. Children would often lead the way in terms of technical skills, but parents often had to be actively engaged in the information seeking process so that their query could be appropriately addressed. At times, the collaborative health searches revealed opportunities for promoting health and digital literacy simultaneously. For example, Claudia's preference for infographics on diabetes, Emily's use of WebMD, and Cristina's trust of the American Cancer Society's website, all suggest that health literacy interventions should consider the role of ICTs and online information. A focus on online search practices within family units would help further unpack how health literacy is understood and how it can help vulnerable populations better access critical health resources (Aldoory, 2017; Kreps & Sparks, 2008).

Finally, our findings complement research on the buffering role of communal coping during health crises and for health promotion (Afifi et al., 2012; Lin et al., 2019). While parents were grateful for the assistance of their children, some were concerned about codependence or the psychological impact of health-specific brokering. As Alicia^{P} described:

> "I have been told that psychologists are now saying having children involved in so many adult decisions is not good for them … who are we going to rely on when we need help? Especially, when it is about information that is private and personal."

This sentiment reflects both discomfort and necessity, underscoring the complex value of communal decision making. While collaborative online searching and brokering may help families cope with health information needs, particularly those that are critical and directly involve a family member's wellbeing, the psychological impact of this form of communal coping warrants further investigation. Kam et al. (2018), for example, provide a typology of coping behaviors among Latino youth brokers. They found that communal copers (those who felt a shared responsibility for brokering) experienced greater levels of brokering stress than tentative copers (those who were unsure of the purview of brokering needs) and declined-ownership copers (those who felt brokering was their family's responsibility) (Kam et al., 2018). Such findings suggest that further research on how communal coping manifests within families through health information seeking can help examine how brokering practices impact both parents' and children's wellbeing.

Limitations

There are important limitations to this study that should be discussed. First, our methodological approach

resulted in a very detailed qualitative dataset on specific search processes. Because we focused this analysis on health-specific practices, we were only able to highlight the interactions of a few exemplar families. The challenges of qualitative analysis were thus particularly salient in our study, and in future work we will provide space for more participant voices to be heard. Second, our recruitment methods may have led to the oversampling of mothers and daughters, a common methodological challenge when conducting research with Latino families. The cases we highlight in our findings mostly include teenage daughters. We did find that teenage children seemed to be more equipped to assist their parents with complex queries. Our broader analysis of the non-health related interviews and search tasks also suggests that daughters take on more technology-related responsibilities than their male counterparts. This dynamic has been theorized in other work on child brokering as a form of caregiving (Correa et al., 2019; Kiesler et al., 2000), and would require additional interviews with fathers and sons to better support a gendered hypothesis. Third, while all of the participating parents self-identified as Latino or Hispanic, a majority (20 out of 24) reported being from Mexico. Our sample is thus not representative of the heterogenous Latino population in the United States, and there are further culture-centered analyses that would enrich our findings. Future research in this area could consider the role of acculturation, immigration generation, socioeconomic status, and other socioecological factors across a more heterogenous sample.

Fourth, we observed few moments of tension between the dyads even though the brokering literature suggests that frustration can emerge during such interactions. This may be a function of our methods, in that the interviews and search tasks were mostly retrospective and were being audio recorded. Privacy implications are important to consider when interpreting data gathered through home visits. Lastly, while we conducted multiple interviews with each family, a sample size of 24 is still relatively small in terms of generalizability. Future work should consider a mixed-methods design (interviews, search tasks, surveys) in which the experiences of a greater number of bilingual families from different demographic groups can be captured.

Conclusion

This study examined ways in which children help guide health-related online searches on behalf of and with their family members. This particular form of collaborative health information seeking is shaped by the health needs of the family, and by their digital connectivity. As such, we posit that a focus on intergenerational online searching and brokering reveals an opportunity to promote health literacy in culturally relevant ways. First, moving beyond individual-level approaches can help researchers and practitioners view family communication as an asset, bringing intergenerational collaboration to the forefront in efforts to promote health. Second, framing health literacy as a family-level mechanism can build on emerging research on eHealth and crowdsourcing to leverage the creative problem solving that occurs within families. And third, by further studying intergenerational online health information searching and brokering among diverse families, we can better understand how digital and health equity intersect and identify ways to tackle pressing needs in both areas.

Notes

1. One participant initially identified as an immigrant and then reported being first generation (U.S.-born with immigrant parents).

2. Prior research has identified the 10–17 age range as the most common age in which youth are likely to actively broker for their families (Katz et al., 2018; Orellana et al., 2003). While researchers have documented how children as young as six may engage in language brokering, our explicit focus on online searching and brokering required a slightly older age group who would be more likely to engage digital tools and navigate online resources.
3. We welcomed grandparents as they were identified, by themselves or the family as collaborators in the process of search and brokering.
4. This research was conducted during the 2016 U.S. presidential election during which Latino-specific anti-immigrant rhetoric was particularly salient and families were understandably hesitant to divulge private information.
5. During the recruitment process, the parents in these four families reported engaging in collaborative online searches with their children. However, during V1 interviews they expressed having confidence to search online on their own and did not describe much brokering or co-searching. The only generalizable pattern among these four families was that at least one parent in each family described having higher digital literacy.
6. Quote translated from Spanish.
7. Quote translated from Spanish: “Para [mis hijas] es muy fácil. Yo para mí me tardaría.. todo el día para buscar una información. Pero [para] ellas: ‘Mira, mami, nomás se le pucha esto y lo buscas aquí y ya te van a decir qué son los síntomas’. O qué es lo que puede ser. Dependemos de ellas. Ahora sí que es codependencia.”
8. Quote translated from Spanish: “Me gustaría yo [buscarlo].. En veces hay cosas más fuertes que no tienen que saber ellos o no tendrían que informarse de eso.”
9. Quote translated from Spanish: “Te dan varias opciones [y] le pones y te da otra y luego te va a dar otra cosa. Pero a veces salen muchas cosas que no debes de ver.”

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