“I felt like I was doing grown-up things”: Young Adult Reflections on their Childhood Experiences of Online Searching and Brokering in Immigrant Families

ANH LE, University of Washington, USA
MICHELLE MA, University of Washington, USA
LINH BUI, University of Washington, USA
ANNA SHI, University of Washington, USA
LINH PHAM, University of Washington, USA
CARMEN GONZALEZ, University of Washington, USA
JASON C. YIP, University of Washington, USA

Online search and brokering (OSB) is the phenomenon in which youth search for information for their immigrant families on the Internet. Few studies exist on reflecting on the past as youth conduct OSB from childhood to adolescence to young adulthood. We conducted a retrospective study using semi-structured interviews of 27 young adults (ages 19 - 24) to examine their experience and perceptions of OSB over time (primary schooling, secondary schooling, undergraduate). We found that although all the interviewees shared a common experience of being an online searcher and information broker for their immigrant families, their stories exist on various dimensions which are constantly shifting and changing over time, as ecological factors influence searching behaviors. We discuss how the results from our study can serve as future references for researchers doing work in search research and designers who are currently working on improving design tools for searching.

CCS Concepts: • **Human-centered computing → Collaborative and social computing**; *Empirical studies in collaborative and social computing*

Additional Key Words and Phrases: Online search and brokering, youth, families and children, collaborative search, immigrant and refugee families, bilingual search

ACM Reference format:
Anh Le, Michelle Ma, Linh Bui, Anna Shi, Linh Pham, Carmen Gonzalez, Jason C. Yip. 2024 “I felt like I was doing grown-up things”: Young Adult Reflections on their Childhood Experiences of Online Searching and Brokering in Immigrant Families. Proc. ACM Hum.-Comput. Interact., 8, CSCW1, Article 68 (April 2024), 27 pages. https://doi.org/10.1145/3637345.

1 INTRODUCTION

With the Internet growth and technology advances from 1990 - 2000s, our society has entered a digital era where information we need to function daily exists online.

2573-0142/2023/4 - 68
https://doi.org/10.1145/3637345

However, some challenges have become more prominent in a digitized society. In the USA, newly immigrated families from the Global South continue to settle and bring with them different cultural perspectives, expectations, lived experiences, and languages. As new multilingual immigrants, they need a variety of information to establish their new lives. Due to the language and cultural barriers, the burden of finding information often falls on the children of immigrant and refugee families [38,64,65,83–85]. *Online search and brokering* (OSB), a term coined by Pina et al. [64], is a testament to the complex family work that children of first-generation immigrants engage in. Not only are youth searching for information online at a young age, but they must also broker this information to their families through language translations and cultural explanations.

As online searching has become an essential part of life, it is important to learn more about the experiences of those who engage in OSB work for their families. For instance, in the early 2010s, HCI and library and information science (LIS) studies examined the searching roles of children [70] and adolescents [71]. Foss et al. [35,36] and other LIS scholars [4,5] generally focused on mainstream USA families that were not recent immigrants. In 2016, Yip et al. [84] started the first OSB studies with children of immigrant families. However, there are still knowledge gaps about how youth conducted OSB with their immigrant families during the early days of broadband Internet adoption (later 2000 to 2010s) to the transition of mobile searching in the early to mid 2010s. By examining the past and present, we can better understand design implications for future technologies and processes that shape online information search.

We ask the following research questions:

RQ1. What are the perceptions and experiences of young adults who reflect on their time conducting OSB from primary, secondary, and undergraduate schooling for their immigrant families?

RQ2. How did the online searching and brokering process change as family dynamics transitioned (e.g., new technologies in the home, new information problems) during their primary, secondary, and undergraduate schooling?

We conducted retrospective interviews with 27 young adults (ages 19 – 24). These young adults reported having conducted OSB with their immigrant families during childhood, adolescence, and presently. Our interview protocol focused on their OSB experiences from primary-to-secondary years (2006 – 2011), secondary-to-college years (2011 – 2020), and college-to-young adulthood years (2017 – 2022).

We hope to provide a better picture into the experiences of being an immigrant in the U.S. navigating various information resources while managing cultural and languages barriers. Earlier technology studies in 2006 (the time of mass broadband adoption by U.S households) were generally focused on the digital practices of non-immigrant youths [35,36]. However, by only focusing on mainstream samples of youth (e.g., White, Educated, Industrialized, Rich, and Democratic – WEIRD), such research largely ignores the online searching experiences of youth and families from historically marginalized groups. Through retrospective interviews of youth in immigrant families, the current study broadens insights on how youth were searching for information from the mid 2000s to the early 2020s. By getting a detailed glimpse into the searching process from the retrospective view, it can help inform future technology studies. Through this broadening, this study makes three important contributions. 1) Empirically, our study's findings show that while there is a common experience of OSB among young adults in immigrant families,

various temporal dimensions impact the nature of this family work. 2) Theoretically, this study contributes deeper insights into how children conduct OSB work and how their work is influenced by internal and external forces. 3) Finally, through critical reflection, this work offers important considerations for designers and researchers who are invested in understanding and improving information access [71].

2 RELATED WORK

Below we provide a summary of the current research landscape of youth online information searching. First, we go through the general literature on youth and information searching. We demonstrate that youth searching literature tends to focus on snapshots, rather than reflections that emphasize growth and longitudinal change over time in searching behavior. Second, we examine the literature on technology development in online searching for youth. We show that for historically marginalized youth, the digital divide in hardware access and broadband access is changing. While technology adoption and digital literacy is indeed growing among youth, inequitable access to online information persists, especially during times of crisis such as the COVID-19 pandemic. Finally, we examine the specific phenomenon of OSB with youth. Language brokering has been examined for decades (e.g., interpretation and translation in medical, legal, and other contexts). OSB has only been examined since 2016, with limited research on longitudinal practices that may evolve over time.

2.1 Youth and Information Online Searching

Prior research in LIS has examined how children and youth search for information online [44]. Children (ages 7 - 11) can perform complex Internet searches requiring a multi-step process of searching for the information [35]. In the Information Problem-Solving for the Internet (IPS-I) model, Brand-Gruwel et al. [19] demonstrated the processes and skill sets needed for individual youth to search efficiently online. Agosto and Hughes-Hassell developed a theoretical model of developmental roles of 27 urban teens and how roles of daily information seeking for social-self, emotional-self, reflective-self, physical-self, creative-self, cognitive-self, and sexual-self come together [5].

While online searching may seem as a solitary task [10], research demonstrated that youth do rely on collaborative searching [60] as a way for support. Foss et al. [36] showed that children and adolescents do not search alone but they often have "influencers" who provide guidance to them while searching, which were mostly mothers of the searchers. Youth online searchers also fall into different types of search roles (e.g., developing searcher, power searcher, social searcher) and they mature over time as their searching needs change [35,36]. When examining the searching roles of adults inside the home, children play a role in helping adults search due to their own expertise and showed that youth searchers also learn how to search by watching older family members [1]. More recently, Yip et al. [85] and Roldan et al. [65] provided a better view of how youth and their family members collaborate with each other to search for information. Youth rely on their funds of knowledge while leveraging their language and searching skills to work with their parents and siblings on important online search tasks for their households [65,85].

When searching online, adolescents are performing tasks simultaneously: they are applying their searching skills, interpretating and evaluating sources of information [20]. Youth online information seekers can learn how to search in school settings, however, searching skills for information outside of the classroom setting is a self-actualization process [40]. Youth's perception of search engines can be seen as an authority and fact-finding instrument in relations to school assignments [9]. Further insights into the complexity of search topics of children and teenagers are understood through the type of information children and teenagers are seeking online, including information on mental health resources on how to cope with anxiety and depression [21].

While extensive research has been accomplished in youth and information searching, we argue there needs to be a better understanding of how youth information searchers change over time due to their natural progression of growing older and maturing. For instance, Torres and Weber note in their log analysis of online searching found that youth ages 16 – 18 had search behaviors more like children ages 8 – 9, than that of young adults ages 19 – 25 [33]. They speculate this sudden jump may be attributed to more work and adult responsibilities, but their study is a single limited snapshot. Most extant research offers a single snapshot in time rather than a fuller longitudinal picture of how youth online searchers change over the course of their major developing years [62]. Our study attempts to provide multiple temporal snapshots throughout time through retrospective reflection. We intentionally focus on the longitudinal search practices of lower-SES first-generation immigrant youth to bring their voices into contemporary research on technology engagement.

2.2 Technology for Youth's Online Information Seeking

Research conducted in the later 2010s and early 2020s on technology and online searching in youth demonstrated some shifts in how youth perceive online searching technologies. Agosto et al. [5] found that teens in an urban setting thought of public schools and libraries as outdated institutions that did not fit with their technology-focused home lives. With 95% of children in the USA having some access to the Internet by age 11 (in 2010), youth are constantly searching for information online, but with different perspectives [23]. In a qualitative study by Andersson [9] on the role of Google in everyday online searching for Swedish teenagers (ages 15 - 16), the study found that teens perceived Google in three framings: fact finding, neutral infrastructure, and authority [9]. In school contexts, Google is seen as fact finding, while the infrastructure framing occurs when youth search for information in their free time. Google as an authority frame is shown in both school and free time, demonstrating youth trust in the search engine [9].

Nowadays, youth are searching for online information with affordable mobile technologies [18,77]. Portability allows youth to differentiate their search behaviors among a choice of devices, mobile searching allows for "quick dips" into information with apps to satiate everyday needs [18]. Youth, while still using mostly Google, tend to now seek out information within in-app searching as a targeted approach to information seeking [16]. Youth also use social media platforms (e.g., Facebook, YouTube) as sources of online information [1].

Technology for searching is not always optimized for youth. Adolescent searchers reported frustrations with the abundance of information on the Internet and how poorly organized it can be [4,6]. The abundance of online information poses another challenge for young online

searchers' interaction with search engines: many do not fully grasp how search results are ranked [16]. Some adolescent searchers have a difficult time deciphering the quality of information they search for online [57]. Through these studies, we know that various online search tools are not youth friendly. Furthermore, filtering through information on the Internet is a complex skill that many children have not yet developed in their young age [15].

Overall, in a reflection of youth online information research in the past 20 years, Agosto emphasized the need for work in understanding youth perspectives, especially for youth of different racial, gender, and socioeconomic (SES) backgrounds and in different settings beyond school [7]. Although the area of technology and youth online information seeking has expanded our knowledge over the years, we know little about the experiences of immigrant youths with technologies, especially as search technologies have vastly changed since 2006. Despite the mass adoption of broadband and advanced computing technologies from 2006 to present time, many lower-SES and immigrant youths continue to experience digital barriers [12]. Barriers include inequitable digital access and literacy exacerbated by a language barriers for those who are English Language Learners (ELL) [48]. Important to note is how the COVID-19 pandemic revealed how poor the U.S. broadband infrastructure is for youth in lower-SES families [22]. Our study addresses Agosto's [7] critiques by focusing on lower-SES college undergraduates from immigrant ELL families. We ask them to reflect on their past OSB work with and for their immigrant multilingual families to better understand their role in mediating access to technology and information across various personal and digital transitions.

2.3 Immigrant Children and Brokering

The experiences of immigrant children's brokering are a well-researched area, specifically around language and technology brokering [11,13,38,55,64,65,73,84,85]. Studies in the early 2010s focused on the nuanced experience of brokering information, language, culture and society and technology, demonstrating that children broker on a wide spectrum [11,14,29,30,38,73]. Earlier studies have shown that immigrant children take on the brokering role for their family due to their fast acculturation to a new society and language [13,65,83,85]. Youths who have acted as language brokers for their parents may experience a wide range of emotional association with their experience ranging from associated negative emotions such as "responsibility" compared to positive emotions such as "privilege" [11]. Language brokering has shown to be stressful on children [73]. The family stressors are contextual to the broker's environment and family situation [52]. Some stressors during the process of brokering are due to the complex dynamics of immigrant children having to perform their duties within exclusionary societies [30]. Other stressors involve the complexity of brokered adult topics [14,29].

Studies have shown that children from immigrant families play an important role as broker of digital technologies for their parents. Immigrant adolescents help their family members adopt technologies in order to maintain a line of communications with their family members residing in other parts of the world [13,47,81]. Children work alongside their immigrant families to search for important information relating to education, health, laws, and common everyday needs such as navigation, online purchases, and store hours [64,65,84,85]. Familism is a useful lens through

which we can examine motivations behind OSB practices. The concept of familism posits that youth act in service of family needs based on honor, obedience, trust, and loyalty [72]. OSB reflects this concept of familism when youth help older family members access technology and information as a sign of respect [65,66,84]. Similarly, Pina et al. [64] conceptualized "online search and brokering" (OSB) to illustrate the intertwined process between language translation and online searching as influenced in an ecological system. Under the ecological system of OSB, at the family level, youths and their parents collaborate closely with each other using their respective knowledge to solve crucial information problems [64].

Research extends the knowledge on brokering by applying an online searching lens on youth who bridge the information gap for their immigrant families [47,64,84]. We now better understand how youths engage in OSB work for their family, the positive and negative effects of OSB, and relational dynamic between the parents and child broker. While we know more about present day OSB from 2016 to 2022, little is known about intricacies of OSB from 2005 to 2016, an era when families in the USA adopted broadband Internet and transitioned to mobile technologies. For instance, we know that youth in immigrant families had a difficult time with COVID-19 from 2020 – 2022, such as mental health, access to healthcare, and anti-immigration sentiments [34,87]. However, we have little understanding of the OSB phenomenon during COVID-19 as youth transitioned to young adulthood. We aim to understand how these technological changes and other contextual factors changed the way youth conduct OSB to help their parents.

3 METHODS

3.1 Positionality Statement

In the spirit of transparency and reflexivity [2] we acknowledge our standpoint and position as educated Global South researchers. All the researchers in this study are children of immigrant families from the Global South (i.e., Latin America, Asia) living in the USA. Each author of this study grew up as a child language and information broker. The first author is a first-generation immigrant and college student who started online information seeking at a young age and continuing in the present time. The middle authors are undergraduates who reflect the identities of the participants of this study and a graduate international student from the Global South who does translation work. The last two authors grew up as youth language translators during the early 1990s, before home Internet was adopted in the mainstream. Our positionality as co-authors is reflective of our commitment to highlight strengths and build capacity within marginalized immigrant communities in the USA and beyond. Collectively, we are researchers who are racialized minorities in the USA (Asian, Latin American), and first-generation college students. Our experiences holding these identities as brokers within our own immigrant families informs our research lens and analytical approach.

3.2 Study Design

Our study design consists of a single semi-structured interview of young adults who reported conducting OSB work as children from the years 2006 – early 2020s. Our qualitative research study consisted of 27 online interviews using Zoom video chat (www.zoom.us) with young adults (ages 19 – 24, mean = 20.8, SD = 1.76) mostly around the Pacific Northwest, USA from April 2021

to March 2022. Participants had the option to turn on their video camera. All study materials and procedures were approved by the University of Washington's Human Subjects Division. We chose to do a retrospective interview with the young adults because we wanted to understand their perceptions of change over time from 2006 - 2020. Prior research from 2006 – 2020 on youth online searching does not generally oversample and include historically marginalized Global South populations [4,5,6,7,35,36]. Therefore, our study design focused on reflections from this group pertaining to how they supported their lower-SES immigrant ELL families through OSB.

Our interview protocol consisted of five major sections where the primary interviewers asked questions regarding when interviewees learned about searching on the internet, the early days of OSB, technology change and adoption overtime, and family dynamics. The interviews concluded with inquiries about OSB in the present day. Each interview averaged 1.5 hours and had five essential components:

- General questions about demographics, current state of living, and family;
- Participants' reflections on their early days (primary and secondary schooling) of searching online (for themselves and for their families);
- Questions focused on adolescent years of searching online and searching technologies;
- Questions on present day OSB, including searching for COVID-19 information from 2020 – 2022; and
- Conclusion questions on their overall OSB experience and thoughts about the future of OSB for youths who are currently doing OSB work for their parents.

During the Zoom virtual interviews, we asked participants for their verbal consent to record the interview. If the participant agreed, the recording began. The lead interviewer informed all participants of the procedure to store the video recording on a private server hosted by the research team's university. Participants were informed of the privacy measures that would be taken to protect the video recording and their identity. Participation in the study was completely voluntary and participants had the option to stop the interview at any time. Participants received a $75 gift card as compensation for completing the interview. Interview teams included two team members, with one member being the lead interviewer, and the second member taking notes and asking follow-up and clarifying questions. Two interviews (P7, P24) lasted significantly longer than the 1.5 hours, which meant we conducted a second interview as a follow up.

3.3 Selection Criteria and Data Collection

The participants of this study fit the following eligibility criteria: (1) the participant and/or their immediate family are immigrants to the USA from countries in the Global South [79]; (2) the participant identified themselves as having prior experience searching for online information for their family; and (3) the participant and / or their siblings are the first in their family to attend higher education in the USA. Table 1 shows a summary for our participants and demographics. This study uses a purposive sample [77]; the 27 study participants were selected for their capacity to inform the phenomenon of investigation (OSB over time). Compared to a probabilistic sampling, which is more aligned to quantitative research and generalizability, our sampling

methods prioritize information rich cases [63]. Therefore, our goals are guided by Lincoln and Guba's sample size and analysis recommendations of information redundancy [56], that is, sampling is terminated when information from participants repeats itself.

We chose the age range of 19 – 24 because that is the age in which the participant as a child would have had possible access to the Internet in the home or school at around age 7 (year 2005 had broadband penetration in USA homes) [41]. We selected young adults because we wanted to engage with a group of participants that could retrospectively reflect on their past selves as youth searchers. Children and adolescents can lack the maturity and language skills to authentically express themselves [8]. We specifically chose current or graduated undergraduates because of the process of how their families chose higher education as part of their information seeking needs (see Limitations and Future Work). For instance, lower-SES college young adults would have searched on complicated critical family topics, such as higher education (e.g., college applications) and finances (e.g., student loans, financial aid) as child brokers. College students who act as brokers for their families would also have to juggle family responsibilities and balance school and home expectations. Finally, we chose immigrant participants from the Global South. The Global South "references an entire history of colonialism, neo-imperialism, and differential economic and social change through which large inequalities in living standards, life expectancy, and access to resources are maintained" [27]. This disparity in political power, language, and economics give rise to the conditions in which our youth participants would be engaging in OSB in the USA. Overall, we conducted 29 interviews. However, we found later two interviews (P16 and P22) did not fit study's eligibility criteria. Both ineligible participants' families still lived in the home countries and the OSB took place in the home country, rather than the USA. Therefore, we decided to only focus on the 27 participants that fit our criteria.

For our recruitment strategy, we began by working with a campus association that centered around supporting college access and educational equity for high school students in accessing resources and opportunities to become first-generation higher education attendees. We also worked with Global South cultural groups in the Pacific Northwest (Asian, Latin American, African, Latinx groups) to advertise the study. Finally, we relied on snowball sampling methods from participants who wanted to relay this study to fellow students who would meet the study's participation requirements. We had a total of 54 individuals complete the recruitment questionnaire. Of the 54 individuals, one was not qualified for the study (only spoke English). We contacted 20 potential recruits but they did not follow up, and four chose not to participate in the study. Following the initial contact, the Primary Investigator (PI) of this study scheduled a 15-minute Zoom call with each participant to go over the study. Once the PI and potential participant met and decided that the study was a good fit, the PI scheduled the interview with the participant. After we interviewed 20 participants, the research team felt that saturation had been reached for search and brokering participants who originated from Asia [66]. We needed to shift our recruitment strategies to include additional immigration and OSB stories in our dataset to ensure a diverse range of perspectives. Therefore, the next wave of participant selection focused on participants from countries in Africa, Latin America, and the Middle East. We were able to recruit 7 more participants from these Global South regions and noted that they also repeated similar themes to the first 20 participants. We concluded the study at 27 participants once we did our initial analysis.

Table 1: Demographics of study participants

ID Number	Age	Gender identification	Family ethnic identification	Family order	Non-English languages spoken at home
P1	21	She / They	South Vietnamese	Oldest daughter	Vietnamese
P2	19	He / Him	Guinea, West Africa	Second youngest Son	Mandinka, Susu, Arabic, and French
P3	21	He / Him	Bangladesh	Youngest Son	Bangla
P4	22	She / Her	Hmong	Oldest daughter	Hmong
P5	22	She / Her	Vietnamese	Oldest daughter	Vietnamese
P6	21	She / Her	Chinese	Second oldest daughter	Taishanese, Cantonese
P7	21	She / Her	Filipino	Youngest daughter	Tagalog and Ilonggo
P8	21	She / Her	Mexican	Fourth oldest daughter	Spanish, Mixtec
P9	20	She / Her	Chinese	Oldest daughter	Mandarin
P10	20	She / Her	Chinese	Only daughter	Mandarin, Vietnamese
P11	20	She / Her	Mexican	Middle daughter	Spanish, some Mixtec
P12	21	She / Her	South Vietnamese	Only daughter	Vietnamese
P13	20	She / Her	Indian	Oldest daughter	Hindi
P14	22	She / Her	Chinese	Second oldest daughter	Teochewnese
P15	19	She / Her	Filipino	Youngest daughter	Tagalog
P17	21	She / Her	Chinese	Only daughter	Mandarin
P18	21	He / Him	Mexico	Third oldest son	Spanish
P19	19	She / Her	Indian	Youngest daughter	Tamil
P20	21	She / Her	Chinese Vietnamese	Oldest daughter	Vietnamese with parents, Cantonese with grandparents
P21	19	She / Her	Chinese	Middle daughter	Cantonese
P23	24	She / Her	Ethiopian	Oldest daughter	Amharic, some Tigrinya
P24	20	She / Her	Iraqi	Oldest daughter	Arabic (Iraqi dialect)
P25	24	She / Her	Ethiopian	Oldest daughter	Amharic, Tigrinya
P26	21	He / Him	Vietnamese	Youngest son	Vietnamese
P27	20	She / Her	Palestinian	Youngest daughter	Arabic (Palestinian / Lebanese dialect)
P28	20	She / Her	Iraqi	Oldest daughter	Arabic (Iraqi dialect)
P29	23	She / Her	Eritrean	Youngest daughter	Tigrinya

3.4 Data Analysis

Using Zoom video chat, we recorded all interviews, using both video and audio. The Zoom online platform provided first initial transcription, followed by the team correcting transcription errors. We did edit the transcripts for readability by minimally deleting conversation filler words (e.g., like, ummm, er, ah) and repetitive words (e.g., okay-okay, you know-you know). Next, we employed an inductive approach to coding the transcripts, which took 11 separate meetings with our team. Based on our interview notes and read of the transcripts, we drafted an initial codebook. We met four times to develop this codebook. The initial codebook included code labels on technology usage, affect around searching, support in searching, learning around searching, topics of searching, strategies and processes, challenges, translation issues, values, and identity. Over the course of a month, the research team added to the initial codebook as data surfaced from reviewing the transcripts. Final code book included code labels such as primary year, secondary years, college years, old and new topics, searching resources, family dynamic, and searching on-

the-go. Next, using Delve Tool (www.delvetool.com) we partially coded the data using this initial code and revised the codebook based on three passes of the data.

We followed a consensus model in which two coders (a primary and secondary coder) coded the interviews [59]. The primary coder made the first pass, while the secondary coder indicated if they agreed or disagreed with the codes. In three team meetings, we discussed their discrepancies between the results, and reached a conclusion about the coding. When coding discrepancies could not be resolved, a third coder came in as a tiebreaker. We went through three more rounds of coding and discrepancy checks. After the initial coding, we discussed our results and codes as a team, and refined the codes for clarity and consistency. In our Findings, we present our main themes and representative samples of the coded data that demonstrate contrasting quotes based on dimensions of OSB in families.

In our data analysis, theoretical saturation occurred around 20 participants, when we had at least two participants repeat the same themes. We chose to close the sampling at 27 participants as themes became more repetitive beyond the 20 initial interviews. Marshall et al.'s systematic analysis of 83 information systems qualitative studies found that grounded theory studies typically include between 20 – 30 interviews [58]. For this paper, we provide as many of the numerical counts for the coding. The use of quantifier "some" and "others" for the participants refers to two or more participants.

4 FINDINGS

For interviewees of this study, we found that OSB occurred in three major time frames: primary-to-secondary, secondary-to-college, and college-to-young adult years. Each of the time frames marks significant changes in OSB with three specific dimensions contributing to the interviewees' perception of doing OSB in the past and present for their immigrant parents. We found that interviewees have unique yet overlapping dimensions that shaped their OSB experience throughout the years.

4.1 Primary-to-Secondary

We refer to the primary-to-secondary (approximately 2006 to 2011) time frame as the time when participants first learned how to search online while in elementary and middle school, and when OSB dynamics often emerged. Below we report on the three dimensions that shape the nature of OSB during this early time.

4.1.1 Intensity of OSB Activities

Not all youth participated heavily in OSB during their primary-to-secondary schooling days. Participants mentioned a range of involvement from no OSB work to being the sole person responsible for OSB in their family. When participants started doing OSB the level of intensity depended on multiple factors including their family structure, age, resources such as internet access in the home and other adults who can supplement OSB.

Six participants noted they did not help with OSB during their primary-to-secondary years. For example, P14 explained that during this time, her uncle and older sister assisted with her parents' information needs. Participants also had extended family members that could assist with OSB.

One participant explained an in-between situation of not helping their parents search all the time but searching whenever needed. P26's extended family members, such as an aunt, played a more prominent role in the OSB process because his aunt was more situated in the USA. P26's aunt already knew the language and how to navigate the internet to find information. At the same time, P26 would sporadically supplement at home if his aunt was not available doing more straightforward search tasks, such as ordering items online for their mom.

In contrast, four interviewees reported a high frequency of OSB work for their parents during the primary-to-secondary years. Once interviewees started online searching, their parents would frequently ask them to help with OSB. For P27, her parents asked for help progressively: *"I think once I started doing that (OSB), my mom would ask a lot more often"*. Participants perceived an increase in requests for help with online searches, throughout the transition from their middle to high school years. We found that the participants' perception of why requests from parents grew in frequency was due to the participants' search skills and speed at which they can search online compared to their parents.

The intensity in which interviewees in the study engaged in OSB work contributed to the feeling of being overwhelmed with OSB requests at such a young age. However, not all interviewees felt overwhelmed because their level of engagement differed. Since the interviewees were still in their developing years, they were learning how to use the Internet for information searches. We found a spectrum of interviewees' perceived experience; some reported feeling relaxed about a daunting task, while others perceived their experience as mentally overwhelming due to the high urgency from parents.

For interviewees like P18, OSB was not a very difficult task: *"It was chill, not much pressure just had to, I was just looking up what he needed."* (P18). For others like P27, they called it "medium" priority, knowing that OSB was important, but not a desperate situation yet. However, three interviewees indicated that OSB was overwhelming for them in primary school. Their parents relied heavily on them in their early life. In P24's case, her family's financial situation rested upon her ability to search and pay for bills online:

"When he first opened up his restaurant, he had a lot of stuff he had to search up and I would help him, sometimes, but I never really understood it. I remember he sat me down, okay, you need to learn how to pay bills. I was like, 'bro I'm 13.'" (P24).

4.1.2 Access to Resources

We found that resources played an important part for participants' perception of how they went about learning how to conduct OSB work for their parents at such a young age. Resources included access to reliable and fast internet inside their home and who taught them about searching online for information.

For eight of the interviewees, they had somewhere between having no internet access inside their home or some access to Internet outside their home, which shaped their perception of OSB work during primary-to-secondary years. They accessed the Internet outside at their relative's home, schools, libraries, and community centers. In P29's situation, they did not have home Internet until later in high school. They still performed OSB for their mom in public spaces with

access to wireless Internet. For P29, she did not start OSB until high school, with purchases from Amazon.com for mom.

In contrast, P1's earliest memory of OSB was around fourth grade, but they would have to access the Internet at their friend's home:

"I didn't really need the Internet, and so we didn't have it in my house (before fifth grade) ... I would go to my friend's house to do all my homework, because I didn't have the Internet at home. But all my friends had the Internet and so whenever I needed to look something up either for me or my parents, I have it (the request) in my head whenever you go to their house or whenever I need to go to their house. I'd look it up there." (P1).

For five interviewees, they had Internet access earlier because their parents needed it, or their parents thought Internet would be good for the family. The most common reason for early Internet adoption inside the home (around elementary school years) was for the benefit of the interviewees' schooling needs in the cases of P5 and P19.

In addition to having Internet access, we also asked participants about how they learned to find information online during these early years. The interviewees came up with a range of scenarios of how they learned how to conduct OSB for their families. Interviewees mentioned learning how to search by themselves through trial and error, watching other people in their household use the Internet to search, or through formal channels such as school.

Ten interviewees talked about being independent and not relying on anyone to learn how to search. For P15, she figured out how to search online on her own by watching an older sibling navigate a searching device, *"I just kind of figure things out on my own."* Similarly, P15 perceived being comfortable around computing technologies and did not think she needed help learning how to conduct online searches. P1 expressed a sense of independence and curiosity about the possibilities of learning new information via the Internet, believing themselves to be self-taught in OSB.

While some interviewees claimed independence, four interviewees talked more about how older family members directly taught them how to conduct OSB for their parents. In-home learning typically involved an older sibling, cousin, aunt, or uncle who are much more familiar with online searching and home language. P5 said:

"Sometimes I would have my uncles over and they're only a couple years older than me.... I was just in elementary school he was already starting high school. And he was using the Internet for a lot more things like doing his homework, so I would just watch him and then I would learn from him and then go home and do the same".

Finally, seven of the interviewees talked about how they did learn how to search online through formal channels and external community resources including schools and libraries. Interviewees remembered help and lessons from a teacher and the school's curriculum. This involved learning how to do basic search functions, such as entering keywords in a search engine. P13 stated:

"I think in school, we would have, like during our library time, we would have lessons about ways to search the Internet and stuff...They would talk about if you were an article like keywords and what to like put in the search bar. How to do the different categories of the search on Google and stuff."

In certain instances, interviewees like P7 relied on teachers for translation help in the case when the interviewees needed to translate information their parents.

4.1.3 Family Dynamics and OSB Collaboration

Participants in our study also had family members outside of their immediate family members who depended on them for OSB. In some instances, extended family members relied on our participants to search and broker information related to immigration. P5 reflected on helping their aunt: *"In middle school I did help my aunt with her nationality test. She did pass so I feel like that was very satisfying and by searching for that. What I did was I searched up the test. I helped her translate what it meant. And then I would help her search up YouTube videos because they have YouTube videos that help you practice for them. And I always search up like locations to take the test and then I'll search up how to tell if you pass the test or not."*

When it came to sibling collaboration, not all participants perceived the same dynamic in terms of OSB work split equally among siblings within the household. The amount of OSB work that fell on our participants varied on different levels. In the primary-to-secondary years, siblings played a collaborative role in helping the interviewees with OSB tasks. The sibling order of the interviewees was an indicator of how much assistance they received from a sibling. The interviewees explained that being the oldest meant they took on the burden of the majority of OSB work. Their younger siblings were too immature to understand OSB and conduct online searches reliably. Ten interviewees talked about growing up as the oldest and having to start the OSB responsibility early and by themselves in primary school. P4 said, *"I was the oldest; I do have this responsibility of taking care of my family and my brothers."*

Interviewees also talked about being with their siblings at a young age and working together with them. P8 is a middle child and came from a large family with a few older siblings who helped teach them how to search online. Older siblings often conducted more OSB practices before our interviewees took over in later years. For example, P29's oldest sibling is 12 years older than her. It was not until high school that P29 started doing OSB for her mom, after her oldest sister had established a life outside their home:

"She (sibling) was in college, while I was still in middle school. She just went to (anonymous) University as though she would help my mom with the government applications paperwork medication. You know, mom has a few medical conditions of her own. So as the younger siblings we would take care of the house."

P18's oldest brother was five years older than him and more fluent in Spanish while his older brother in middle school got their first laptop from school, *"My older brother would (help translate). I think my older brother would probably help out more, since he did know more Spanish."* However, as time passed, P18 did become the main searcher in the family and became more depended on by their parents.

4.2 Secondary-to-College

The secondary-to-college phase marked dramatic changes for the interviewees. Interviewees transitioned to high school and started considering college, which meant they became occupied with college admissions related activities. Overall, they became busier with more responsibilities. During 2011-2020, the rise of mobile computing and affordable technologies gave the interviewees a chance to become more independent with computing devices, especially as some had full

ownership and autonomy of their own laptops, smartphones, and tablets. This shift in the meaning of access to resources is a major marker of this temporal period where searching technologies became an important aspect of OSB.

4.2.1 Intensity of OSB Activities

The intensity of OSB activities varied during this time as topics were often carried over from their primary years. Interviewees thought they were still searching for the same topics online as they were in primary schooling. For instance, P14 noted:

"One of the first times my dad approached me to help him was for eBay…He loves thrifting, and he loves going on eBay to look up vintage and things like that. So, he will go to me to help him look up, like type the word. Even to this day I'm still doing that for him." P14 was first approached by his dad for help on how to search for items on eBay during his primary schooling years, but it is still a search task that P14 is still doing during his secondary-to-college years.

However, topics became more complex as the interviewees were growing up and becoming more advanced in their searching ability. For instance, health and financial topics became more pertinent for their families when the interviewees attended secondary schooling grade levels. P28 did extensive online searching for information that will help manage their dad and brother's chronic illnesses. P10's parents asked her to perform new complex topics such as *"taxes"* and *"rental housing"* in high school because they felt that P10 had matured enough to perform the more complex search tasks.

As searching topics may become more complex, so does the possibility that responsibilities are changing for OSB and youth. Majority of interviewees highlighted a range of responsibility changes that occurred from primary school to secondary education. For example, interviewees did not think their multilingual parents needed them to do OSB as much as the interviewees were growing up and being presented with more of their own responsibilities such exams, researching potential colleges, and completing high school. For example, P3 noted his parents prioritized his schoolwork over the parents' need for OSB. In contrast, a few families still relied quite heavily on the interviewees in their secondary-to-college days, to the point at which emotions could run high due to the competing priorities that a typical teenager would face during this time. P12 reflected on a particularly intensive moment with their parents and OSB:

"I would get very heated because I'm like 'hey I have my priorities too. Why can't you (parents) just let me do what I need to do first and then I'll do it for you like literally 10 minutes later.' He (father) was very kind of forceful." Negative emotions including irritation and anger were also mentioned by interviewees like P20 who had homework and exams on their mind but had to balance their OSB duties because their parents needed help.

4.2.2 Access to Resources

As OSB topics ranged in secondary schooling, technology for searching also started to become more diverse, moving from stationary to mobile computing. Interviewees remembered having different options in terms of technology available in the home to conduct OSB.

Eighteen interviewees mainly stayed on their laptops and desktops for OSB tasks. They indicated that online searching for their families was difficult on mobile devices at this time. OSB

topics were better found on desktops and laptops. P24 explained, *"For example, when me and my dad will bank online, sometimes we only use a laptop."*

Around the 2010's, mobile computing became more pervasive and affordable. Many of the families started to mix smartphones and tablets as their primary way of searching [60]. Specifically, the interviewees started using their parents' smartphones as part of convenience.

"If it's like a paper document or something on their phone, I usually, if it's something that I can look up on my own computer, I'll do that. Because I feel a lot more comfortable using my own computer. But if it's like something that can't be pulled up on my own computer then I'll just look at their phone and do it from there." (P5).

"Just laptops (for searching) I would say. And then after we started getting more smartphones we got (Samsung) Galaxies and stuff. If it was something easy that I can search up, I would just (use Samsung Galaxy), where I don't have to attach documents or stuff like that, I would just look it up on my phone." (P23).

As noted in the literature on bottom-up transmission [21,22], youth can be the main influence for how technology gets purchased and upgraded in homes, particularly lower-SES families. In our study, we noted for OSB, it can also be a spectrum, with six interviewees claiming to be the main influencers or parents as the influencers.

Technology upgrades played a big role contributing to OSB for our interviewees. For instance, interviewees worked with their siblings to convince their parents that technology upgrades were necessary. Not all technology upgrades had to do with OSB. Changes occurred out of educational necessity as in a laptop or a fast desktop was needed to complete homework assignments. P1 noted, *"I'm the instigator in terms of getting more technology into my home. And kind of like highlight the benefits of technology for my parents and kind of like advocating."*

In certain instances, parents were the main influence of upgrading OSB technologies. When parents upgraded their own technology, this meant the interviewees also got to upgrade their Internet-based devices. In P28's middle school years, she remembered everyone in the family following the parents' suit by upgrading to all iPhones and iPod Touches. P5 explained that once his family got home broadband, his parents felt like his brother and him needed to succeed in school. P5's parents eventually started to buy more technologies for their children's education. This also allowed for more OSB in families.

"It (the tech situation) changed rapidly after middle school. After middle school each of us had our own laptops in our own rooms, my parents would have a computer in their room. My brother had his own desktop, and I got my own laptop in my room and then we'd have a TV downstairs…If we had to look things up for my parents, we would just do it on their computer all together in their room." (P05).

As technology shifted from stationary to more mobile, and from expensive to more affordable, a range of ownership existed on computing for OSB.

Parents started to own their own devices, in which the interviewees would conduct the OSB on those devices: *"I've been using my dad's phone, since he has most of the information saved on there."* (P28).

However, because technology became more affordable and mobile, 10 interviewees explained that they transitioned from shared stationary to their own mobile devices easing the process of OSB. P5 mainly conducted OSB on her own devices because she felt more familiar with her own device. Although interviewees like P5 preferred to search on their own device, the use of the computing device depends on the OSB task at hand, *"If it's something that I can look up on my own computer I'll do that because I feel a lot more comfortable using my own computer."*

4.2.3 Family Dynamics and OSB Collaboration

Secondary schooling represented a time of transition to young adulthood. Some interviewees were preparing to go to college, move out, or just became busier with more responsibilities and establishing their lives. As such, a range of interactions existed within OSB and sibling dynamics.

Because they knew their time living at home was limited, interviewees began helping their younger siblings start the OSB process:

"I have two younger brothers. They also kind of help my parents in looking for information online if I can't be there. Or if I'm busy. I'm thinking of my (OSB experience) and it might be better now because, my mom also asked my (younger) brothers as well." (P9).

For other interviewees who were the middle-child or younger-child, they would still ask their older adult siblings for help during the secondary-to-college phase. P6 asked their older sister for help as they both tag team an OSB task.

4.3 College-to-Young Adulthood

The college-to-young adulthood years (2020 to 2022) marked a time of further changes for the interviewees. Some of them were preparing to graduate from college, while others were entering the workforce for the first time.

4.3.1 Intensity of OSB Activities

Topics interviewees would search got easier or remained the same as compared to the topics in the earlier phases of life. Others noted that the need for OSB at this time was even greater as they transitioned to young adulthood. Since most of the interviewees have been doing OSB work since elementary school, they expressed an ease with online searching for their parents during this phase. Parents also understood and prioritized education first, so they let the interviewees focus on their college education before burdening them with OSB requests. P17 expressed a shift in ease of searching for their parents because they do less OSB work in college.

On the opposite end, there were interviewees who did not experience the same ease of responsibility during this phase. Ironically, because they do have more experience, their multilingual parents viewed their adult-children now as expert searchers. The parents relied on them even more for OSB work. P24 reflected on the increase of complex search topics as compared to earlier years:

"They (the OSB process) are a lot different because it's like heavier stuff and it's like more mature stuff. I feel like when I was a kid it was mostly like 'oh hey, we need to find this nearest like halal store stuff like that.'"

Parent dependency as a dimension looks at how the interviewees perceive if their parents still rely on them for OSB during the college-to-young adulthood phase.

Parents can remain dependent on their adult children for OSB tasks. In the present day, OSB is made easier through technologies, such as text messaging, group messaging, and video calling. Interviewees maintained connection with their families while away in college through these technology innovations. Parents would often send help requests through text messages, group chats, or video chats. For instance, parents can use tools like FaceTime to directly talk about OSB with the interviewees being away from home in the case of P7. The speed of which the parents' help request is fulfilled, depending on how busy the interviewees are outside of college.

"Yeah, usually my dad, we use the group chat a lot. But sometimes my dad calls me. I don't know where, 'I'm like oh I'm in class right now, coming to see you back in a bit.' And I asked him, 'hey what's wrong, do you need help with anything?' And so it's just mainly like either they call us randomly or they group chat… So just like making sure that we're always on the group chat, making sure that we're responding to either meet their needs." (P10).

At the same time, 10 interviewees moved back home to their parents' home during the COVID-19. Living at home meant some of them thought they performed more OSB work compared to when they were away:

"I think it's gotten worse now that I've moved back home. Think now that they have me at home 24/7 and since I've also graduated from college, even if it's something that they can do it's just a lot easier for them to come to me and just say 'hey how do I do this?' or 'how do I pull that up?', even though they know it." (P25).

In addition, the COVID-19 pandemic presented another information challenge. We found that the OSB work during this time was easy information requests from their parents, *"Other than like drive-through testing and vaccinations, just like death rates or like oh how it's going in Vietnam and other countries."* (P5).

Some COVID-19 topics were less straightforward, such as the interviewees searching and explaining to their parents about the efficacy of masks and/or the side effects of the COVID-19 vaccines. P8 needed to use three languages (English, Spanish, and Mixtec) to search and explain the mask mandate and side effects of the COVID vaccines. For context, Mixtec is an indigenous language in Mexico that has no direct translation into English. P8 could not rely on any online machine translation of Spanish to Mixtec. Therefore, P8 leveraged different OSB strategies to search and explain a complex topic such as vaccine side effects for their parents:

"It's hard for me to understand that COVID, like process of what happened, the shots, all those things. From there to explain to my parents is more hard and then Mixtec. There the vocabulary (of Mixtec) is not big so it's really hard explaining to them…. When it's like a shot and about the side effects… I just have to breakdown what a Spanish word is and they make it into Mixtec. Which is longer, they take longer for me to explain it." (P8).

During the same time of the COVID-19 pandemic, USA political tensions were high. The interviewees had to navigate through difficult political information. Interviewees had the additional duty of fact checking certain online information before brokering the information for their family members:

"My grandparents watch this Vietnamese news channel that's very right leaning. I swear they say things that are not legit. So, then I would look it up and then my mom would be there to like kind of

facilitate. And then we'd all talk about it in Vietnamese, and it'd be like it'd just be very awkward because there's people on the very left and very right in the middle and it's just uncomfortable." (P5).

4.3.2 Access to Resources

Parents became independent searchers during the interviewees' college-to-young adulthood years. Interviewees described parents, having spent years in the USA and experiencing OSB with their children, being able to do online searches independently. Due to the upgrades in computing technologies (e.g., apps, mobility, translation tools, language options in keyboards, video chat, social media, etc.), parents supplement many different tools to help with their quest as independent online searches. For instance, two interviewees mentioned their parents using present day technologies such as voice assistants for help with online searches. Due to language capabilities of VA, interviewees' parents can now verbally ask the voice assistants for help with certain searches in their native language. For P18, assistive technologies can now do both work of searching and language translation, relieving the interviewees from some of the OSB work:

"For the most part I think my mom has gotten the hang of things. She has it in Spanish, so she just searches in Spanish. But she pretty much almost all time she ends up finding what she's needing, my dad too. He talks to Google in Spanish. He has his Siri in Spanish, so I think the technology is just translated automatically for them."

Parents also leveraged popular social media platforms such as Facebook to search for information by reading news feeds and comments. However, interviewees like P3 expressed concerns for mom's exposure to potential misinformation on these platforms. Due to these concerns, even though P3's mom is somewhat self-sufficient using social media for searching needs, P3 wanted to help her navigate information she comes across even though P3 is now busy with their college lives and responsibilities.

4.3.3 Family Dynamics and OSB Collaboration

While our interviewees are transitioning into young adulthood, they noted different ways their parents still relied on them in OSB. We found that some were still doing online searches for their parents, ranging from individual online searches for parents to still working collaboratively with other siblings.

Life transitions such as going to college does not necessarily mean OSB responsibilities transfer automatically to younger siblings. For P28, their parents relied on them for immigration related information search and brokering into the young adult stage, including difficult politically charged topics such as the Muslim ban in the USA. P28 had to understand and interpret the legal side of the Muslim ban for their parents, *"So I found myself doing a lot of searches based off of that and when the immigration or not immigration or yeah like when the Muslim ban happened, I had to like explain that to my parents, it was kind of difficult because I had to explain, like the legal side of it."* Despite having siblings, P28 engaged in OSB for their parents because their parents often came to them for information help related to their immigration status.

Interviewees did more asynchronous searching to help their parents with online searches while they are away at college or outside the home. P19 tried to strike a balance between helping her family and setting boundaries, *"If it's like they asked me, 'oh like search this and tell me what time you can do'. I can do remotely I'll try to do like best I can."* (P19).

Interviewees who have siblings who are still living at home do collaborative searching in a tag-team style with their sibling. P9 would perform one part of the online search, and hand off what she could find for her brothers at home to complete the search for their parents. Due to their busy schedule, OSB work in this dimension can happen during odd hours such as nighttime, when the interviewees are done with their classes and are winding down for the night.

As interviewees reflected in the present time about their past OSB experience, a range of emotions and attitudes came up. Emotions associated with OSB for interviewees shifted over time as they grew older and matured in their OSB role. Although this was not a consistent finding in our sample, emotions, and attitudes about OSB work were different. Fifteen interviewees expressed negative emotions as they reflected on their OSB experience while 13 had nuanced perceptions which changed over time resulting in a positive overall reflection of their OSB experience.

Certain interviewees, like P21, had a perception that remained similar in present day, the same mixed feelings from childhood stayed with them, *"Definitely made me feel good and bad. At the same time. Like, I felt like I was doing grownup things. I was actually helping, being productive. But I also felt like this is probably something a 16-year-old probably doesn't need to know right now"* (P21).

Other interviewee emotions and attitudes shifted over time. P13 reflected on their past feeling associating OSB with negative emotions ("annoyed" and "frustrated"), but the rewarding feeling of helping one's parents and living up to their personal core values triumph over any negative feelings they might have harbored in the past, "I guess like in the beginning, before helping her, I'm like annoyed and frustrated, but then like after I helped her I like the feeling, a positive feeling." (P13).

P28 felt that due to their OSB work for her parents, their childhood years were cut short. She noted feelings of "resentment" towards parents of not being more self-sufficient to conduct online searches for themselves. However, like other interviewees, P28's feelings changed. Her perspectives on parents' reliance versus independence also changed as she grew older and was able to reflect on their childhood.

5 DISCUSSION

Based on the themes and sub-themes findings, we developed our discussion on the temporal dimensions of OSB and the use of reflection in youth information research in the following five parts: 1) Youth's searching roles and choices, 2) Youths' perspectives, 3) Youth's searching on-the-go 4) Youth identity development and 5) Designers and researchers' role in working with youth in this area. These five points highlight the changing nature of youth information searching and brokering especially within the social and cultural context of being first-generation immigrants. The nature of the shift depends on the themes we pointed out in our findings section. Temporal online searching is a complex phenomenon which requires multiple youth dimensions and practical ways to approach this type of research. The author Chimamanda Ngozi Adichie warns of the danger of a single story, that is, relying only on a single representation of a complex social phenomenon is problematic [3]. Similarly, we argue there is no single story about OSB.

While many youth and their families engage in OSB, the reflective stories indicate that they embody different dimensions within their families.

Prior online search literature in HCI and library and information sciences focuses on youth searching within a single period in their lives, such as childhood [35] and adolescence [36]. Similarly, studies on OSB often focus on present cases (e.g. [38,64,65,85]), with less reflection on how youth searchers in immigrant families develop their sociotechnical practices over time. Our reflections in OSB work responds to scholar Denise Agosto's direct call for youth online search studies to innovate and expand on what it means to be a youth online searcher [7].

5.1 Youths Searching Roles and Choices

Our study contributes to the current body of knowledge of youth and information searchers by giving a behind the scenes view into how immigrant youth might have searched starting in 2005 during the mass broadband adoption. In line with Foss et. al. [35,36], we learned that the participants in our study performed various search roles such as visual searchers (e.g., searching with YouTube) and power searchers. We highlight social searching in particular, as it is the role in which youth collaborate and coordinate with others to search online [35,36]. Foss et al. [35,36] found that youth in their studies typically were not social searchers as children ages 6 - 11, but slightly became more social searchers as they developed into adolescents ages 12 - 17.

Our participants would have been around the primary and secondary schooling years at the time of the Foss et al. [35,36] studies in 2012 and 2013. Our findings support Foss et al.'s [36] conceptualization of social searchers, and expands this idea beyond a mainstream sample. Social searchers are identifiable by use of social networks and communication sites for searching [36]. They instigate conversations with other people offline or online about searching. While mainstream populations tend to social search for their own personal interests [4–6,35,36], we found in our study the historically marginalized participants consistently social searching with their siblings or with their parents for family needs. At times, it was necessary to search next to their parents due to the collaborative nature of OSB work. We found that some younger children in the primary years may have higher intensity of OSB and social searching activities than what was reported in Foss et al. [35,36].

However, the level of intensity is not the same for all OSB searchers. The intensity of OSB activities is shaped by various triggers [36] including family dynamics (whether other older adults are available to help parents), sibling order, and home infrastructure. We found that access to resources shifts from primary to secondary years. In the earlier years, it was important for OSB searchers to have access to older family members or older siblings in the household who can teach them OSB roles and practices. Participants in our study are not searching for themselves, which is different from studies in which youth's interests were the primary driver [4–6,35,36]. At a young age, due to the multicultural nature of their upbringing, the OSB participants in our study must search for difficult information, including immigration policies for sponsoring a relative and politically charged immigration topics. As they grow older, access to technology shifted as they often require personal device and reliable internet connection so they can continue with their OSB search role.

Similarly, Foss et al. [35,36] notes the role of power searchers, that is youth who have higher levels of searching skills than searchers in other roles. From the reflections of our participants,

even at a young age they have skills such as shifting through different search results to find the information their parents requested for. This is similar to Torres and Weber, who explain that youth online search maturity behavior may be affected by more exposure to work responsibilities [33]. Finally, Foss et al. [35,36] noted reluctant searchers. We did not observe any participants discuss being reluctant searchers due to them being the main online information searchers for their family. Many participants in our study reflected on the unique family responsibility they have in OSB. However, the participants did comment on times they did not want this OSB responsibility.

In answering our second research question, youth choices and experiences of OSB throughout time depended on multiple factors including access to resources, and the collaboration that occurred within their families. Interviewees' perceptions of their OSB experience were shaped by these three important factors throughout the three major time periods. Our findings helped us understand that the OSB experience for immigrant families can be varied on a spectrum where not one experience is the same. This spectrum also includes the range of devices youth used throughout their temporal phases. The youths in our study strategically picked between different methods and devices depending on the OSB task at hand. Similarly, Agosto [4] found several factors influencing teens' selection of communications medium to use. Youths in our study mostly made decisions on devices based on the needs of the OSB task and ease of use.

Participants expressed that if a task required filling out paperwork, they mostly likely preferred to use a laptop / desktop compared to their phone. Their choice of devices is also influenced by availability of personal devices that belonged exclusively to them. As mobile devices became more accessible during the later 2010s, the participants adopted their own personal devices for specific OSB tasks demonstrating the different choices young searchers made during the times of immense changes in the technology market.

5.2 How Youth Perspectives on OSB can Influence Search Research

Like Agosto [1,2], we argue that youth reflections of the past searching can be a powerful way to examine online searching. Using past reflections, we found that young adults who engaged in OSB as youths had to adjust their practices quickly due to constantly changing factors in their families, contexts, and technologies. Pina et al. [64] observe that youth OSB is influenced from ecosystems, such as individual factors (e.g., language skills, technology fluency), microsystem factors (e.g., families, peers, siblings, neighbors), mesosystem factors (e.g., community centers, libraries, schools), exosystem factors (technology infrastructure, policies), and macrosystem factors (cultural values, familism) [64].

We argue the ecosystem for OSB constantly shifts, resulting in changes in OSB practices. Some of the more obvious shifts were changes in technology infrastructure and access to resources (e.g., new broadband, mobile technologies). Shifts also occurred in the family, as siblings got older and left the home or younger children needed to be trained to do OSB. Immigrant parents needed more or less help as the years progressed. Familism (macrosystem) is a cultural value that emphasizes supportive family relationships and that family be prioritized over self [68,70].

Because ecological factors around OSB are dynamic, OSB is a complex sociotechnical phenomenon that may require a longer duration to study. For some participants, their parents adapted to the USA, developing stronger language proficiency, social capital, and technology fluency and did not need our interviewees in the later years for OSB related tasks. For others, OSB will be a lifelong process with their families. We advocate there is a need for youth search studies towards a longitudinal and developmental perspective (see Limitations and Future Work).

5.3 Collaborative Searching On-the-Go

While search research has transitioned from school-learning [44,67] to youth contexts [9,32,42], collaborative searching practices like OSB are now "on-the-move". Morris discusses the process of collaborative search (co-searching) as an increasingly common type of information-seeking experience [60]. Co-searching has evolved to include technologies beyond traditional search engines (e.g., smartphones, social media, etc.), often as ad-hoc combinations of everyday technologies. In our study, interviewees explained that video chatting, group text messaging, and voice assistants have transformed their OSB process to anytime, anywhere. This is especially salient as our undergraduates compared their prior OSB situations, occurring mostly in homes. Searches with mobile technologies focused primarily on easy-to-do searches [18], while complex searches (e.g., need for PDFs, forms) happened on desktops / laptops.

However, as our interviewees developed into young adults, with new responsibilities, they needed to rely on a mix of different technologies when families needed them. There is opportunity to study youth OSB when not in the home, but on-the-go. Opportunities also exist to examine co-searching with other populations in our society, especially those who are often not thought about in terms of avid searchers, such as older adults who use mobile devices on the move to co-search with their families [78].

5.4 Identity and Online Searching and Brokering

Finally, our findings point to Agosto's need for more authentic online searching studies, particularly as identity along the lines of ethnicity, economic status, and family expectations (i.e., family order/age, gender) intersect [7]. First, because our study focused on multilingual immigrant families from the Global South it is important to consider how language, politics, transnational interactions, and indigenous knowledge influence technology usage. Netto et al.'s [61] work on Global South refugees and technology usage demonstrates that multiple resilience-building strategies exist through smartphone usage when navigating multiple languages [61]. Netto and scholars adapted Bourdieu's [17] work on cultural capital and digital literacy [54] to explore the complex relationships between language, literacy, and digital practices. Our findings support Netto et al.'s work to demonstrate how families from the Global South, over the course of years, need to develop resiliency to navigate issues of cultural capital and OSB. We advocate for studies looking at youth at resilience-building strategies and technologies, not just at a single timeframe, but through multiple time periods and reflections.

Second, our study looked at first-generation college students in the USA who considered themselves as lower-SES. Prior work has shown that children in lower-SES families can have a direct and indirect influence on parental adoption of digital media (e.g., [43,45,49]). Communication scholars call this phenomenon "bottom-up technology transmission", which

occurs often in lower-SES families (e.g., [24,25,46,50,74]). Our study extends the work of communication scholars by noting how OSB plays into parental technology adoption and learning. Our research suggests that while children of immigrant families are influential in technology adoption, OSB practices in the children spill over to their parents. Children who act as brokers for immigrant families and digital contexts are engaging in a socioeconomically situated practice that is attempting to benefit their families' well-being [37,46,75,80]. By looking at this practice through a reflective perspective, we note that one of the possible benefits is that parents are learning how to engage in searching practices over a period of time.

Finally, this study acknowledges the importance of the perception of family expectations. Prior studies in language brokering, cultural brokering, and OSB note that youth work is influenced by age and order of siblings [64,65]. Similarly, family work has also shown to be gendered [26,31], in that women and girls in the family often take on the majority share of chores and responsibilities. We note that there is a dynamic of sibling order / age and gendered-perspectives at play. These perspectives around OSB are intertwined with each other in relation to interviewees' perception of family expectations. These identities and expectations around sibling age and gender are dynamic, intersectional, and murky.

For instance, P6 explained, *"I feel like as a daughter, I see myself supposed to be more supportive of the family. And my brother kind of just gets to do his own thing. But I feel like that's not necessarily gender. It's just also like that big age gap between, like all my sisters (older), and then my brother (younger)."* In this case, P6 acknowledged how gender plays into family expectations, but also noted age and order are influential. In contrast, P28 stated, *"I think that if I was a boy I would not have to do any of the things that I do now (around OSB), and I think also culturally."* P28 highlighted how gender did play a role, specifically how her larger culture played a role in gendered dynamics. The perception of gender and order can differ depending on the interviewee's personal context and does not necessarily fit neatly on one single dimension.

5.5 Inspirations from Critical Reflections with Design Implications

Overall, our study use of reflection paints a picture of OSB, not as the single story, but of dynamic change in advancing technologies, changing global issues (e.g., COVID-19), and shifts in family structures. Critical reflection [71] brings the "unconscious aspects of experience to conscious awareness, thereby making them available for conscious choice." Critical reflection is a particularly useful set of principles as we look to examine OSB perceptions and reflections. Because online searching is a phenomenon youth today grow up with and develop over a lifetime, we advocate for searching research to utilize reflection as part of their research and design methodology.

Designers can use reflection to uncover and alter the limitations of design practice. To uncover the unconscious values and assumptions in OSB, we needed our interviewees to spend time considering their own implicit practices of OSB over time. For example, the development of searching literacy is not just about developing stronger youth searching skills [44,53] or utilizing better technology designs (e.g., translation tools, video chat, etc.). Instead, our study highlights that OSB practice shifts and develops because of entire contextual dynamics changing over time.

As time passed, not only did the interviewees and their families change, but so did the problems that came up, the technologies that developed, the changing responsibilities of the youth, etc.

Researchers should use reflection as it is not a separate activity from action, but it is folded into it as an integral part of experiences. Critical reflection is effective when it can be integrated into direct experiences, actions, identities, and practices. Sengers et al. [71] note we should be considering reflection-in-action [69] not as a standalone activity, but as a holistic experience. Many of the participants expressed gratitude to us, as most of the participants had never reflected on their entire OSB journey. We wonder what opportunities can be present for youth engaged in OSB to reflect on their experiences while in the act of engaging in OSB tasks? Can designers create searching experiences that help people think about how their searching practices have evolved?

6 LIMITATIONS AND FUTURE WORK

This study has several limitations to consider. First, the method of looking retrospectively in the past relies on memories from years ago that might not be always accurate [28]. This study only highlights perceptions of the past, rather than accuracy in recall. Future work can consider longitudinal studies that follow the actual development of youth to adult searchers through data collection of analytics, video recordings, and contextual inquiries. Specifically, looking at both reflection-on-action and reflection-in-action [69] over time could be potentially important.

Second, our interviewees were 27 undergraduates or recent graduates mostly in the Pacific Northwest, USA in an urban university. Our sampling skewed towards more Asian participants from the Pacific Northwest region. We recommend further studies attempt to oversample towards other Global South regions. We also recognize that our sampling is limited, as there are numerous types of colleges and universities from which to sample (e.g., community colleges, two-year associate's programs, small liberal arts colleges). We also recognized the geographic limitations of our recruitment strategy as it we were only able to recruit from our local area. Future studies should consider sampling from nationwide colleges and universities. At the same time, this kind of deeper reflection of OSB over time needs to start somewhere, and our positionality in a university community facilitated a study about the OSB experiences of college students. We recommend that future work can focus on OSB work done by young adults in different life scenarios, such as those who specifically only attended community college and those who decided not to attend college.

Because diaspora is an international phenomenon beyond the USA [2], we also encourage new studies on youth OSB that looks at immigrant youth and OSB development over time in other migration patterns. We would also recommend reflection studies that include more family members (e.g., parents, siblings) that could triangulate the young adults' stories. Finally, this work focuses on theoretical generalizations, not statistical generations [82]. For that reason, our specific numerical counts of the number of participants do not hold statistical generalizability, but instead information richness and depth.

7 CONCLUSION

We conducted retrospective semi-structured individual interviews with young adults who have done OSB work for their parents starting at a young age. Our focus was mainly their perception

through time starting in the early primary education years all the way through their current perception in today's time. We found that OSB work is constantly changing due to external and internal factors existing on different dimensions of the searching experience. Based on the findings, we recommend several reflective strategies for future designers to incorporate in their work.

Past research on OSB have given better insights into how children and their parents conduct online searches at home [64,65,83,85] and the role each person plays in the online search process [35,36]. It is important to understand how people perceived their "invisible work" through their lens by reflecting on the past [85]. New immigrants will continue to settle in the USA today and in the future. Through the lens of OSB, we have a better understanding into intricacies of how people from underserved communities are closing the information gap with technology as a supplement to this quest. We can course correct and are better equipped to solve any unmet needs of people who are dependent on technology to find information needed to run productive lives.

ACKNOWLEDGMENTS

We thank the families and young adults who have shared their lives and personal stories with us. We thank the University of Washington Dream Project for support and help in recruitment. This material is based upon work supported by the National Science Foundation: CAREER under Grant No. 1941679. Any opinions, findings, and conclusions expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Science Foundation.

REFERENCES

[1] Amelia Acker and Leanne Bowler. 2018. Youth Data Literacy: Teen Perspectives on Data Created with Social Media and Mobile Devices. *Hawaii Int. Conf. Syst. Sci. 2018 HICSS-51* (January 2018). Retrieved from https://aisel.aisnet.org/hicss-51/dsm/learning_in_dsm/2

[2] Fiona B. Adamson and Gerasimos Tsourapas. 2020. The Migration State in the Global South: Nationalizing, Developmental, and Neoliberal Models of Migration Management. *Int. Migr. Rev.* 54, 3 (September 2020), 853–882. DOI: https://doi.org/10.1177/0197918319879057

[3] Chimamanda Ngozi Adichie. Chimamanda Ngozi Adichie: The danger of a single story | TED Talk. Retrieved September 12, 2022 from https://www.ted.com/talks/chimamanda_ngozi_adichie_the_danger_of_a_single_story

[4] Denise Agosto. 2002. Bounded rationality and satisficing in young people's Web-based decision making. *Journal of the American Society for Information Science and Technology* (2002). Retrieved from https://onlinelibrary.wiley.com/doi/abs/10.1002/asi.10024

[5] Denise Agosto. 2006. Toward a model of the everyday life information needs of urban teenagers, Part 2: Empirical model. *Journal of the American Society for Information Science and Technology* (2006). Retrieved from https://asistdl.onlinelibrary.wiley.com/doi/abs/10.1002/asi.20452?casa_token=-o7ISHYXmvcAAAAA:2ulkPFY0snxLE1mC26621r5svjxUsXAt7fvqSVoCDENB9I4nwrgFwnNXYZBxl2Y1vp7d5M-sUGlrXIg

[6] Denise E Agosto. 2002. A model of young people's decision-making in using the Web. *Libr. Inf. Sci. Res.* 24, 4 (January 2002), 311–341. DOI: https://doi.org/10.1016/S0740-8188(02)00131-7

[7] Denise E. Agosto. 2018. Thoughts about the past, present and future of research in youth information behaviors and practices. *Inf. Learn. Sci.* 120, 1/2 (November 2018), 108–118. DOI: https://doi.org/10.1108/ILS-09-2018-0096

[8] Paul R. Amato and Gay Ochiltree. 1987. Interviewing Children about Their Families: A Note on Data Quality. *J. Marriage Fam.* 49, 3 (1987), 669–675. DOI: https://doi.org/10.2307/352212
[9] Cecilia Andersson. 2017. "Google is not fun": an investigation of how Swedish teenagers frame online searching. *J. Doc.* 73, 6 (January 2017), 1244–1260. DOI: https://doi.org/10.1108/JD-03-2017-0048
[10] Cecilia Andersson. 2019. Searching and deleting: youth, impression management and online traces of search. *Aslib J. Inf. Manag.* 72, 1 (January 2019), 34–48. DOI: https://doi.org/10.1108/AJIM-05-2019-0129
[11] Marta Arumí and Gema Rubio-Carbonero. 2022. Reflecting on past language brokering experiences: how they affected children's and teenagers' emotions and relationships. *Multilingua* (May 2022). DOI:https://doi.org/10.1515/multi-2021-0152
[12] Sara Atske and Andrew Perrin. Home broadband adoption, computer ownership vary by race, ethnicity in the U.S. *Pew Research Center*. Retrieved June 27, 2023 from https://www.pewresearch.org/short-reads/2021/07/16/home-broadband-adoption-computer-ownership-vary-by-race-ethnicity-in-the-u-s/
[13] Lara Aumann and Peter Titzmann. Technical Brokering of Immigrant Adolescents in Switzerland: A Developmental-Acculturative Perspective | SpringerLink. Retrieved September 12, 2022 from https://link.springer.com/article/10.1007/s10826-021-02165-1
[14] Jennifer R. Banas, James W. Ball, Lisa C. Wallis, and Sarah Gershon. 2017. The Adolescent Health Care Broker—Adolescents Interpreting for Family Members and Themselves in Health Care. *J. Community Health* 42, 4 (August 2017), 739–747. DOI: https://doi.org/10.1007/s10900-016-0312-5
[15] Dania Bilal and Joe Kirby. 2002. Differences and similarities in information seeking: children and adults as Web users. *Inf. Process. Manag.* 38, 5 (September 2002), 649–670. DOI:https://doi.org/10.1016/S0306-4573(01)00057-7
[16] Dania Bilal and Yan Zhang. 2019. Tell Me Exactly What I Need to KNow! Youth's Conceptual Understanding of the Internet and Search Engines. *ICERI2019 Proc.* (2019), 5688–5693. DOI:https://doi.org/10.21125/iceri.2019.1370
[17] Pierre Bourdieu. 1991. *Language and Symbolic Power*. Cambridge: Polity Press.
[18] Leanne Bowler, Heidi Julien, and Leslie Haddon. 2018. Exploring youth information-seeking behaviour and mobile technologies through a secondary analysis of qualitative data. *J. Librariansh. Inf. Sci.* 50, 3 (September 2018), 322–331. DOI:https://doi.org/10.1177/0961000618769967
[19] Saskia Brand-Gruwel, Iwan Wopereis, and Amber Walraven. 2009. A descriptive model of information problem solving while using internet. *Comput. Educ.* 53, 4 (December 2009), 1207–1217. DOI:https://doi.org/10.1016/j.compedu.2009.06.004
[20] David Brazier, Geoff Walton, and Morgan Harvey. 2019. An investigation into Scottish teenagers' information literacy and search skills. Retrieved September 12, 2022 from http://www.informationr.net/ir/24-1/isic2018/isic1819.html
[21] Andrew J. Campbell, Brad F. Ridout, Melina Linden, Brian Collyer, and John Dalgleish. 2018. A Preliminary Understanding of Search Words used by Children, Teenagers and Young Adults in Seeking Information about Depression and Anxiety Online. *J. Technol. Hum. Serv.* 36, 4 (October 2018), 208–221. DOI:https://doi.org/10.1080/15228835.2018.1518186
[22] Alexis Cherewka. 2020. The Digital Divide Hits U.S. Immigrant Households Disproportionately during the COVID-19 Pandemic. *migrationpolicy.org*. Retrieved May 30, 2023 from https://www.migrationpolicy.org/article/digital-divide-hits-us-immigrant-households-during-covid-19
[23] Lynn Schofield Clark. 2012. Risk, Media, and Parenting in a Digital Age. (November 2012). DOI:https://doi.org/10.1093/acprof:oso/9780199899616.003.0001
[24] Teresa Correa. 2014. Bottom-up Technology Transmission Within Families: Exploring How Youths Influence Their Parents' Digital Media Use With Dyadic Data. *J. Commun.* 64, 1 (February 2014), 103–124. DOI:https://doi.org/10.1111/jcom.12067
[25] Teresa Correa. 2015. The Power of Youth: How the Bottom-up Technology Transmission from Children to Parents is Related to Digital (In)equality. *Int. J. Commun.* 9, 0 (April 2015), 24.

[26] Lyn Craig and Abigail Powell. 2018. Shares of Housework Between Mothers, Fathers and Young People: Routine and Non-routine Housework, Doing Housework for Oneself and Others. *Soc. Indic. Res.* 136, 1 (February 2018), 269–281. DOI:https://doi.org/10.1007/s11205-016-1539-3

[27] Nour Dados and Raewyn Connell. 2012. The Global South. *Contexts* 11, 1 (February 2012), 12–13. DOI: https://doi.org/10.1177/1536504212436479

[28] Hasker P. Davis, Scott A. Small, Yaakov Stern, Richard Mayeux, Simeon N. Feldstein, and Frederick R. Keller. 2003. Acquisition, Recall, and Forgetting of Verbal Information in Long-Term Memory by Young, Middle-Aged, and Elderly Individuals. *Cortex* 39, 4 (January 2003), 1063–1091. DOI:https://doi.org/10.1016/S0010-9452(08)70878-5

[29] Vanessa Delgado. 2020. "They Think I'm a Lawyer": Undocumented College Students as Legal Brokers for Their Undocumented Parents. *Law and Policy* 42, 3 (2020), 261–283. DOI:https://doi.org/10.1111/lapo.12152

[30] Vanessa Delgado. 2020. Children of immigrants as "brokers" in an era of exclusion. *Sociology Compass* 14, 10 (2020). DOI:https://doi.org/10.1111/soc4.12832

[31] Lisa Dodson and Jillian Dickert. 2004. Girls' Family Labor in Low-Income Households: A Decade of Qualitative Research. *J. Marriage Fam.* 66, 2 (2004), 318–332. DOI:https://doi.org/10.1111/j.1741-3737.2004.00023.x

[32] Allison Druin, Elizabeth Foss, Hilary Hutchinson, Evan Golub, and Leshell Hatley. 2010. Children's roles using keyword search interfaces at home. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '10), Association for Computing Machinery, New York, NY, USA, 413–422. DOI: https://doi.org/10.1145/1753326.1753388

[33] Sergio Duarte Torres and Ingmar Weber. 2011. What and how children search on the web. In *Proceedings of the 20th ACM international conference on Information and knowledge management* (CIKM '11), Association for Computing Machinery, New York, NY, USA, 393–402. DOI:https://doi.org/10.1145/2063576.2063638

[34] Tarik Endale, Nicole St Jean, and Dina Birman. 2020. COVID-19 and refugee and immigrant youth: A community-based mental health perspective. *Psychol. Trauma Theory Res. Pract. Policy* 12, S1 (August 2020), S225–S227. DOI:https://doi.org/10.1037/tra0000875

[35] Elizabeth Foss, Allison Druin, Robin Brewer, Phillip Lo, Luis Sanchez, and Evan Golub. 2012. Children's search roles at home: Implications for designers, researchers, educators, and parents. *Journal of the American Society for Information Science and Technology* (2012). DOI:https://doi.org/10.1002/asi.21700

[36] Elizabeth Foss, Allison Druin, Jason Yip, Whitney Ford, Evan Golub, and Hilary Hutchinson. 2013. Adolescent search roles. *Journal of the American Society for Information Science and Technology* (2013). DOI:https://doi.org/10.1002/asi.22809

[37] Inmaculada García-Sánchez. 2010. (Re)shaping Practices in Translation: How Moroccan Immigrant Children and Families Navigate Continuity and Change. *MediAzioni J. Interdiscip. Stud. Lang. Cult.* 10, (January 2010), 182–214.

[38] Carmen Gonzalez, Beth Bollinger, Jason Yip, Laura Pina, Wendy Roldan, and Carolina Nieto Ruiz. 2022. Intergenerational Online Health Information Searching and Brokering: Framing Health Literacy as a Family Asset. *Health Commun.* 37, 4 (March 2022), 438–449. DOI:https://doi.org/10.1080/10410236.2020.1847445

[39] Andrew Gary Darwin Holmes. 2020. Researcher Positionality - A Consideration of Its Influence and Place in Qualitative Research - A New Researcher Guide. *Shanlax Int. J. Educ.* 8, 4 (September 2020), 1–10. DOI:https://doi.org/10.34293/education.v8i4.3232

[40] Hannah Hopkins and Gabriela Martinez. 2018. Extracurricular Information Seeking: Adolescents' Informal Information Seeking Practices. (May 2018). DOI: https://doi.org/10.2139/ssrn.3173731

[41] John B. Horrigan. 2006. Part 1. Broadband Adoption in the United States. *Pew Research Center: Internet, Science & Tech.* Retrieved September 12, 2022 from https://www.pewresearch.org/internet/2006/05/28/part-1-broadband-adoption-in-the-united-states/

[42] Mizuko Ito. 2013. *Hanging Out, Messing Around, and Geeking Out: Kids Living and Learning with New Media*. The MIT Press. Retrieved September 13, 2022 from https://library.oapen.org/handle/20.500.12657/26060
[43] Mizuko Ito, Heather A Horst, Matteo Bittanti, danah boyd, Becky Herr Stephenson, Patricia G Lange, C. J. Pascoe, and Laura Robinson. 2009. *Living and Learning with New Media*. Cambridge.
[44] Yasmin Kafai and Marcia J. Bates. 1997. Internet Web-Searching Instruction in the Elementary Classroom: Building a Foundation for Information Literacy. *Sch. Libr. Media Q.* 25, 2 (1997), 103–11.
[45] Vikki S. Katz. 2014. Kids in the Middle: How Children of Immigrants Negotiate Community Interactions for Their Families. Rutgers University Press.
[46] Vikki S. Katz. How Children of Immigrants Use Media to Connect Their Families to the Community: The case of Latinos in South Los Angeles: Journal of Children and Media: Vol 4, No 3. Retrieved September 12, 2022 from https://www.tandfonline.com/doi/abs/10.1080/17482798.2010.486136
[47] Vikki S. Katz and Carmen Gonzalez. 2016. Community Variations in Low-Income Latino Families' Technology Adoption and Integration. *Am. Behav. Sci.* 60, 1 (January 2016), 59–80. DOI:https://doi.org/10.1177/0002764215601712
[48] Vikki S. Katz, Carmen Gonzalez, and Kevin Clark. 2017. Digital Inequality and Developmental Trajectories of Low-income, Immigrant, and Minority Children. *Pediatrics* 140, Suppl 2 (November 2017), S132–S136. DOI:https://doi.org/10.1542/peds.2016-1758R
[49] Tracy L. M. Kennedy. 2008. Networked families: parents and spouses are using the internet and cell phones to create a "new connectedness" that builds on remote connections and shared internet experiences. Pew Internet & American Life Project, Washington, D.C. Retrieved September 12, 2022 from http://pewinternet.org/pdfs/PIP_Networked_Family.pdf
[50] Sara Kiesler, Bozena Zdaniuk, Vicki Lundmark, and Robert Kraut. 2000. Troubles With the Internet: The Dynamics of Help at Home. *Human–Computer Interact.* 15, 4 (December 2000), 323–351. DOI:https://doi.org/10.1207/S15327051HCI1504_2
[51] Jinyoung Kim, Brenna McNally, Leyla Norooz, and Allison Druin. 2017. Internet Search Roles of Adults in their Homes. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (CHI '17), Association for Computing Machinery, New York, NY, USA, 4948–4959. DOI:https://doi.org/10.1145/3025453.3025572
[52] Su Yeong Kim, Yang Hou, Jiaxiu Song, Seth J. Schwartz, Shanting Chen, Minyu Zhang, Krista M. Perreira, and Deborah Parra-Medina. 2018. Profiles of Language Brokering Experiences and Contextual Stressors: Implications for Adolescent Outcomes in Mexican Immigrant Families. *J. Youth Adolesc.* 47, 8 (August 2018), 1629–1648. DOI:https://doi.org/10.1007/s10964-018-0851-4
[53] Judine Ladbrook and Elizabeth Probert. 2011. Information skills and critical literacy: Where are our digikids at with online searching and are their teachers helping? *Australasian Journal of Educational Technology* 27, 1 (2011). DOI:https://doi.org/10.14742/ajet.986
[54] Wan Shun Eva Lam and Doris S. Warriner. 2012. Transnationalism and Literacy: Investigating the Mobility of People, Languages, Texts, and Practices in Contexts of Migration. *Read. Res. Q.* 47, 2 (2012), 191–215. DOI: https://doi.org/10.1002/RRQ.016
[55] Vanja Lazarevic, Marcela Raffaelli, and Angela Wiley. 2014. Language and Non-linguistic Brokering: Diversity of Experiences of Immigrant Young Adults from Eastern Europe on JSTOR. *Journal of Comparative Family Studies* 45, 4 (2014), 517–535. DOI:https://doi.org/10.3138/jcfs.45.4.517
[56] Yvonna Lincoln and Egon Guba. 1985. *Naturalistic Inquiry*. SAGE Publications, Inc.
[57] Mônica Macedo-Rouet, Anna Potocki, Lisa Scharrer, Christine Ros, Marc Stadtler, Ladislao Salmerón, and Jean-François Rouet. 2019. How Good Is This Page? Benefits and Limits of Prompting on Adolescents' Evaluation of Web Information Quality. *Read. Res. Q.* 54, 3 (2019), 299–321. DOI:https://doi.org/10.1002/rrq.241
[58] Bryan Marshall, Peter Cardon, Amit Poddar, and Renee Fontenot. 2013. Does Sample Size Matter in Qualitative Research?: A Review of Qualitative Interviews in is Research. *J. Comput. Inf. Syst.* 54, 1 (September 2013), 11–22. DOI: https://doi.org/10.1080/08874417.2013.11645667

[59] Nora McDonald, Sarita Schoenebeck, and Andrea Forte. 2019. Reliability and Inter-rater Reliability in Qualitative Research: Norms and Guidelines for CSCW and HCI Practice. *Proc. ACM Hum.-Comput. Interact.* 3, CSCW (November 2019), 72:1-72:23. DOI:https://doi.org/10.1145/3359174

[60] Meredith Ringel Morris and Eric Horvitz. 2007. SearchTogether: an interface for collaborative web search. In *Proceedings of the 20th annual ACM symposium on User interface software and technology* (UIST '07), Association for Computing Machinery, New York, NY, USA, 3–12. DOI:https://doi.org/10.1145/1294211.1294215

[61] Gina Netto, Lynne Baillie, Theodoros Georgiou, Lai Wan Teng, Noraida Endut, Katerina Strani, and Bernadette O'Rourke. 2022. Resilience, smartphone use and language among urban refugees in the Global south. *J. Ethn. Migr. Stud.* 48, 3 (February 2022), 542–559. DOI: https://doi.org/10.1080/1369183X.2021.1941818

[62] The internet as an information and economic appliance in the lives of teens and young adults. *Pew Research Center: Internet, Science & Tech*. Retrieved June 27, 2023 from https://www.pewresearch.org/internet/2010/02/03/part-4-the-internet-as-an-information-and-economic-appliance-in-the-lives-of-teens-and-young-adults/

[63] Michael Quinn Patton. 1991. *Qualitative evaluation and research methods*. Retrieved January 13, 2023 from https://onlinelibrary.wiley.com/doi/abs/10.1002/nur.4770140111

[64] Laura R. Pina, Carmen Gonzalez, Carolina Nieto, Wendy Roldan, Edgar Onofre, and Jason C. Yip. 2018. How Latino Children in the U.S. Engage in Collaborative Online Information Problem Solving with their Families. *Proc. ACM Hum.-Comput. Interact.* 2, CSCW (November 2018), 140:1-140:26. DOI: https://doi.org/10.1145/3274409

[65] Wendy Roldan, Paola Vanegas, Laura Pina, Carmen Gonzalez, and Jason Yip. 2019. The Role of Funds of Knowledge in Online Search and Brokering. *International Society of the Learning Sciences* (2019). DOI: https://doi.dx.org/10.22318/cscl2019.160

[66] Terry Rowlands, Neal Waddell, and Bernard McKenna. 2015. Are We There Yet? A Technique to Determine Theoretical Saturation. *Journal of Computer Information Systems* 56, 40–47 (2015). DOI: https://doi.org/10.1080/08874417.2015.11645799

[67] Sophie A Rutter, Paul David Clough, and Elaine G Toms. 2019. How the information use environment influences search activities: A case of English primary schools. *Journal of Documentation* (2019). DOI: https://doi.org/10.1108/JD-07-2018-0111

[68] Fabio Sabogal, Gerardo Marín, Regina Otero-Sabogal, Barbara Vanoss Marín, and Eliseo J. Perez-Stable. 1987. Hispanic Familism and Acculturation: What Changes and What Doesn't? *Hisp. J. Behav. Sci.* 9, 4 (December 1987), 397–412. DOI: https://doi.org/10.1177/07399863870094003

[69] Donald A. Schon. 1991. Educating the Reflective Practitioner: Toward a New Design for Teaching and Learning in the Professions. Jossey-Bass.

[70] Seth J. Schwartz. 2007. The applicability of familism to diverse ethnic groups: a preliminary study. *J. Soc. Psychol.* 147, 2 (April 2007), 101–118. DOI:https://doi.org/10.3200/SOCP.147.2.101-118

[71] Phoebe Sengers, Kirsten Boehner, Shay David, and Joseph "Jofish" Kaye. 2005. Reflective design. In *Proceedings of the 4th decennial conference on Critical computing: between sense and sensibility* (CC '05), Association for Computing Machinery, New York, NY, USA, 49–58. DOI:https://doi.org/10.1145/1094562.1094569

[72] Gabriela L. Stein, Laura M. Gonzalez, Alexandra M. Cupito, Lisa Kiang, and Andrew J. Supple. 2015. The Protective Role of Familism in the Lives of Latino Adolescents. *J. Fam. Issues* 36, 10 (August 2015), 1255–1273. DOI: https://doi.org/10.1177/0192513X13502480

[73] Kim Su Yeong, Wen Wen, Chen Shanting, Yan Jinjin, Zhang Minyu, and Zeiders Katharine. 2022. Mexican-origin youths' language brokering for fathers and mothers: Daily experiences and youths' diurnal cortisol slopes. Retrieved September 12, 2022 from https://srcd.onlinelibrary.wiley.com/doi/10.1111/cdev.13768

[74] Lisa Tripp and Rebecca Herr-Stephenson. 2009. Making Access Meaningful: Latino Young People Using Digital Media at Home and at School | Journal of Computer-Mediated Communication |

Oxford Academic. Retrieved September 12, 2022 from https://academic.oup.com/jcmc/article/14/4/1190/4583583
[75] Angela Valenzuela. 1999. *Subtractive Schooling*. Retrieved September 12, 2022 from https://sunypress.edu/Books/S/Subtractive-Schooling
[76] Mariek M. P. Vanden Abeele. 2016. Mobile youth culture: A conceptual development. *Mob. Media Commun.* 4, 1 (January 2016), 85–101. DOI:https://doi.org/10.1177/2050157915601455
[77] Konstantina Vasileiou, Julie Barnett, Susan Thorpe, and Terry Young. 2018. Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. *BMC Med. Res. Methodol.* 18, 1 (November 2018), 148. DOI:https://doi.org/10.1186/s12874-018-0594-7
[78] Winter Wei, Cosmin Munteanu, and Martin Halvey. 2022. Partners in life and online search: Investigating older couples' collaborative information seeking. In *ACM SIGIR Conference on Human Information Interaction and Retrieval* (CHIIR '22), Association for Computing Machinery, New York, NY, USA, 47–55. DOI: https://doi.org/10.1145/3498366.3505820
[79] Terrence G. Wiley. 2021. Outside in: The Relevance of Epistemologies of the Global South for North America and the United States Amidst the Immigration Debate. In *A Sociolinguistics of the South*. Routledge.
[80] Janelle Wong and Vivian Tseng. 2008. Political Socialisation in Immigrant Families: Challenging Top-Down Parental Socialisation Models. *J. Ethn. Migr. Stud.* 34, 1 (January 2008), 151–168. DOI: https://doi.org/10.1080/13691830701708742
[81] Shane Worrell. 2021. From Language Brokering to Digital Brokering: Refugee Settlement in a Smartphone Age. *Social Media + Society* (2021). DOI: https://doi.org/10.1177/20563051211012
[82] Robert K. Yin. 2013. Validity and generalization in future case study evaluations. *Evaluation* 19, 3 (July 2013), 321–332. DOI:https://doi.org/10.1177/1356389013497081
[83] Jason C. Yip, Carmen Gonzalez, and Vikki Katz. 2017. Children of Immigrants' Experiences in Online Information Brokering. In *Children and Families in the Digital Age*. Routledge.
[84] Jason C. Yip, Carmen Gonzalez, and Vikki Katz. 2016. The Learning Experiences of Youth Online Information Brokers. *International Society of Learning Sciences* (2016). DOI:https://dx.doi.org/10.22318/icls2016.48
[85] Jason C. Yip, Wendy Roldan, Carmen Gonzalez, Laura R. Pina, Maria Ruiz, and Paola Vanegas. 2022. Youth invisible work: the sociocultural and collaborative processes of online search and brokering between adolescents and English-language learning families. *Inf. Learn. Sci.* 123, 7/8 (January 2022), 330–350. DOI: https://doi.org/10.1108/ILS-01-2022-0004
[86] Digital and Economic Divides Put U.S. Children at Greater Educational Risk During the COVID-19 Pandemic. *PRB*. Retrieved June 27, 2023 from https://www.prb.org/resources/economic-and-digital-divide/

Received January 2023; revised July 2023; accepted November 2023.