Income, Race, and Class: Exploring Socioeconomic Differences in Family Technology Use

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ABSTRACT
Minorities are the fastest growing demographic in the U.S. and the poverty level in the U.S. is the highest it has been in 50 years. We interviewed middle to upper class, suburban, white American parents and low-income, urban, African-American parents to understand how each group incorporates technology into their lives. Participants had teens in their homes and devices like computers and cell phones played a powerful and preeminent role in family life. Our results show that socioeconomic differences both reflect and reinforce technology use at home. Specifically, low socioeconomic status families share devices more often and low socioeconomic status teens have more responsibility and independence in their technology use. We argue that that as low socioeconomic status families become the majority demographic, the CHI community needs to better understand how to design for these groups.

Author Keywords
Parents; teens; families; social computing; African American; race; income; class; socioeconomic status.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
Demographers have long predicted that a dramatic shift would take place in the racial makeup of the population in the United States. This prediction came to fruition in early 2011. Data from the 2010 Census Bureau revealed that fewer than half of current three year-olds in the U.S. are Caucasian and more than half of them are races other than Caucasian [9]. As they grow up, this generation of non-Caucasian races will be over 50% minority. In other words, the rising new racial makeup is and will continue to be a *minority majority*.

At the same time, economic inequality is increasing in the U.S. The income gap between the richest and poorest Americans is the largest it has been since household income was first tracked in the 1960s [37]. In 2011, 15% of Americans and 22% of American children live below the poverty line [37]. In past decades, economically less advantaged individuals were arguably less relevant for HCI because computers were predominantly used only by the wealthy. Today, this has changed. Among families making under $30,000 per year, 59% have computers at home and 75% have mobile phones [29]. Taken together, these two trends mean that the typical HCI user is less and less likely to be white and middle class. These changes present an opportunity and challenge to the HCI community. To confront this emerging design space, HCI research will need to broaden its vision of the normative user.

We take a preliminary step towards this broad agenda through a qualitative study of how parents manage their teens' technology use. This provides a context through which to examine rules, priorities, and values that are deemed important by the family. Parent-teen relationships around technology use have been the focus of our research for a while and in this study, we wanted to use this familiar context to explore new territory around socioeconomic issues and technology use. We conducted interviews with 16 middle to upper class, white parents and 18 low-income, African American parents to explore how social structures bear on technology adoption. Prior research shows that low-income, African American populations tend to have different family structures and technology purchasing patterns; yet, little is known about how these differences impact technology use. The questions we ask are: does technology access and use differ across these two populations, and, to what extent are these differences pushed to the forefront by socioeconomic conditions?

As might be expected, we find that parents from both groups share many of the challenges in monitoring and managing their kids' use of technology. It is well-known that parents struggle with how much their teens use cell phones and the Internet, and with appropriateness of both teen behavior and the content they access [39] (see [23] for a detailed review of parenting concerns). However, we also find some novel, and perhaps surprising, relationships between socioeconomic status and sharing of devices, responsibility, and family structure. The results speak to themes that are too large to fully debate and theorize here. The goal of this paper is to contribute empirical data on the

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nature of the issues. This work brings two contributions to HCI. First, we show how technology uses relate to socioeconomic differences among two social groups. Second, we make a broader argument for moving the minority majority towards the center of the design process in future research.

RELATED WORK

To orient readers around this work, we first draw on research from Family Studies, Sociology, and large surveys to describe family structure and technology purchasing and adoption patterns. We then describe how our work builds on prior HCI studies of race and income as they relate to technology use.

Differences in technology use exist among different families and cultures. This section briefly highlights comparisons of technology ownership and use based on indicators of socioeconomic status, including race, income, and neighborhood. In this work, African American is defined as it is in the U.S. Census, as a person having origins in the black racial groups of Africa, and includes people who indicate their race as "Black or African American." This is a binary classification that doesn't take into account social and economic criteria that might affect the extent to which one identifies with this category. Similarly, White or Caucasian refers to people who identify as "White" on the U.S. Census and thus as having origins in Europe, the Middle East, or North Africa. Some participants identified as more than one race—White plus another race. No participants identified as mixed race of White and Black.

Like Ames et al. [1], we examine differences based on socioeconomic status (SES). SES relates to *class*, or *social class*, and is a function of many individual properties including income, education, employment, race, neighborhood, and lifestyle. Ames et al. argue that socioeconomic status and class are important but overlooked aspects in HCI research. Factors like race and income are at the heart of sociology and anthropology research but are often at the margins or even invisible in HCI.

Technology Purchasing and Adoption

Whites own desktop computers more than African Americans do and they go online using a computer more often. They also have Internet access and broadband Internet at higher rates than African Americans [15,30,31]. On the other hand, African Americans use mobile phones more often than Whites do, including for Internet use, to play games, and to use social networking sites [3,25,28,31,32] They also spend more time playing video games than Whites do, and spend more discretionary income on videogame hardware and software.

In terms of income, high-income families (>75k) own and use more technology than low-income families (<75k). Specifically, high-income families are more likely to use the Internet on any given day and to own multiple Internet-enabled devices. They also own more desktop and laptop computers as well as game consoles than low-income families [16]. Finally, patterns of use differ among urban, suburban, and rural Internet users. Urban users have three times as many friends on social networking sites as rural users [11] and they own smartphones at twice the rate of rural users [33]. Urban residents are more likely than suburban residents to use their mobile phones to play games, use social networking sites, or watch a video [34].

In general, African-Americans are the most active users of the mobile Internet and their use of it is growing the fastest [15]. Their heavy use of mobile devices offsets lower levels of access through traditional devices like desktop computers, laptops, and home-broadband connections [15]. African Americans spend more of their discretionary income on computers, cell phones, and other electronics than any other racial group. They remain somewhat less likely than whites to go online but the gap has decreased over the past 10 years [30,31].

Related Work in HCI

Recent work in HCI has increasingly focused on race and income in technology design and use. Research that has examined low-income demographics include Woelfer's studies of homelessness and technology use [38] and Dillahunt et al.'s studies of energy use in low-income communities [8]. Work that has examined race includes Grimes' series of studies which focused on eating patterns among African American populations [13] and DiSalvo et al.'s studies of young African American male game practices [7]. Nakanamura has examined the effects of race online and its consequences for offline behavior [22]. However, these studies of technology tend to focus on a particular demographic rather than a comparison of two demographics. Comparisons studies are difficult to conduct because technology deployments are often designed for a particular demographic and recruiting does not scale well if looking for two disparate types of participants. A notable exception is Ames et al.'s comparison study of screen time among working class and middle class families with young children [1]. They find that middle-class families restrict television and computer use whereas working-class families promote technology to their children.

We build on their work but focus on two new directions: 1) comparison of low-income, urban, African Americans and middle-upper class, suburban, white parents. They categorize middle and working class based on income alone whereas we also group by race and location. 2) study of families with pre-teens and teens (ages 10 and up). An overwhelming proportion of children get their first cell phones and online accounts during the middle school years [18]. Middle school is well-known as the time when children go through major developmental changes (e.g. biological transformations of puberty, educational transition out of elementary school, growing autonomy, and physical

shifts with sexuality) [19,27]. Thus, we focus on this disruptive and transformative stage in families' lives. As others have done [35], our research problematizes a design process where the normative user is assumed to be white and middle class. The growing body of work on low-income and minority groups' use of technology reflects the research communities' interest in understanding users beyond white, middle class.

There is extensive work on family communication through technology in HCI, much of it focusing on systems to support family connectedness (see [36] for one example). In earlier work, we have described challenges parents face in managing their kids' use of social media, but we focused on middle and upper class parents [39]. Odum et al. (2010) report tensions around communication, coordination, negotiation, and identity in divorced families and consider ways of designing for these alternative families and their children [24]. Despite the range of prior work, there are gaps in this work that should be addressed. Little is known about the relationship between technology use and race and income and its implications in HCI. This is an important research direction with social, educational, and design implications in understanding the next generation of products and users.

METHODS

Participants were geographically split between north and south Atlanta. Atlanta has a rich history of diversity and struggle, and is representative of the diverse racial, ethnic, and economic backgrounds that we described in the introduction. Specifically, Atlanta has a high income equality rate and is 54% Black and 38.4% White according to 2010 U.S. Census data [40]. In this study, the middle and upper class, white parents live in North Atlanta and are referred to as high socioeconomic status (high SES). The low-income, African American parents in general live in South Atlanta and are referred to as low socioeconomic status (low SES). References to specific families are Family number + B or A to refer to high or low SES.

We partnered with a private school where most students are from middle or upper class families. At this school, students are tracked to go to college and parents keep their children involved in a number of after-school activities. We recruited parents through word of mouth, the school's parent board, and letters through the school. We interviewed 16 parents, two fathers and 14 mothers. The length of the interviews ranged from 40 minutes to 1.5 hours. Interviews were conducted at a time and location that was convenient for the participant such as the school, workplace, home, or a coffee shop. All participants were in a two-parent, heterosexual relationship with between 1-4 children. The recruiting pool we drew from was middle and upper class families. The average median income in the school we partnered with is just over twice that of the average median income in the U.S. This sample was biased towards parents who were economically able to buy new technologies.

	Low SES	High SES
Participants		
Mother	15	14
Father	3	2
Family Size		
1 child/family	3	0
2 children/family	8	2
3 children/family	5	7
4 children/family	1	4
Participants' Children		
(Total) Girls	20	22
(Total) Boys	18	19
Children's Ages		
<8	8	7
8-11	13	9
12-17	10	17
>18	7	8

Table 1: Participant demographics. Individual family structures have been aggregated to maintain privacy.

We also partnered with local community programs to recruit low-income, African American parents. Program I was a program for African American teen boys to learn computer programming skills. They had to be qualified as low-income as defined by the federal Free and Reduced Lunch Program. We interviewed 5 parents from Program I. These interviews took place in a mall food court, at Burger King, over the phone, and at a coffee shop.

Program II was a nationally recognized after-school program for youth with multiple sites in the city of our study. We visited two sites over multiple evenings and multiple weeks to interview 12 parents. We recruited by setting up a desk near the entrance and exit and invited parents to participate as they picked up their children.

All parents identified as African American in their interviews with us (five of the seven feeder schools into Program II are 100% Black [10]). Among the seven feeder schools into Program II, five have over 90% eligibility for

Free and Reduced Lunch (FRL). FRL is determined as a proportion of the Federal Poverty Guidelines (income has to be under 130% of FPG for eligibility for free lunch and 185% for reduced lunch). For example, for a 5-person family the FPG is $25,790; thus, families with an income less than $33,527 are eligible for free lunch and less than $47,712 are eligible for reduced lunch.

Interviews ranged in length of time from 15 minutes to one hour. Short interviews were in instances where parents were in transit while picking up their children and neither we nor they wanted to interrupt their day for too long without a prior scheduled appointment. We tried to recruit Program I parents for interviews but found it difficult to get them to return our phone calls or emails and thus resorted to the strategy at Program II. We did not pay any participants. We asked parents first about who was living in their home, then about what kinds of technology were there. As the interview progressed and parents became more comfortable, we asked about what kinds of rules they set at home around technology use, and what they found easy or difficult in enforcing such rules. All interviews were conducted in English and all participants were native English speakers. We refer to both parents and guardians as parents for simplicity, but note that the term "parent" may be more representative of some demographics than others.

We used a grounded theory approach to guide our data analysis [12]. We coded transcripts for high-level codes related to parenting, technology, and class. As we iterated over the interview transcripts and high level codes, we broke these codes down into more detail, such as strictness, values, rules, access, use, income, occupation, education, and family. We coded the interview transcripts again with the detailed codes and looked for high-level themes to emerge among interview transcripts. To do this, we highlighted themes throughout each transcript then aggregated them across transcripts and looked for the most common topics. The top themes were rules, monitoring, sharing, responsibility, economics, and status. We organized these into four major themes in the results section of the paper.

RESULTS

In general, the amount of use of technology and the appropriateness of content exchanged present challenges for parents. However, the exact form of those challenges differs in various ways.

Rules and Monitoring

Parents wanted their children to have cell phones to facilitate communication with parents and for safety and emergencies. High SES parents usually wanted their middle school kids to be able to coordinate after-school pick-ups and carpools real-time. Some low SES parents wanted their kids to be able to communicate when they took the bus to school or from after-school activities. Parents across demographics had similar approaches to rules about how their younger children (middle school and younger) could use social media.

Most of them looked to limit the amount of time their children spent on computers and mobile devices. Some parents limited television to a certain daily time limit or no TV at all during the week. A mother in Family 30A expanded the policy to include Facebook as her children grew older, though her children were upset that Facebook was not allowed. Her children shared a desktop between them (and she had her own desktop and laptop for herself). Though she had wanted to get them laptops for Christmas, she did not because she felt it was inviting more issues with Facebook. Her older son had Internet access on his cell phone so he could check Facebook anyway but she felt that cell phone use was different than a computer monitor, where people could chat for hours. The following quote from her was representative of many we heard about immediate families' use of cell phones:

> *It got to the point where they would email each other in the same house at the same time. They be emailing each other, he's upstairs, she's downstairs, the child's in another room.*

Parents recounted stories of other children's' parents calling them to tell them that their own child was engaged in inappropriate behavior. In one case, a parent had learned her child was writing that "nobody liked him" online and another girl told her mom who called the parent. In another case, a parent received a phone call from a father of an 8-year-old girl who said her 12 year-old son was playing games and chatting with the girl online late at night. In this case the girl had given the boy her home phone number and he called; the parents had callerID so they called the parent, who was previously unaware of his late night gaming and chatting.

Cutting off the Internet was a frequently used strategy for parents, though they accomplished this in different ways. Parents often did not have the right language for conveying the decisions they made. A parent in Family 11B told us she "cut off the Internet, for a long time." When asked how she did that, she said she "closed the laptop and took it downstairs." A parent in Family 14B, when asked the same question about how the computer turned off at 8:30pm, she could only say that "It just shuts off." High SES parents were more likely to tell us that they explicitly relied on other community members like parents and schools to help monitor and keep an eye on their children; however, this is likely in part because the school was private and tight-knit (as compared to the relatively disparate and under-funded public schools in the low SES neighborhoods).

Parents across demographics reported that it was hard for them to keep up with what their kids were up to. They assumed their kids knew more than they did about technology:

I have shut Facebook off completely because they were still going downstairs. If I go upstairs, where the kitchen and all that is, I can't see what they're doing. They were spending too much time on Facebook, so my computer friend showed me how to go in and block it. I just locked it within the last two weeks. They haven't said anything; I don't know if they've figured out how to get around it.

Parents were familiar with checking history as a tool for surveying their children's browsing activity. Many parents had tried blocking Internet use. A parent in Family 15A told us that she and her husband had blocks on their Internet browser. Her husband checked history and could tell that it was being erased. In low SES, a mother in Family 22 reported the same experience:

Researcher: How do you know where they've been?

Participant: I look over their shoulder. Sometimes I go back into their history but then they got real smart and they'll erase it as soon as I get up...

Researcher: How do you know?

Participant: When I check there's nothing there.

Researcher: How did you learn to check history?

Participant: From classes I've taken. From operating a computer myself.

Parents told us they had taken classes to learn about computers though where they accessed classes varied. The local Apple store was a source of information for some high SES mothers whereas local community centers were sources for some low SES parents.

Most parents knew that their kids were likely to be hiding search history in some way, especially as they got older. The low SES parents also knew that their kids were using private browsing (which means history is never logged and cannot be viewed later). In contrast, high SES parents we talked to did not mention private browsing and only a few mentioned deleting items from history. However, we observed that information tended to spread quickly and widely through parents at the high SES school and, thus, they often knew and were concerned about similar things. In both cases, parents acknowledged that their kids probably knew how to circumvent whatever rules they were setting up. Most parents were looking for effective ways to monitor their children's activities. Some wanted to monitor all the time, others just wanted the ability to monitor if they felt it was needed. Few families reported that their children were likely to tell them what they were doing.

There were some exceptions where families did communicate more openly among low SES families. One example indicates how family structure relates to attitudes towards technology. A low SES woman in her 50's was raising three of her nephews, the youngest of whom was a senior in high school. She became the legal guardian of the boys when they were 8-13 years old and the difference was discernable in the ways that she had raised them with respect to technology use. She gave them more freedom because they were not her own children. She also communicated with them more openly, and they with her.

I never had any kids of my own and I worked a lot. When I got them it was like one day I didn't have kids, the next day I had a bunch… I've heard some of my colleagues say they use Facebook to check what their kids are doing. My kids just tell me; sometimes it's too much information. Maybe it's because I'm their aunt and not their mom, I've always tried very hard to be not judgmental. If they bring it to me I try to be objective and show them why this is really not cool to be doing. So anything that they do, I basically already know.

Sharing Devices

Our findings suggest that low SES families are more likely to share devices like computers and cell phones than high SES families. Low SES parents reported that sharing posted challenges for them, such as the logistics of trying to share computer time. Parents were annoyed when children downloaded software and that slowed down the machine or when they changed settings. Some parents had rules about time of use, such as if children went over on their allotted time, the time would be taken from the next day's allotment. In most families, parents had their own computer(s) but children sometimes shared devices. In general, parents felt that sharing computers made it easier for them to monitor what their kids were doing on the computer.

Sharing of other technologies, like phones, also made it easier for parents to know what was going on. Most high SES children were given mobile phones around middle school time, at which point they no longer used the home phone line. For families who did still share phones, the sharing enabled parents to more easily "catch" their children. In Family 24A, the oldest son did not have a cell phone and a female friend called their home line at 4am. The son's parent intercepted the call before he could get to the phone. This transpired because he did not have a cell phone, but his female friend did, and thus imposed her own social protocols on his home landline. In Family 21A, a grandmother, who was the guardian of her grandchildren, caught her granddaughter's inappropriate sexual conversations after sharing a cell phone with the granddaughter. The granddaughter had borrowed the cell phone for a few days and the boys' texts kept coming. In these kinds of cases, shared devices left traces.

In contrast, high SES parents rarely shared personal desktops or laptops with their children, especially once the children reached middle school age and older. When parents decided their children needed a computer and a cell phone for homework and communication, respectively, high SES parents chose to purchase devices like laptops and

cell phones for their children. We did not hear any parents say that they shared their devices with their children before purchasing children their own devices, though sometimes young children shared computers with one another. For high SES parents, middle school was when their children began to get their own devices and services (e.g. Facebook accounts). For these parents, transitioning into this new stage of parenting was a difficult and sometimes exhausting process [39].

How parents used technology also impacted their kids' uses. Family 17A consisted of a single mother of two young children who had gone back to school and did not have time to watch her daughter on the computer:

> *I'm really strict with her with the computer because she likes to explore places where she shouldn't. So she can only get on it if I'm going to be sitting there with her but that's really difficult because I use it for school.*

This single mother of two children was working a job and also going to school for a post-secondary degree. In her home, as was the case in many homes, the shared computer was for the parents' work first, and the children's play second. Parents felt that young children—roughly 5th grade and younger—didn't need computers for school work; computers were mostly for fun and play. Parents in both groups believed middle school was about when computers time should be allotted in the evening for homework.

The sharing of devices among high SES revealed important differences in participation. High SES parents were more likely to purchase their children individual laptops and cell phones around middle school while Low SES parents either prioritized sharing of existing household devices or passing down old ones to the kids, (though certainly some purchased devices for kids like high SES parents). Some Low SES families shared passwords for their email accounts, Facebook, and other online logins. One parent told us:

> *I have access, everybody has access to everybody's passwords. We have to have access to all passwords, FB, email, anything that is online.*

When asked how her children felt about it, she told us "They are okay with it." Another participant said she was friends with her children on Facebook. When asked if they were okay with it, she responded "Yeah, they don't have a choice." Many Low SES parents replied in similar tones, emphasizing their parental authority:

> *Participant: If they're using the computer in their room too much, we say something: "Why are you going to your room to use the computer? It's a laptop. Sit down here." You know, so, we don't allow too much private use. If we see a pattern of someone always wanting to go to their room, then we stop it.*
>
> *Researcher: And they're okay with that?*
>
> *Participant: They don't have a choice. I don't know if they're okay with it. It doesn't matter.*

Such responses like these were common and reveal the more authoritarian approach to parenting that has been described in earlier studies of African American parenting [23]. They can be more strict and demanding of their children, and reported this approach to us confidently. A grandmother of two teenagers told us she checked what the children were doing on the computer "whenever she felt like it." For her, privacy was a philosophical approach that undergirded day-to-day decisions in their home. When asked if they knew she was checking, she laughed and told us:

> *There's no such thing as privacy for them. They don't have privacy. We're just a very free-flowing kind of not uptight kind of family.*

Responsibility

Low SES parents consistently talked about responsibility as an important part of raising their children. Part of responsibility included getting a job as soon as teenagers were old enough, and transitioning towards independence as an adult, at age 18. In contrast, high SES parents rarely discussed jobs or economic independence (though that is undoubtedly a long-term goal they hold for their children [23]). These parents were more likely to talk about education and extracurricular activities—sports, music, and camps—than the low SES parents. An outcome of the emphasis on jobs and income among low SES participants was that low SES teens sometimes purchased their own devices, like games, and in those cases their parents and guardians granted them more agency over their uses. In Family 25A, an aunt who was guardian of three boys gave the youngest, a senior in high school, freedom with his laptop because he had purchased it himself. She didn't like the amount of time he spent on it but didn't feel it was her authority to tell him what to do it with it because he owned it. When we asked how he paid for it, she replied:

> *He bought it. He has money because when their dad died they received money every month until they were 18—a portion, a income, and I would give it to them every month because I thought it was only right. I find when kids don't have money to buy the little things, they tend to get into negative behaviors. I feel that at a certain age your parents are done. It gives you an opportunity to be on your own.*

Her philosophy had worked well for the older children she had raised but she was having trouble with the youngest one, who had just turned 18:

> *He spends an exorbitant amount of money on these games. He went out and bought with his graduation money, part of it, a flat screen TV. I'm talking a 42" flat screen TV and put it in his room. So you know*

'where's your money for your [college] room deposit'? Busted…

Her oldest boy had purchased handheld games and her middle boy purchased new cellphones, but for both she never felt it was an addiction. In contrast, she felt her youngest was addicted to the Xbox and at age 18, it was becoming his responsibility to take control of his future.

Getting a job and earning potential was important at an earlier age for low SES parents. A mother in Family 19A lamented that her teenage son spent his time playing games with a neighbor instead of getting a job or planning to go to school.

Lately, he's been going to another friend's house, guy that lives two doors down, they grew up together, and they play that game. He doesn't have a life either. He's about 21 years old, living in his mom's basement, and working at a McDonald's, not there's anything wrong with that, working at McDonald's is an opportunity. That guy has gained like 50 pounds, you can tell a young life going nowhere.

In Family 13B, the mother had gotten her oldest son a cell phone when he was in middle school but she took it away because he was using it too much. She got him one again for this 16th birthday. Her rule was that if she got any calls from school about him using it there or they confiscated it, he would not get it back. She did not want him using it during homework but knew he probably had it on vibrate and felt at age 16 he needed some leeway to use his own judgment.

Both high and low SES parents talked about taking away cell phones as punishment. Most parents felt that their child was their responsibility and there had to be consequences to actions. Taking away the cell phone was a supreme punishment for kids, and parents of all backgrounds appeared to be relieved to have at least one reliable leverage point over their kids.

Economics and Status

Many of the public schools attended by low SES children did not have working computers with Internet, and the local library was instead used as a computer and Internet resource center. The low SES local community also had parent centers available where parents could go to use the Internet. Parents' attitudes towards technology and educational opportunities varied. A Family 22A guardian lamented the fact that other parents thought it was more important to have cell phones than to have Internet service at home. For many families, there was status associated with having a "nice, shiny phone" that could take pictures and have Internet service rather than a home computer and Internet to do homework.

Status and stigma were associated with different devices and influenced purchasing decisions for families from all backgrounds. Low SES parents told us their children did not like prepaid cell phones because there was a stigma against them:

It's just considered an amateur phone. In the same way they might like Michael Jordan more than New Balance. It's a status symbol. –Family 9A

Phones like the TMobile and the Virgin Mobile both fit under this stigmatized category whereas the Blackberry and iPhone had higher status. Some low SES parents put their children on flat-fee plans like MetroPCS because they were worried about high cell phone bills. Low SES parents were concerned that their children would go over the monthly limit and they would be billed for their teenagers' heavy use. Low SES parents were also concerned about their children breaking devices, in part because they did not always have the financial resources to replace them. High SES parents were concerned about amount of use of cell phones as well, but their concerns were often related to the health and well-being of their children around excessive technology use.

The economic realities for low SES parents were that they had to make choices about what devices to buy and what services to pay for, especially during economic downturns. We spoke to a low SES participant who had worked at a neighborhood public library for over 20 years and who described the changes in patronage as the economy fluctuated:

Most of these people had the equipment before the economy went bad and the laptops, WalMart just about giving them way, people get their income tax, they go buy a laptop... It's incredible how many people do not know how to use the computer, how many people who were pushed out of the work force don't know how to do a resume. –Family 13A

At that particular library, patrons—up to 20 at a time—would come to the library before it opened and sit in the parking lot to use the wireless. Many low SES participants had laptops, or cell phones, or broadband, but not all three. Though they had some access to devices and Internet, they were hindered—especially lower income people—by the lack of a fully participatory engagement with technology. This was also the case for adults who were unemployed and could not look for jobs from home.

Results show that sharing of devices, financial responsibility, rules and monitoring, and changes in the economy relate to the ways that families use technology. The implications of these patterns are discussed in the next section.

DISCUSSION

Supporting Parent Literacy

The high SES families among our participants were two-parent families and often had at least one parent who was technologically literate. These families are better equipped

to make informed decisions about how their children should be interacting with technology. In addition, low SES parents who are single parents or guardians may be constrained by first order priorities in their lives like inflexible work schedules, single parenting responsibilities, and ensuring food, shelter, and safety are satisfied first and foremost. Managing and monitoring social media use are secondary concerns.

Parents did not appear to have differences in terms of worldviews or moral panics about technology more generally. Some parents were pessimistic about the changes technology was bringing upon society and others were optimistic about the social and learning opportunities afforded. Most parents conveyed some amount of concern that their family was using social media too much. What we did observe was that parents who were often most concerned or confused were the least likely to be active users of social media themselves. For these parents, unfamiliarity bred uncertainty. It was hard for them to imagine what kinds of activities their children were engaging in on different sites, and thus, to imagine creative and effective approaches to teaching their kids how to use these sites.

However, while the issues are the same, how to address them within each group is different. Dual parent households often reported that one parent was the technical person and the other was less so (and this was often gendered). For single-parent families, the sole parent's ability to manage social media use was only as good as their knowledge of social media. For such parents, tools for quickly and easily keeping up with and staying on top of their children's behavior are needed. They need to be more lightweight and easy to use than existing monitoring software. They also should be less invasive of children's every move online, because neither parents nor children want such levels of surveillance.

Some families were more likely to share devices than other families, and the extent to which parents controlled devices varied by age and ownership. Older teens had more control over the devices and teens who bought their devices were afforded independence. In both cases, technological maturity is needed as teens gain ownership over their technology. As in other life transitions like driving, teens know how to use the tools, but their decision-making about what to do with them can be under-developed [19]. Teens are taught about social media in schools but more resources are needed for parents to know how to teach their teens age-appropriate decision-making skills around technology use.

Sharing and Ownership

High SES parents are likely to purchase devices for their children around middle school for communication or educational purposes. Low SES parents are also likely to buy devices for their middle school children, but have to make more choices about what products to get and what services to pay for on top of them. Among low SES families, teenagers are often encouraged to get jobs both for the income source and to prepare them for future employment. Teenagers with jobs and purchasing power can wield more independence from their parents in deciding what technology to use and how because they own their own devices. On the other hand, low SES parents of younger children also share devices more often which can make the monitoring process easier for the parent.

Our results and prior research [36] show that family members generally prefer not to share devices. Parents who do not want their young children to have full access and ownership will construct an environment in which the kids share a computer. However, for many low-income families, sharing a computer is not a choice. The device most parents and teens have is a mobile device. There are opportunities for developing mobile services that explore how low-income, minority groups can better connect to their immediate and extended families and local communities. There are opportunities to open communication channels within immediate and extended families that change some of the existing "get off my lawn" [5] paradigms of online family interaction. This builds on existing work towards connecting families and extended families but considers designing for different classes of users in the context of the kinds of devices they use regularly in their daily lives.

Status and Choices

Cell phones and video games are consistently purchased over desktops among low SES individuals. These devices offer entertainment, connectedness, and status at relatively affordable prices. However, lack of computers, Internet, and productivity software makes schoolwork and job searching difficult to do from home. Different social groups want devices that not only are pleasing for them to use, but that elicit status from their peer groups. Status has always been a lynchpin of adolescence but it is also a marker of class. Whereas families who are not economically constrained can *choose* to have certain styles of technology and not others, low-income families typically *have* to make choices.

An important factor that is also surfaced in our research is that class is dynamic. The use of the public library highlighted the wide swing that the economic downturn caused in library patronage and kinds of use. Some families had laptops but no home broadband, and others had broadband but only to connect to video games. The library was a central hub for computer access, wireless, and entertainment (movie rentals). Future work should also consider the dynamics of race and income and their (changing) economic realities.

Intersubjectivity and Implications for HCI

In this section we consider the implications of socioeconomic diversity for the HCI community. This research takes a microsociological approach to a macrosociological problem. It looks at things like parenting and technology—microsociological units—with the goal of

understanding class and the participation gap—macrosociological issues. Though useful for our research, this approach has its drawbacks. There is a tendency to concentrate on the unfamiliar and frame it as the first order object of focus. This is the case in this work. Although two groups are compared as is done in comparative ethnography, this paper really examines an emerging majority minority group in relation to the status quo that has dominated HCI research.

Researchers have called for more reflexivity in HCI research [26]. Reflexivity refers to the ways in which the research approaches and outputs are impacted by the people doing the research [6]. As anthropologists have long known, it is impossible for researchers to write about other people without letting their own voice and preexisting biases into the writing [21]. Thus, we look to position our own presence in this research, recognizing the tension Bardzell describes between pursuing a socially conscious agenda and achieving scientific and moral objectives [4]. Even more importantly, we emphasize that it is not possible to determine in this research what is attributable to various features of class like race, income, education, or neighborhood from other aspects of participants' lives. None of these can be detached from the larger milieu in which participants live (see [20] for a discussion of intersectionality, or how socially constructed categories do not act independently of one another).

The results of our research are contextualized in an implicit set of values about what is right and desirable in terms of parenting and raising children. There are also values prescribed to technology adoption and its use in the home. These value judgments are inherent in any HCI study, but often fail to acknowledge the wide range of values that might exist across demographics. HCI research has a tendency to report observable characteristics like age and gender but ignore subtle cultural stereotypes like conversation style, self-presentation, or face-saving strategies. The class and culture researchers identify with is often different than that of the participants with whom they are interacting. As such, there is an inherent in-group and out-group formation, though power dynamics may vary fluidly depending on the number of researchers and participants and the nature of the research. Frequently, authors will identify with the race and education level of one group more than the other; yet, choices in conversation style, attire, and interview location can mitigate some of those differences.

Categories, social roles, and labels are dynamic. Researchers from a wide range of disciplines have wrestled with the use of race, in particular, as a scientific, socially constructed, and cultural categorization (and indeed, critical race theorists examine how researchers themselves participate in the social construction of race). Challenges include distinguishing between race as a risk factor or as a risk marker and finding a way to write about race that appropriately treats the we/they dichotomy [17]. Scholars also ask how to make sense of accounts in which race is silent or non-manifest [14]. In [2], Andersen warns against research inquiries that privilege the perspective of dominant group members. Andersen also warns against examining the experiences of minorities by holding them up to a set of norms that come from the dominant group or from any group different than their own. Moving forward, we encourage HCI researchers to consider both the observable and unobservable ideological structures within the research context. These impact the way technology is used and valued and broadens the scope and outcome of the research beyond the familiar normative user.

CONCLUSION

Race, income, and class affect access to devices, responsibility with those devices, and ability to monitor teens' use of them. Parents from all backgrounds share challenges in knowing what their children are doing online and how to best manage use, but low SES parents face particular challenges among single parents and teens with jobs and independence. On a micro level, this research indicates that training and resources are needed for parents to keep up with and keep ahead of the technology that their kids are using. On a macro level, this work exposes the limitations of HCI studies that marginalize or ignore completely the effects of socioeconomic status. HCI should attend to socioeconomic factors like race, income, and education of its users in it study design. Otherwise it risks conflating study results with socioeconomic factors, particularly around adoption and use which may be over or under reported depending on income, race, culture, and other factors. As low SES individuals and families become the majority demographic, the CHI community needs to acknowledge their differences and report on study results as a function of socioeconomic status.

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