



A Portrait of Technology in Rural Appalachia: Patterns of Technology Use, Attitudes, and Safety Practices In a Low-Income Rural Sample Recruited Offline

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Executive Summary

Research on technology has burgeoned along with advances in technology. However, much research has relied primarily upon urban and suburban samples that are primarily recruited via technology (online or phone). The experiences of rural, low-income residents are less well understood, and participants who cannot be easily recruited online are largely absent from recent studies. This paper presents data on technology use, attitudes, and experiences among a rural, low-income sample from Appalachia. 478 individuals (57.1% female), with an average age of 36.44 years old ($SD = 17.61$) were recruited through a variety of strategies, including in-person at community events and word-of-mouth, in rural Appalachia. Technology use ranged, but fewer participants owned a cellphone or computer, and fewer used email at least once a week compared to recent national data. Approximately 1 in 7 (14%) reported using a computer only a few times in their life, while approximately 1 in 4 participants were light users of computer technology. Technology-related concerns were common, although few participants felt that rural communities had unique problems. In terms of safety practices, limiting access to one's location or contacts, refraining from posting personal information (such as birthdays) online, and avoiding using debit cards online were associated with lower victimization rates. Rural Appalachia is a technologically diverse area, with some high users and some light technology users who are not well represented in prior research. Future research on technology needs to take more efforts to be inclusive of rural, low-income communities and those with limited exposure to technology.

Keywords: digital technology, Appalachia, digital victimization, patterns of technology use, online safety practices

Introduction

Technology has transformed almost every aspect of modern life, from interpersonal relationships to workplaces to commerce. However, this transformation has not happened evenly across all segments of the population. Recent national studies on technology use have noted that some technologies, such as cell phones and email, have nearly reached “saturation” with the U.S. public (Pew Research Center, 2017b; Smith, 2015), and other technologies are increasingly common. However, most existing evidence relies on studies that use technology to recruit participants. For example, many studies recruit through various web-based survey programs (e.g., Vishwanath, Herath, Chen, Wang, & Rao, 2011). Some sample panels are recruited through phone contact (landline or cell) (e.g., Mitchell, Jones, & Wells, 2013), with some of these subsequently maintained through online contact (e.g., Duggan, 2017), but even this approach relies on people who will answer phones from unknown numbers, which many people are reluctant to do (Hamby, Taylor, Smith, Jones, & Mitchell, 2018; Ridolfo, Boone, & Dickey, 2013). Indeed, the Federal Communications Commission has released an official recommendation to consumers not to answer calls from unknown numbers as a consumer safety protection (Barton, 2017), and this presents challenges to traditional random-digit-dial (RDD) methods of survey recruitment. Using in-person recruitment strategies, this paper presents information on technology use, experiences, and attitudes in a rural, low-income sample from the southernmost region of Appalachia.

National Patterns in Technology Use, Experiences, and Attitudes

As of 2016, 88% of U.S. adults use the internet and 77% use a smart phone (Pew Research Center, 2017a). More than 3 in 4 (78%) own a desktop or laptop computer (78%) and/or a smartphone (77%) (Pew Research Center, 2017b). Approximately 95% of the U.S. population owns some sort of cell phone, according to the same Pew Research Center data. A recent national survey found that 88% checked email just on their smartphones at least once a week (Smith, 2015).

Formal complaints regarding financially-motivated scams are at a very high level, reaching 22,000 per month, according to recent data (Internet Crime Complaint Center, 2014). Some technology-based problems, such as cyberbullying, have been extensively documented (Duggan, 2017). However, other areas remain surprisingly understudied. There has been some research on the nature of appeals that are common in online frauds (Muscanell, Guadagno, & Murphy, 2014), but less community-based research on people’s perceptions of online fraud. Chen and colleagues are one recent exception (2017), but their study focused on global privacy concerns and safety practices that focused on computers (such as updating antivirus software). In terms of cybersecurity, recent knowledge surveys have shown that many people in the U.S. have limited

information about online scams and safety issues (Olmstead & Smith, 2017). As far as we are aware, none of this research has been conducted in rural or low SES communities.

Limitations in Existing Knowledge on Technology

The chief gap in the literature that will be addressed in this study is the lack of information on rural, low-income communities and lack of inclusion of people who cannot be recruited via technology such as phone or Internet. In addition, there are many other notable gaps in the literature. Considerable research on cybersecurity warns about the perils of online scams and identity theft, but much of this research is focused on the public's lack of technical knowledge (e.g., Olmstead & Smith, 2017) or conceptual analyses of popular scams (Muscanell et al., 2014). While an important piece of the puzzle, there has been less study of the psychological reasons that protecting oneself online are challenging, and even fewer studies on the public's perceptions of these challenges. Online fraud and scams are, by their nature, intended to deceive, and qualitative work has noted that there are several common deceptive practices that can make it difficult to distinguish legitimate from fraudulent communications (Hamby, Taylor, et al., 2018). One study did find that perceptions of risk were higher among lower SES individuals (Reisig, Pratt, & Holtfreter, 2009), but this was based only on a single question of perceived risk of theft, not other perceptions or actual experiences of cyber-victimization. However, quantitative work on perceptions of these challenges is largely lacking. As far as we are aware, no past research has systematically studied whether there are features of rural communities that contribute to online vulnerability, such as increased reliance on online shopping due to fewer local outlets. We will explore perceptions related to rural residence in this study. This study will also extend current knowledge on typical safety practices and whether these vary by light and heavy technology users.

Technology Use in Rural Communities

The experiences of rural communities with technology use has received relatively little research attention. In rural areas, scarcity of wi-fi hotspots and cell phone towers can make access to technology difficult, if not impossible (Benton, 2015). According to the Pew Research Center (2017), compared to individuals living in urban or suburban areas, people living in the rural U.S. are two times more likely to not use the internet. Qualitative work has found that specifically in rural Appalachia, some residents are reluctant adopters who prefer more traditional forms of communication and highly value privacy (Hamby, Taylor, et al., 2018). Other cultural work in rural Appalachia has also found that privacy is highly valued in this region (Woodard, 2011). Nonetheless, digital technology use is growing in the rural U.S. (Pew Research Center). As technology and internet use continues to rise in rural areas of the country, these communities will become greater consumers of digital information, more impactful players in digital

markets, will experience more enhanced connectivity to other communities around the world, and, unfortunately, will likely experience growing rates of cyber-victimization of all forms. More research needs to ensure that the evidence base includes individuals living in rural areas and individuals with lower incomes, to ensure our knowledge base reflects all internet and technology users.

The Current Study

To address these gaps in the research, this exploratory study presents a snapshot of technology, use, experiences, and attitudes among a rural, low-income community in the southernmost region of rural Appalachia. We inquire about use of various devices and technologies, as well as collect attitudes about Internet use, frequency of several technology safety practices, and perceptions regarding challenges distinguishing scams from legitimate contacts and the impact of rural residence on technological use and vulnerability. As far as we are aware, this is the first study to examine these issues in rural Appalachia and from a sample recruited through word-of-mouth and in-person recruitment strategies.

Method

Participants

Participants were 314 individuals from rural areas in the southern U.S., who were a subsample of a larger community sample ($N = 478$). For this report, inclusion criteria included participants from rural areas with a population of less than 2,500 people (53.5%) or a small town with a population of 2,500 to 20,000 people (46.5%). The sample was majority female (63.3%) and ranged in ages from 12 to 75 years old ($M = 38.25$, $SD = 17.72$). Most (86.8%) of the sample identified as White/European American (non-Latino), 4.2% described themselves as African American/Black (non-Latino), 4.8% as more than one race, 2.9% as Latino/Latina (any race), 0.6% as Asian (non-Latino), and 0.6% American Indian/Alaska Native (non-Latino). Almost one-third of our sample (29.5%) reported an annual household income under \$20,000 per year, 37.0% reported earning \$20,000 to \$50,000, and 33.6% reported earning \$50,000 or more.

Procedure

Participants were recruited through a wide range of advertising techniques. Most of our sample was recruited through word-of-mouth (70.1%). Recruitment at local community events, such as festivals and county fairs, was the second most productive strategy (20.1%), while the remaining 9.9% were recruited at local community organizations. With a range of recruitment strategies, we were able to reach segments of the population who are rarely included in psychological research, including those with limited online experience. The overall completion rate was 94%; technical problems and time limitations at events kept some individuals from being able to complete the survey. The

survey was a computer-assisted self-interview that utilized the Snap11 software on computer tablets with touch screens. Participants who had not used a tablet before were offered in-person instruction and assistance as necessary. In our past work, we have found that touch-screen tablets are easier for people to use than laptops or other devices. On average, the survey took 31 minutes to complete. Each participant was given a \$20 Walmart gift card and a list of local resources after they finished the survey. Informed consent, was obtained from all individual participants included in the study. All procedures were approved by the IRB.

Measures

The measures included in this paper were part of a larger questionnaire on technology and coping. Content validity was established through a multi-stage process in which literature was reviewed to generate ideas about the issues being studied, then qualitative data was gathered through focus groups, and finally cognitive interviews were conducted to ensure participants understood the items the way in which we intended (see Hamby et al., 2018 for more details).

Technology use. Technology use was assessed using 15 items that asked the participant whether they owned digital devices such as a computer or a smartphone and used programs such as email or online banking (answered yes or no). See Figure 1 for items. Lastly, to complete the overall view of a participants' technology use, they were asked how often they use a phone that connects to the internet, a computer, and how often they check their email.

To discern high technology users from low technology users, the item that asked participants how often they use a computer was dichotomized with those that responded "only a few times" and "some (but less than once a week, on average)" defined as light technology users, and "often (at least once a week)" and "every day or almost every day" defined as high technology users.

Pros and cons of technology use. Eight items assessed the pros and cons of technology use, with 6 pros and 2 cons. These statements were answered by participants in which they assessed features of technology, such as using the maps on a phone to keep from getting lost, using a phone to call for help because their car broke down, and whether they feel that phones, tablets, and computers are hurting real life relationships. Response categories were on a four-point scale that ranged from "not true about me" to "mostly true about me."

Scam challenges. Questions on scam challenges asked participants to read nine statements on the challenges of identifying an online scam, and check all statements that applied to them. Sample items include, "I've had trouble identifying a scam because

it seemed to come from a company or other source I trust,” and “I’ve had trouble identifying a scam because we seemed to have a lot of mutual friends.” Items were answered on a yes/no scale.

Rural-specific online concerns. Three items make up the rural-specific online concerns. These items denote the ways in which individuals living in a rural areas protect themselves from online cyber-victimization and other types of online crime. The items are, “I ignore calls or messages from numbers I don’t know,” “I say no when apps or programs ask to track my location or see my contacts or photos,” and “I am careful about posting my birthday, address, or personal information online.” The items were answered on a four-point scale with 1 = not true about me and 4 = mostly true about me.

Cyber safety practices. The Digital Safety Practices scale is comprised of 13 items that assess a wide range of methods that participants might utilize in order to protect themselves from cyber victimization. Sample items include, “I never use debit cards online,” and “I check out the security settings on my phone, tablet, or computer.” Items were answered on a four-point Likert-type scale with answers ranging from “not at all true about me” to “mostly true about me.”

Cyber-victimization. Cyber-victimization was assessed with an 11-item scale with items that measured digital or cellphone-based adverse experiences, including interpersonal and financially-motivated victimizations. The instructions were as follows, “The next questions ask about people who have contacted you online or on your phone. We mean anyone who contacted you over a phone, email, app, computer, or other device.” A sample item is, “Someone tricked me into giving personal information over my phone, tablet, or computer.” Participants responded to these items on a yes/no scale. The internal consistency was .71. Higher numbers constitute experiencing more instances of cyber-victimization. Validity was established with correlations with trauma symptoms ($r = .31$) and related constructs.

Demographics. Sociodemographic information, including age, gender, household income, educational status, population density, and race/ethnicity, was collected.

Data Analysis

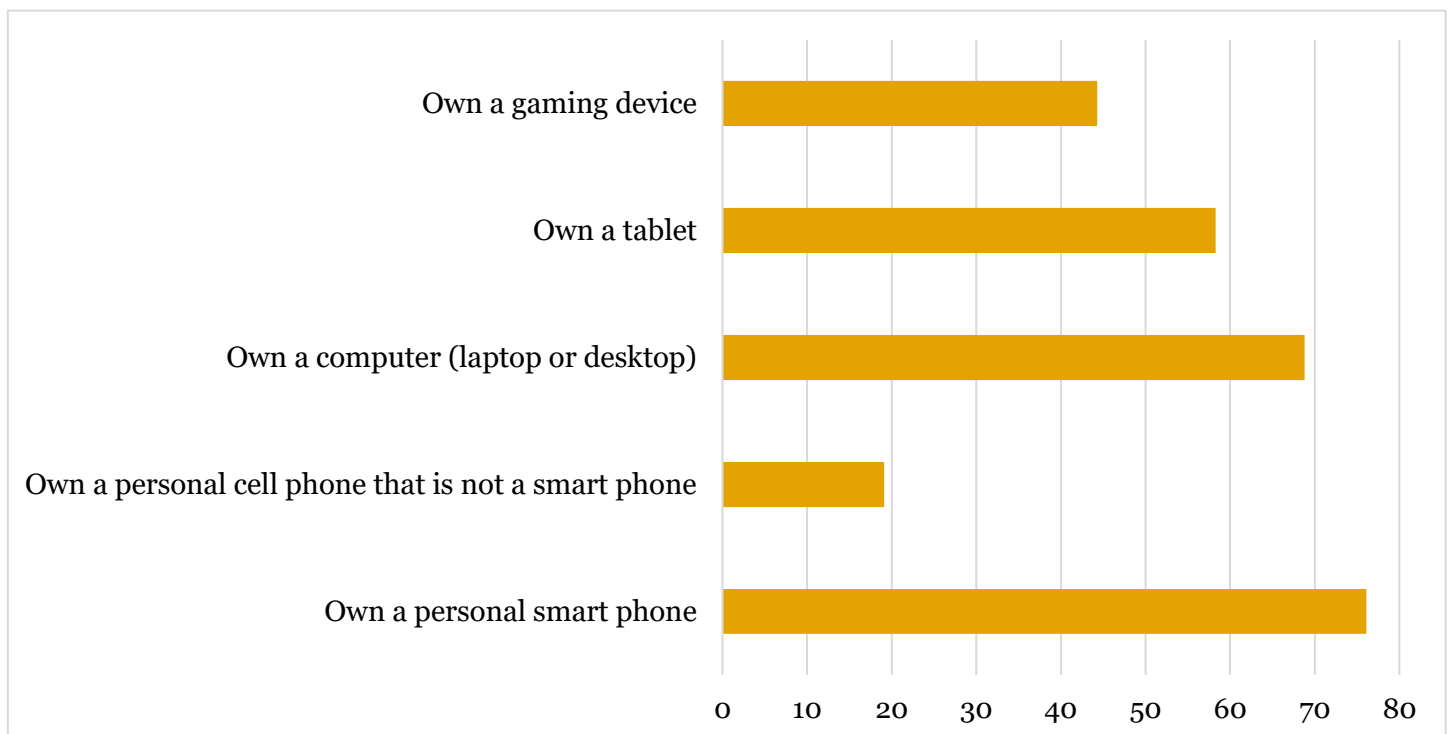
Descriptive statistics were used to describe the sample and to determine the rates with which participants utilized technology, experienced cyber-victimization, encountered scam challenges, which online safety practices were employed the most, including rural-specific online concerns, and how participants rated pros and cons of technology use. We also explored differences between light and high technology users and the relationships between online safety practices, rural-specific online concerns, and scam challenges with cyber-victimization.

Results

Technology Ownership and Use

The participants in this sample demonstrated a large range of technology ownership. Many participants reported owning modern digital devices, including about 3 in 4 (76.1%) owning a personal smart phone, more than two in three (68.8%) owning some kind of computer (desktop or laptop), and over half of the sample reported owning a tablet (58.3%). However, as also indicated by these percentages, there were substantial percentages of the sample who did not own a device, especially not a device beyond a cell phone. See Figure 1.

Figure 1 – Technology Ownership in a Rural, Low SES, Appalachian Sample



Participants were also diverse with respect to technology use. More than 1 in 8 (12.9%) said they had only used a computer a few times in their life, and another 10% reported they use a computer less than once a week. Together, these two figures indicate about 1 in 4 participants fell into a category that we labeled light technology users. In contrast, almost two in three (63.4%) said they use a computer every day or almost every day. (See Figure 2). Lastly, we asked our sample how often they check their email, again found a substantial range, with more than half of participants saying they checked email daily or more often, but about 1 in 4 said they checked their email once a week or less

and another 8.5% said they do not use email. See Figure 3. More than 2 in 3 (67.8%) also said that they do not answer phone calls from unknown numbers (also discussed in safety practices below).

Figure 2 – Frequency of Computer Usage

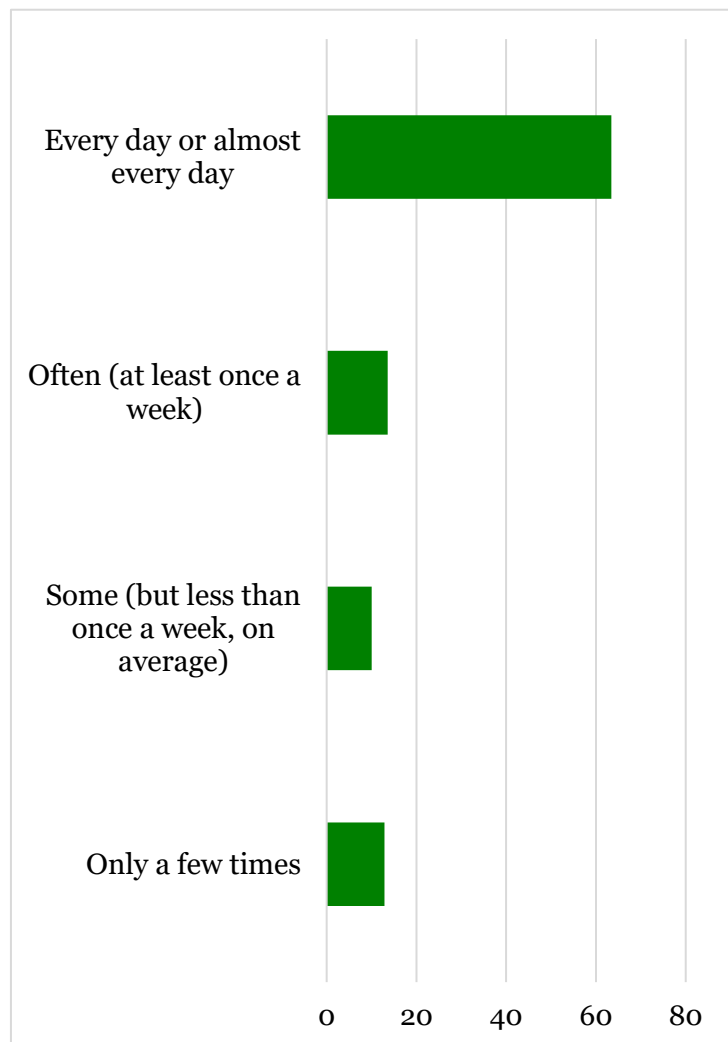
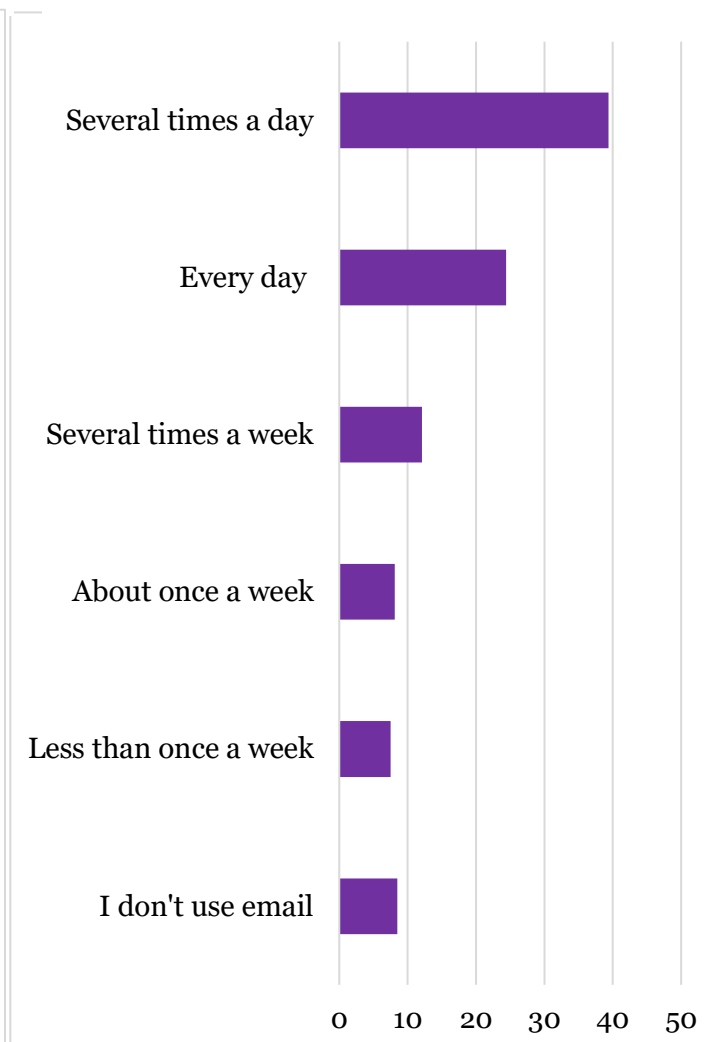


Figure 3 – Frequency of Checking Email



Participant Responses to Pros and Cons of Technology Use

The most common pro of technology use was being able use a phone, tablet, or computer to keep in touch with people far away, reported by more than 3 in 4 participants (Table 4). The second most common pro was being able to use devices for shopping, banking, and entertainment, reported by almost two-thirds of our sample. The least reported con of technology use was being upset about something a family member posted online (10.7%). The notion of devices hurting real life relationships was endorsed by less than 1 in 4 participants, but a notable proportion of our sample still felt this was true. In terms of the pros of technology in emergency or health-related

situations, about 2 in 5 participants said they have used the map on their phone to keep from getting lost, 1 in 3 said they have used their phone to call for help when their car broke down, 1 in 4 reported searching for information on their phone they would be embarrassed to ask their doctor about, and almost 1 in 4 participants said they have used their phone to call 911.

Figure 4(a) – Pros of Technology

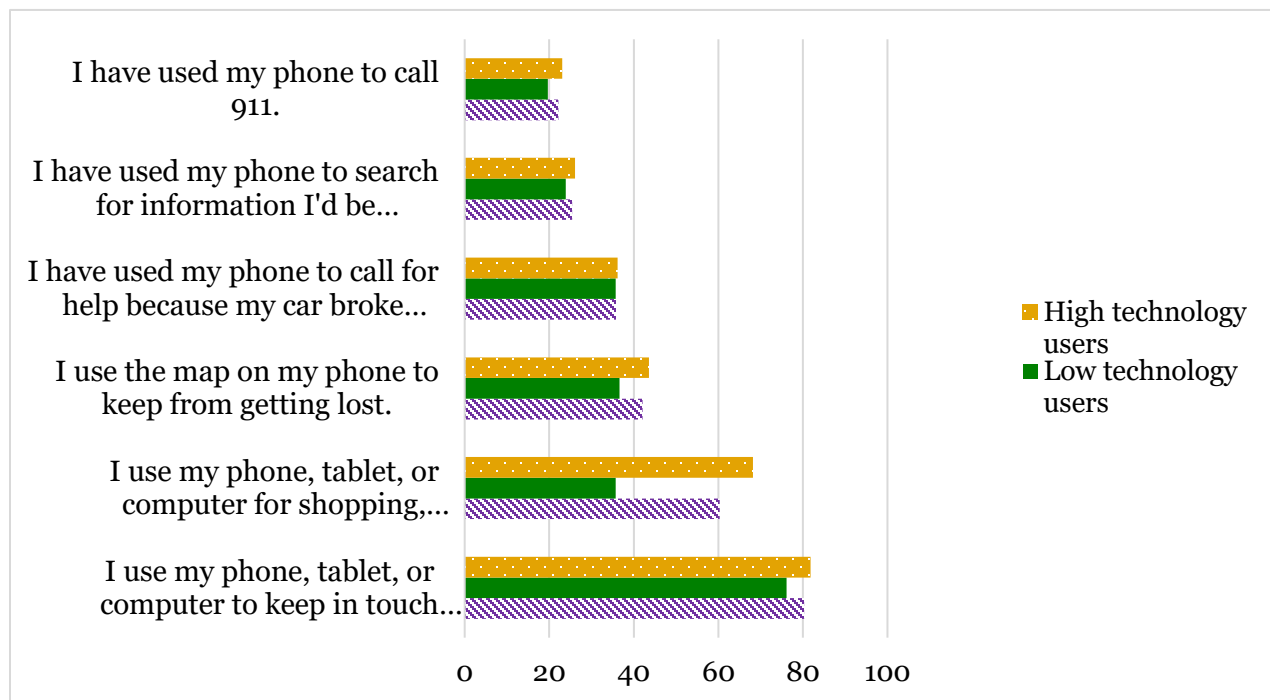
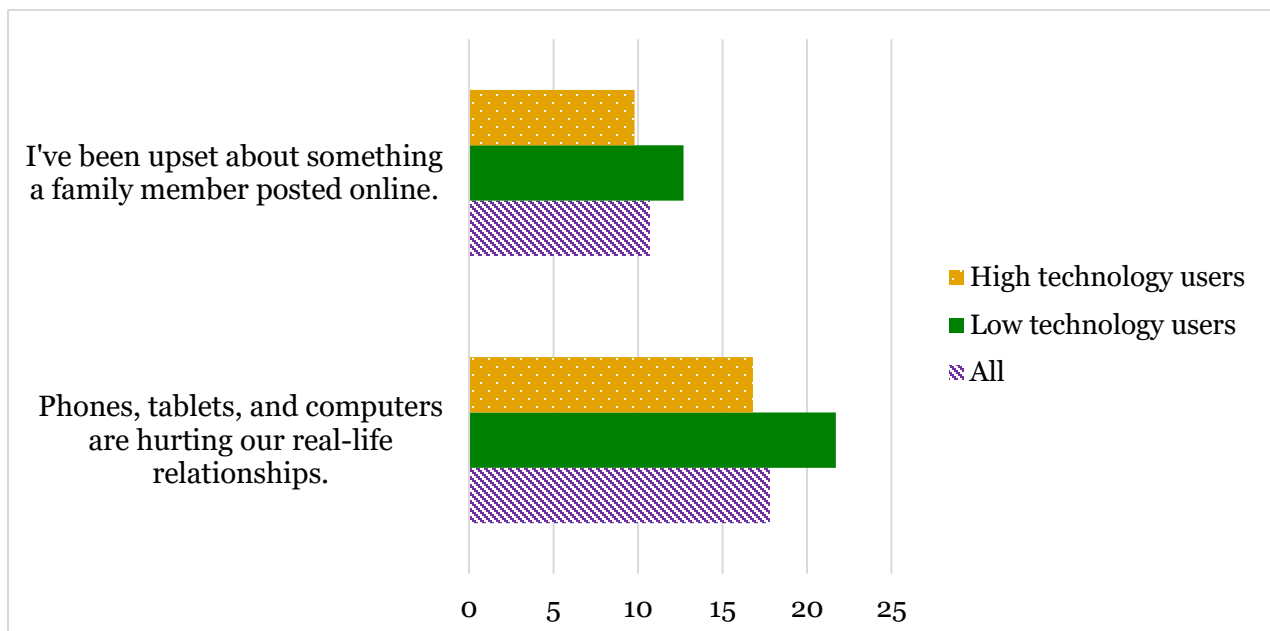


Figure 4(b) – Cons of Technology

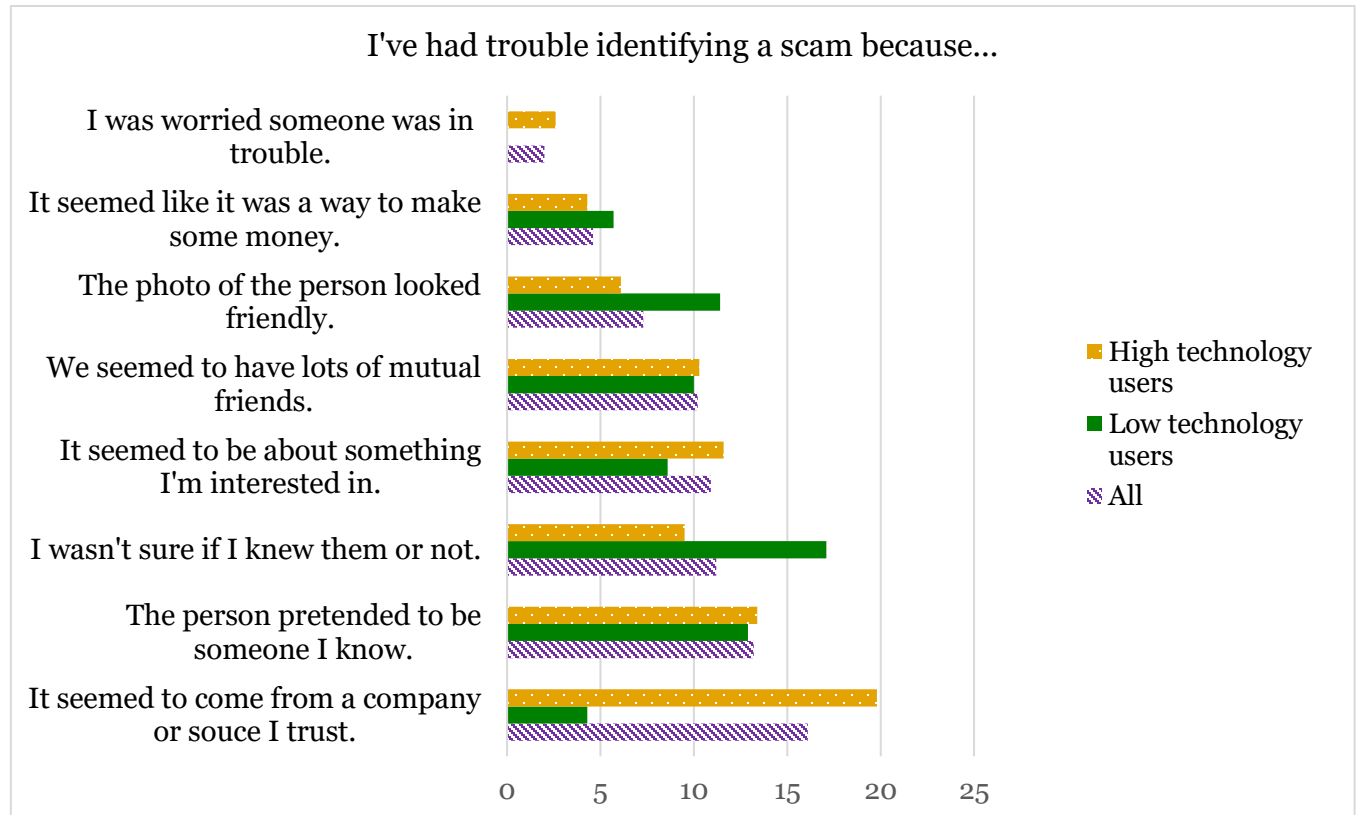


We also examined differences in rates for those classified as “low technology users” and “high technology users.” Not surprisingly, more high technology users (68.2%) reported using their devices for shopping, banking, and entertainment than low technology users (35.7%). However, otherwise perceptions of pros and cons were similar across low and high technology users.

Scam Challenges

The most commonly reported challenge in identifying a scam was because the information seemed to come from a company or source they trusted, reported by one out of every six participants (See Figure 5). Three challenges identifying scams were seldom reported: 7.3% said the photo of the person looked friendly, 4.6% said it seemed like a way to make money, and 2.0% reported they were worried someone was in trouble. The other challenges of identifying a scam were reported by 10 to 11% of the sample, including being unsure of the identity of the sender, the content being something they were interested in, and having mutual friends with the sender.

Figure 5 – Frequency of Perceived Challenges to Identifying Scams and Correlation with Cyber-victimization

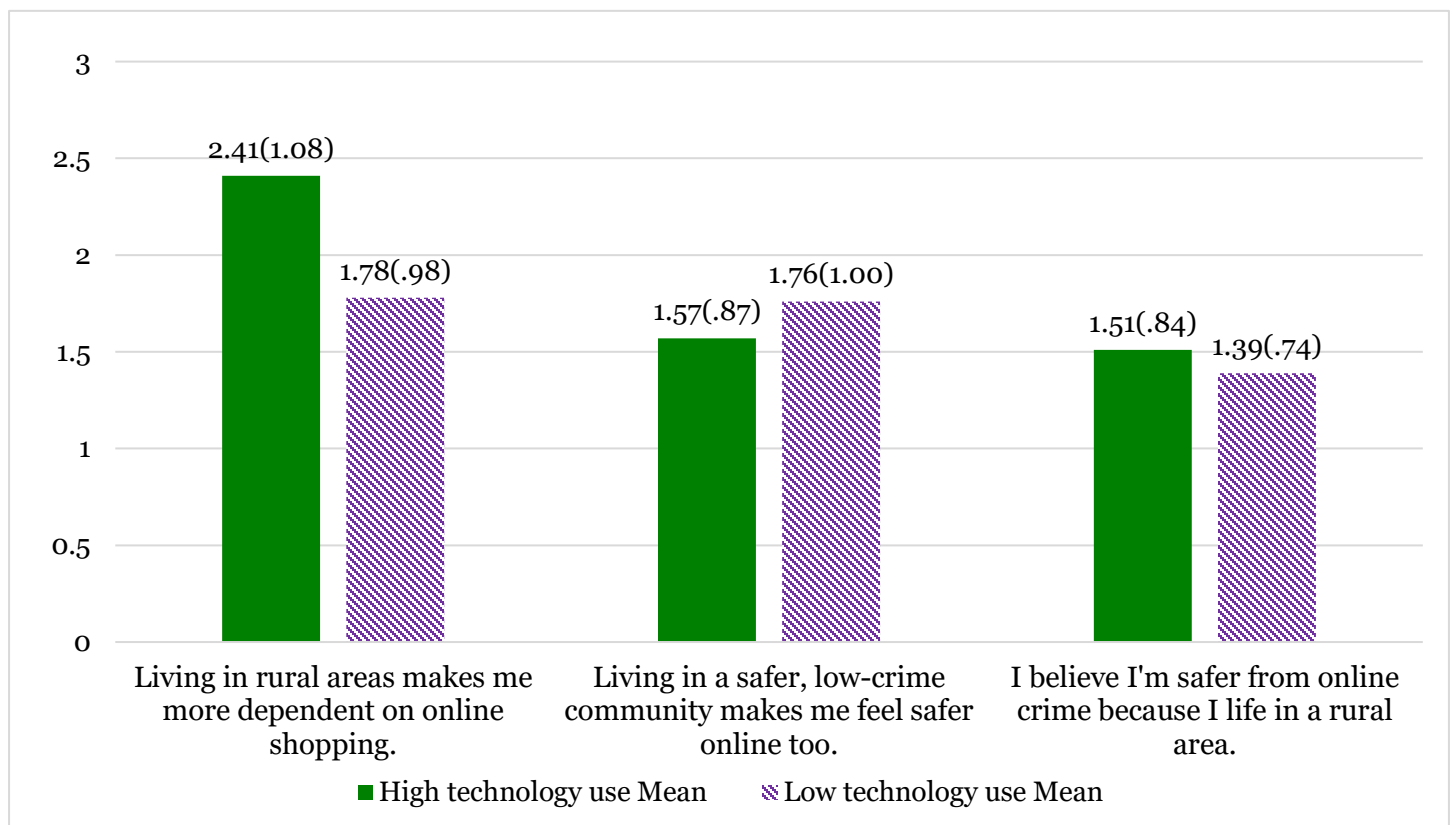


In terms of high or low technology use, high technology users were more likely to report having trouble because the source seemed to be from a trustworthy company (19.8%) than light technology users (4.3%). However, light technology users were somewhat more likely than high users to report trouble identifying a scam because they were unsure if they knew the sender (17.1% vs. 9.5%). Every scam challenge was significantly positively correlated with cyber-victimization (see Figure 5).

Rural-Specific Online Concerns

Three questions about rural-specific concerns had relatively low levels of endorsement. High technology users were more likely to report that living in a rural area made them more dependent on online shopping, $p < .001$ in ANOVAs, and this was also positively correlated with experiences of cyber-victimization. See Figure 6.

Figure 6 – Rural Specific Concerns as a function of Level of Technology Use and Correlation with Cyber-victimization

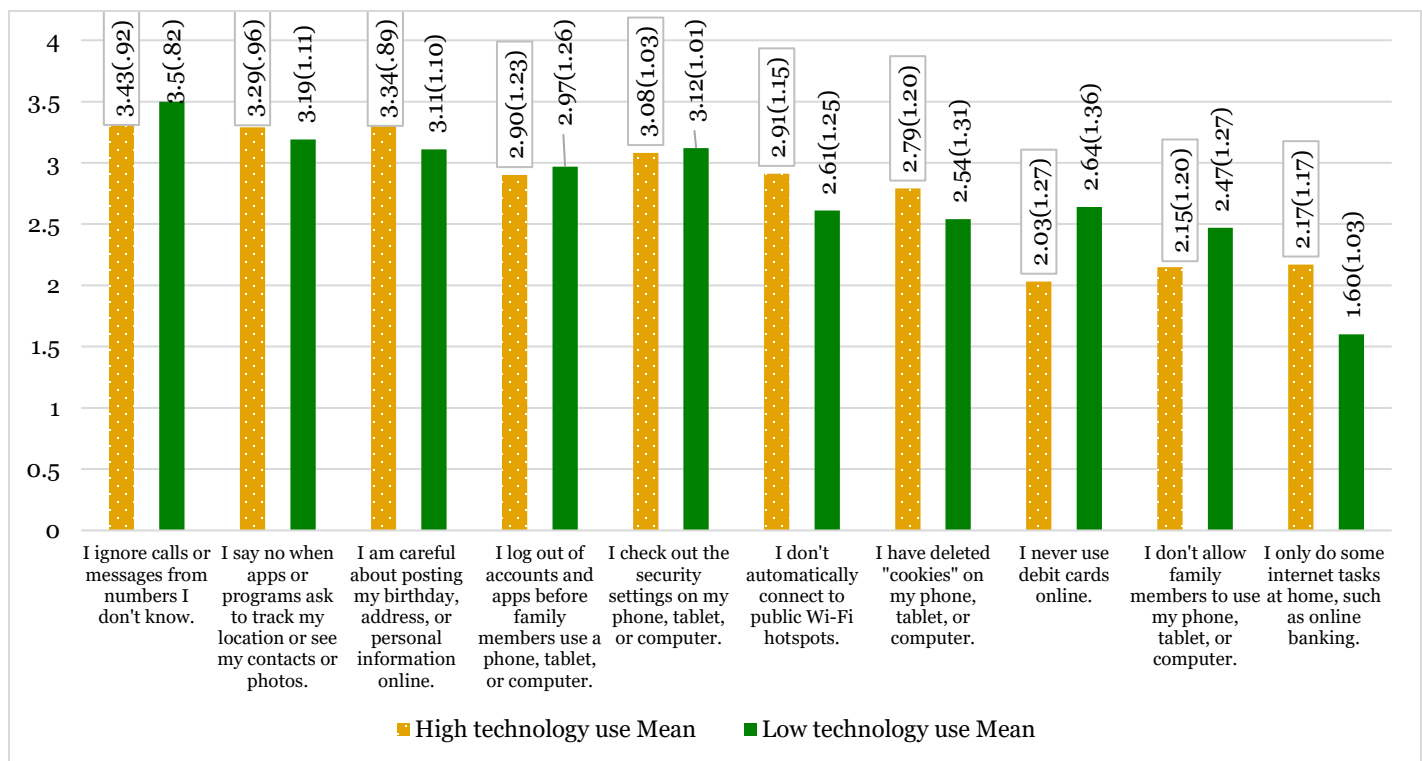


Cyber Safety Practices

We examined endorsement of 12 practices, including 2 potentially risky ones that had been identified in qualitative work. Over two-thirds of the sample said ignoring calls or messages from numbers they do not know was “mostly true” for them (67.8%). Other highly endorsed items included saying ‘no’ when apps ask to track their location or see their contacts or photos (58.0% said mostly true), and being careful about posting personal information, such as their address or birthday, online (57.6% said mostly true).

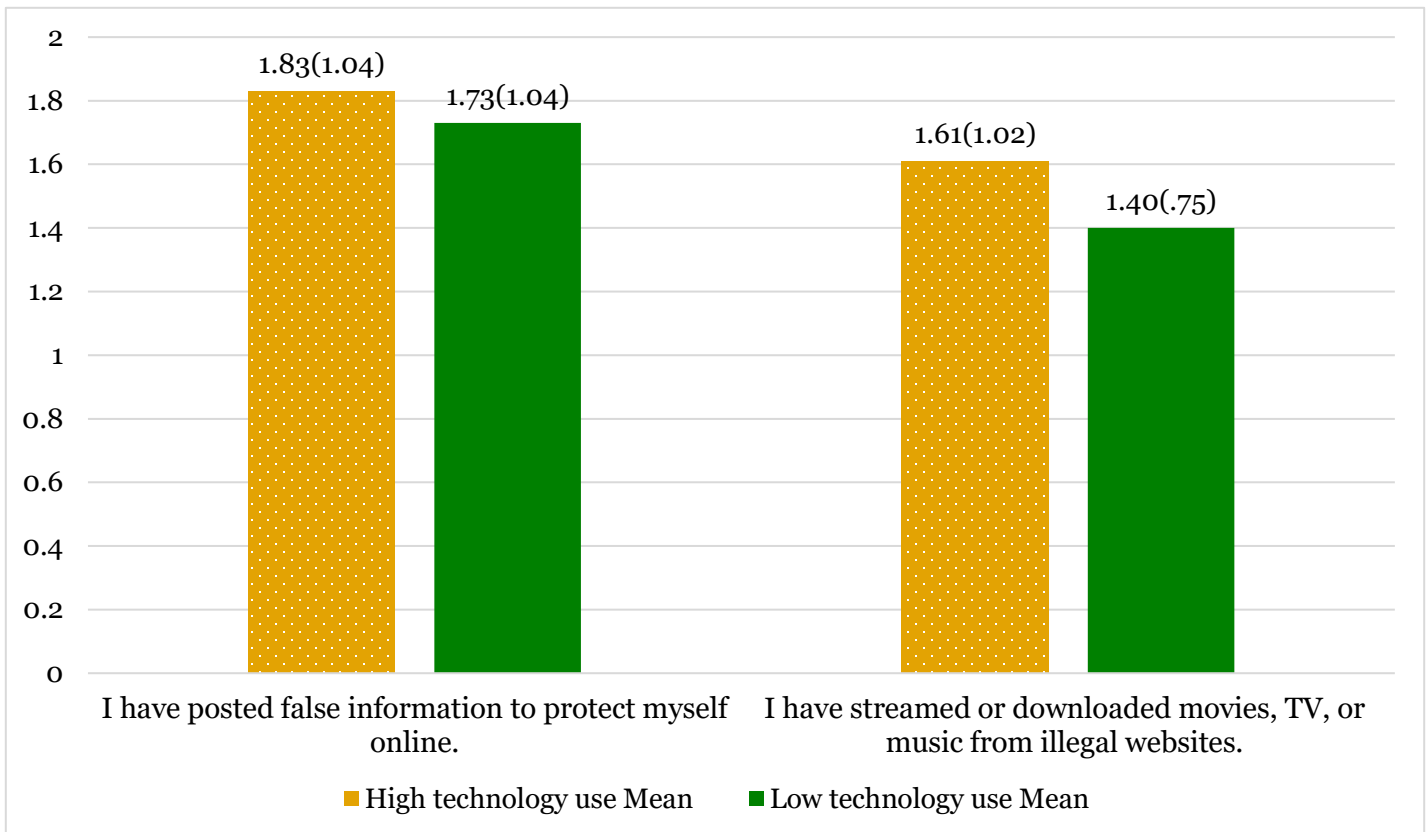
Several of these practices did vary by light and high technology users. High technology users were more likely to say they were careful about posting information online, avoiding public Wi-Fi hotspots, and only doing some internet tasks at home, such as online banking. However, light technology users were more likely to avoid using debit cards online and keeping their devices from other family members. See Figure 7a.

Figure 7(a) – Safety Practices as a Function of Technology Use and Correlation with Cyber-victimization



Regarding the association with cyber-victimization, avoiding debit cards online was associated with less cyber-victimization. Similarly, not posting personal information online and saying no to apps that ask to access personal information were also associated with lower levels of cyber-victimization. Two practices, illegally downloading and posting false information to protect privacy, showed effects in the opposite direction (i.e., were correlated with higher victimization), but neither of these reached significance. See Figure 7b for more details.

Figure 7(b) – Risky Behaviors as a Function of Technology Use and Correlation with Cyber-victimization



Discussion

This study provides a snapshot of technology use, experiences, and attitudes in a rural, low-income Appalachian sample that was recruited through in-person strategies. The sample was technologically diverse. Although smart phone and cell phone ownership were similar to recent national data, almost 1 in 4 participants in the current study reported infrequent use of computers (less than once a week), including approximately 1 in 7 who reported they had only used a computer a few times in their life. This group of light technology users made up a larger percentage of our sample, than has been found in other studies on technology use. For example, computer ownership and email use were lower than in recent national samples (Pew Research Center, 2017a; Smith, 2015). The experiences of these individuals are important to capture to fully understand the

role of modern technology in the lives of people today. Rural Appalachia remains a technologically diverse community, with significant portions of the population reporting little involvement with modern computer-based devices, while for others digital technology has become a fully integrated part of their daily lives.

As far as we are aware, this is the first study to assess the perceptions of rural residents about whether living in a rural area increases their vulnerability to cyber-victimization. For the most part, participants did not think that rural life affected their concerns about or experiences with technology significantly in high numbers. Some thought that living in a rural area made them more dependent on online shopping, and this concern was significantly associated with higher levels of cyber-victimization. High technology users were more likely to endorse this item than low technology users (perhaps giving some credence to those who are reluctant adopters). Few participants thought living in a low-crime rural area in and of itself made them safer from online crime.

We also explored other attitudes regarding technology through a series of items on pros and cons that were developed from focus groups and interviews in this community. The primary benefit of technology that was endorsed by our sample was keeping in touch with distant friends and family (highly endorsed by 4 in 5 participants). Although we expect this would be true in many communities, this is consistent with the high value placed on family and social networks in this Appalachian region (Woodard, 2011). The next highest reported benefit of technology was the convenience of using technology for shopping, banking, and entertainment, but unlike staying in touch, this benefit was less endorsed by light versus heavy technology users (35.7% v 68.2%), again reflecting something of a bi-section in the experiences of different segments of the population. Although in our qualitative work we heard a lot of concerns about the adverse impact on relationships, in this sample only 17.8% reported strong concerns about that.

This study also extends the very limited research that has been conducted on people's approaches to navigating the risk of cyber-victimization. Relying on challenges that were identified in previous qualitative work in this community (Hamby, Taylor, et al., 2018), we explored eight different challenges. The most commonly reported challenges were scams that seemed to come from a trustworthy company (1 in 6 people) or several items capturing that the sender of the scam might belong to their social network. This is consistent with past research identifying this as a particular vulnerability (Vishwanath et al., 2011). For the most part, light computer users were similar to frequent computer users, although light computer users were less likely to say they could be confused by marketing emails, perhaps because they do less online shopping and banking. In other analyses from this sample (Hamby, Blount, et al., 2018), we show that cyber-victimization contributes to psychological trauma, even over and above other (in-person) victimization experiences.

Finally, this study extends existing knowledge to a wider range of safety practices and is one of the first to explore them in a rural, low-income sample. Most of the sample endorsed a range of safety practices, but somewhat smaller numbers indicated that they did so consistently, and of course most of these are not particularly helpful if they are not done every time or nearly every time. The most common safety practice reported was not answering calls from unknown numbers, reported by 2 in 3 participants. Limiting access to one's location or contacts and refraining from posting personal information (such as birthdays) online were the other two that highly endorsed by more than half of the sample. Both of the latter two practices were associated with somewhat lower cyber-victimization, as was refraining from using debit cards online. In general, though, there was both a lot of room for improvement in the use of numerous safety practices, yet at the same time, surprisingly low associations with cyber-victimization suggest that many of these safety practices are minimally effective. It was somewhat surprising to us that several people endorsed the need for safety practices with regard to other family members. We believe these are the first quantitative data on this issue, and we found that it was fairly common to take steps to protect one's privacy from other family members, with about half of participants reporting they logged out of personal accounts before other family members use devices, and almost 1 in 4 reported that they do not let other family members share their devices.

In terms of how our findings compare to other literature, the results are a portrait of both similarities and differences. This region of rural Appalachia has more light technology users than found in other recent national surveys. In our qualitative work, we have found that some people in this community are not just late adopters, but are often reluctant adopters who do not believe that the pros outweigh the cons. Thus, although many people endorsed numerous pros for technology and relatively few endorsed cons, there still seems to be a substantial segment of this population who have chosen to participate cautiously in the technological revolution. However, much of the sample looked very much like people in the rest of the U.S., who own and regularly use computers, smart phones, email, and myriad other computer-based devices and applications.

We caution against inadvertent victim blaming in the attempt to better understand online vulnerability. There have been several papers on online behavior that have adopted the routine activities framework (e.g., Chen et al., 2017), which usually refers to relatively routine risky behaviors, such as being in dangerous locations late at night. Online shopping might be "routine" but it should not be treated as a risk that should be avoided, as it becomes an increasingly essential part of modern living for many people, including many in this rural community. Many online vulnerabilities are essentially unavoidable for many people who are in positions where they must use the Internet and cell phone data networks for essential activities of their work and daily lives.

Strengths and Limitations

The findings should be considered in light of the strengths and limitations of the study. We were able to reach community members who are light users of technology and are less often included in studies on technology. We have also expanded the study of many aspects of measuring technology use and concerns to a rural, low-income Appalachian community for the first time, but future research should investigate these issues in other rural communities and compare with urban populations. Although this sample was quite diverse in terms of technology use and ownership, it was, consistent with the demographics in this area, not very diverse with respect to race and ethnic identity. Some rural areas have very different racial and ethnic make-ups and it is important to expand the knowledge base to include these as well. This was an exploratory cross-sectional survey, but future research would also benefit from longitudinal research, especially regarding the link between safety practices and victimization.

Implications

One of the key implications of this study is the importance of not assuming findings of easy-to-reach technology users are representative of the whole population. Researchers need to take more effort to figure out how to reach diverse segments of the population and how to best communicate with more technologically-diverse communities. A lot of the literature focuses on the issues as ones about technical knowledge. However, it is not clear that all differences between users or between-person differences in risk are due to knowledge differences.

Another implication of these and other findings is that we may need to revisit individual-based approaches to online safety. Although a few safety practices were modestly correlated with lower rates of cyber-victimization, many were not. Fraudulent online solicitations, hostile comments or “trolling” and other adverse experiences have become so commonplace that they may be increasingly harder to avoid through individual action. Other research has suggested that factors such as the sheer volume of email can increase susceptibility to online victimization (Vishwanath et al., 2011). We need more focus on systemic efforts to reduce the burden of cyber-victimization, including efforts by technology companies and efforts by local, state, and national governments to promote safer online environments for everyone.

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