

Wireless Technology Use and Disability: Results from a National Survey

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Abstract

Access to and use of wireless consumer technology (e.g., mobile devices like cellphones and tablets, software and services) has become critical to social and economic participation. This is especially true for people with disabilities. This article presents data from the Survey of User Needs (SUN) conducted by the Rehabilitation Engineering Research Center for Wireless Technologies (Wireless RERC) from September 2012 through April 2013. The SUN focuses on wireless use among people with disabilities to identify patterns of use and the needs of this population. Key questions related to comparative trends among people with disabilities and the general population are addressed, including wireless adoption rates, preferred platforms (cellphone, smartphone, tablet), wireline (landline) use, and wireless use by disability type. Data show that as a group, people with disabilities own and use wireless technology at rates similar to the general population, but substantial variation exists in ownership of different types of wireless devices between disability types.

Keywords

Wireless, use, accessibility, cellphone, smartphone, tablet

Introduction

Access to and use of mainstream wireless technology is increasingly essential to full social and economic participation. The digital divide can be a social divide--if you do not have access to mainstream consumer information and communication technology, you are literally not part of the conversation. For people with disabilities, who already face considerable obstacles to social and economic participation, access to wireless technologies is especially critical. Data from the CTIA-The Wireless Association show over 331 million wireless service subscriptions in the United States (CTIA 2). The Pew Internet and American Life Project reports survey data that show a steadily rising rate of cellphone ownership among American adults in recent years, from 73% in 2006 to 87% in 2012 ("Trend"), with current smartphone ownership at 46%, and tablet computer ownership at 31% of American adults.

At the same time, advances in consumer technology have created new opportunities to empower people with disabilities: to augment or assist communication, aid vision, aid memory, guide navigation outside the home, automate and monitor events inside of the home, monitor health, provide emergency communications and location finding, provide information on the go, socialize, and more. Despite these new opportunities for greater accessibility and utility, the rapid rate of technological innovation poses risks that hard-won advances in accessibility could be undone by new generations of mobile wireless technology (Schroeder and Burton).

This article presents findings from the Survey of User Needs (SUN), a national survey on use and usability of consumer wireless technology by people with disabilities, conducted by the Rehabilitation Engineering Research Center for Wireless Technologies (Wireless RERC). These findings address several core questions related to disability and technology access:

- Disability divide--Do people with disabilities use wireless technologies at rates similar to the general population?
- Income divide--Does income effect adoption rates and use of wireless technology by people with disabilities? (Wireless RERC 1-2)
- Age divide--Do younger adults with disabilities use more advanced wireless technology than older users? (Morris, Mueller, and Jones)
- Wireless substitution--Do income and age of people with disabilities affect the use of wireline technology in the home? (Blumberg and Luke 2)
- Functional divide--Do people with specific disabilities own or use more sophisticated types of wireless devices more than other groups?

Originally launched in 2002, the SUN has been updated over the years to keep up with the rapid pace of technological change. Now in its fourth version (SUN 4) this unique, nationwide survey on wireless technology use by people with all types of disabilities has come to be an important reference for the wireless industry, regulators, people with disabilities and advocates, and other researchers. The results presented in this paper focus on the most recent version of the SUN launched in the fall of 2012. Participants were recruited across the eight general disability categories listed in Table 1. These are based on the categories used by the American Community Survey (ACS), augmented with categories adapted from the National Health Interview Survey (NHIS). The SUN questionnaire permits finer segmentation of respondents by disability sub-types (e.g., blindness as a subtype of difficulty seeing, using a wheelchair as a subtype of difficulty walking). A total of 780 people responded to the survey, with 659 reporting having at least one of the disability types. Females constitute 57% of the

respondents. The mean age of 50 years is partially attributable to excluding minors under the age of 18, due to concerns with conducting research with vulnerable populations.

Table 1 Survey of User Needs Sample by Disability Type

Disability Type	Respondents (%)*
Difficulty walking or climbing stairs	39%
Difficulty hearing	36%
- Hard of hearing	26%
- Deaf	10%
Difficulty seeing	29%
- Low vision	15%
- Blind	11%
Difficulty using hands or fingers	26%
Difficulty concentrating, remembering, deciding	24%
Frequent worry, nervousness, or anxiety	20%
Difficulty using arms	17%
Difficulty speaking so people can understand me	14%

*Many respondents noted more than one disability type.

Source: Wireless RERC, Survey of User Needs, 2012-2013.

Discussion

The paper comprises two main areas of analysis: 1) analysis of responses for all eight disability categories together; and 2) analysis of responses for individual disability categories. General trends related to overall ownership rates and ownership of specific types of device (basic or “feature” phone, smartphone, tablet) are examined. Additionally, response data on wireless substitution (“cutting the cord”) are examined as another way of understanding the degree to which people with disabilities rely on wireless technology.

Table 2 also shows the details of ownership of three general types of devices: basic cellphone, smartphone, and tablet. Overall, SUN respondents with disabilities own basic cellphones and/or smartphones at a slightly lower rate (84%) than the general population (91%)

as measured by the Pew Internet and American Life Project (“Trend”). Some SUN respondents reported owning only a tablet, but not a cellphone or smartphone. Adding these respondents to the basic cellphone and smartphone owners raises the wireless ownership rate to 91%. The SUN sample of people with disabilities shows a rate of smartphone ownership that is similar to the Pew sample for the general population. Tablet ownership rates also are comparable in both samples.

Table 2 Wireless Use and Device Type (All respondents with a disability)

Do you own or use a cellphone, smartphone or tablet?	SUN	Pew
Cellphone or smartphone	84%	91%
Cellphone, smartphone or tablet	91%	--
If you own or use a cell phone or tablet, what kind do you use? (Check all that apply)		
Basic cellphone (e.g., Motorola Razr, Pantech Breeze, Nokia 6350)	31%	35%
Smartphone (e.g., iPhone, Android phone, BlackBerry, Windows phone)	54%	56%
Tablet (e.g., iPad, Kindle Fire, Galaxy Tab, Google Nexus)	31%	34%
Other (iPod Touch, Nook, Kindle, netbook, laptop)	6%	--

Sources: Wireless RERC, *Survey of User Needs*, 2012-2013. *Pew Internet Surveys*, 2006-2013.

Findings are mixed regarding a possible income divide in wireless device ownership among people with disabilities. It is generally expected that people with higher incomes are more likely to own more expensive devices, which in turn are used with more expensive plans (for cellphones and smartphones, but not necessarily tablets).

Table 3 Wireless and Wireline Use by Income (All respondents with a disability)

	No wireless device	Basic phone	Smart phone	Tablet	Wireline
Less than \$10,000	13%	34%	47%	24%	60%
\$10,000-\$14,999	6%	42%	44%	21%	66%
\$15,000-\$24,999	17%	29%	43%	19%	74%
\$25,000-\$34,999	11%	40%	45%	27%	68%
\$35,000-\$49,999	5%	40%	52%	27%	76%
\$50,000-\$74,999	10%	32%	55%	36%	77%
\$75,000 or more	4%	19%	74%	46%	81%

Source: Wireless RERC, *Survey of User Needs*, 2012-2013.

Table 3 shows that there is no discernible income-based pattern to either not owning a wireless device or owning a basic cellphone. On the other hand, the data show clear patterns by which respondents with higher incomes are also more likely to own smartphones and tablets.

Table 4 shows the same wireless options as Table 3, but here the 6 row headers contain age ranges beginning with 18-30 and ending with over 70 years old. It is expected that there would be an age divide whereby younger respondents with disabilities would be less likely not to have a wireless device or to have a basic cellphone than older respondents. Conversely, younger respondents should be more likely to own more sophisticated devices like smartphones and tablets. The percentages of respondents shown in Table 4 support these aspects of an age divide, with the exception of not owning a wireless device. Unexpectedly, the data show that younger respondents are more likely not to own a wireless device than older respondents. Here, too, there is an exception: the oldest age group (over 70) has a higher rate of non-ownership (11%) than all but the youngest age group (18-30), 16% of whom do not own a wireless device.

Table 4 Wireless and Wireline Use by Age (All respondents with a disability)

	No wireless device	Basic phone	Smart phone	Tablet	Wireline
18-30	16%	26%	57%	35%	60%
31-40	10%	25%	67%	37%	55%
41-50	9%	26%	60%	36%	72%
51-60	7%	34%	52%	24%	79%
61-70	7%	40%	48%	25%	85%
Over 70 years old	11%	53%	26%	32%	87%

Source: Wireless RERC, Survey of User Needs, 2012-2013.

Tables 3 and 4 also show wireline use as a percentage of respondents. According to the CDC's semi-annual report on "wireless substitution," individuals with lower income and of lower age are more likely to live in households without wireline phone service, often due to economic pressures (Blumberg and Luke 2-3). Tables 3 and 4 show that younger respondents and those with lower household income are more likely to live in a household without a wireline telephone.

Analyzing data for all respondents with disabilities as a single group has revealed some important trends. However, a more complete understanding requires analysis of wireless device ownership by disability. Table 5 shows wireless device and wireline ownership for the eight disability types listed in Table 1. Table 6 shows the same technology options, but with the respondents who reported having visual or hearing loss disaggregated by level of functional loss: low vision and blind, and hard or hearing and deaf.

Table 5 Wireless and Wireline Use by Disability Type (All respondents with a disability)

	No wireless device	Basic phone	Smart phone	Tablet	Wireline
Cognitive	12%	33%	52%	23%	70%
Anxiety	11%	34%	51%	28%	71%
Seeing	11%	36%	50%	26%	78%
Hearing	10%	25%	58%	33%	73%
Speaking	17%	28%	52%	43%	69%
Using arms	11%	41%	40%	33%	83%
Using hands/fingers	12%	37%	48%	32%	80%
Walking, climbing stairs	9%	39%	48%	34%	76%

Source: Wireless RERC, Survey of User Needs, 2012-2013.

Disability type differs from income and age as a variable in that there is no natural order or progression of the values, except perhaps low vision and blind, and separately hard of hearing and deaf. Consequently, it is not possible to analyze trends across the eight general disability categories as in previous tables. Nonetheless, some specific values stand out. First, those who reported having difficulty speaking have the highest rate for not having a wireless device (17%), and the lowest rate for having a wireline in the home (69%). These results suggest low levels of voice connectedness, relative to the other disability categories (with exception perhaps of people with profound hearing loss), which makes sense given the difficulty with speech. Conversely, this group shows by far the highest rates of tablet ownership (43%), perhaps reflecting use of storyboard-based speech generating apps on tablets, as well as possible use of the larger keyboard interface for text-based communications (text messaging, email, social media).

It is also notable that the three physical disability categories (using arms, using hands and fingers, and walking and climbing stairs) reported the highest rates of ownership of simple phones (41%, 37% and 39%, respectively). These results might reflect interactions with age, but they may also reflect the possible greater accessibility of simple phones with physical buttons by people with limited physical abilities. These interfaces may produce less slippage of fingers or

styluses and physical feedback of key activation. Simple cellphones also may provide greater durability when dropped. There are also notable distinctions between the two vision loss groups and the two hearing loss groups (Table 6). Deaf respondents show much higher rates of smartphone (66%) and tablet ownership (48%) and much lower rates of basic phone (19%) and wireline ownership (46%) than hard of hearing respondents.

Table 6 Wireless and Wireline Use by Disability Type (All respondents with a disability)

	No wireless device	Basic phone	Smart phone	Tablet	Wireline
Low vision	11%	38%	47%	33%	74%
Blind	9%	32%	51%	15%	84%
Hard of hearing	12%	30%	54%	27%	81%
Deaf	8%	19%	66%	48%	46%

Source: Wireless RERC, Survey of User Needs, 2012-2013.

These results make sense since people who are deaf have more complex communication needs that often cannot be satisfied by basic cellphones or wireline phones. For the vision loss groups, the largest differences are in use of tablets and wireline service in the home. Low vision respondents own tablets at a much higher rate (33%) than blind respondents (15%); and they are substantially less likely to have a wireline phone in the home (74% versus 84% for blind respondents). Because tablets offer visual interactions that other devices cannot match, it makes sense that people with low vision would be very attracted to them, while those who are blind would not. Wireline phones, often more readily accessible than wireless devices to people who are blind, are likely to attract high percentages of blind users.

Conclusions

The survey results presented here lead to two general conclusions. First, people with all types of disabilities taken as a single group use basic cellphones and smartphones at a slightly

lower rate than the general population, but smartphones at a higher rate. These results chip away at the notion of a disability divide between people with disabilities and the general population regarding technology use. Additionally, among people with disabilities there is evidence of an income divide (higher incomes lead to use of more sophisticated technology) and an age divide (lower age leads to use of more sophisticated technology). These divides are also believed to characterize the general population.

The second conclusion is that substantial differences in technology ownership and use can be found between and among people with different disabilities. Basic cellphones, smartphones, tablets, and even wireline phones all offer different capabilities that make them more usable for those with a certain limitation, and less so for those with a different limitation. Enabling customers with disabilities to understand and select wireless devices and services that best fit their own needs and abilities should be a primary mission of manufacturers and carriers that value this large and growing customer market.

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