Concerns, Skills, and Activities:
Multilayered Privacy Issues in Disadvantaged Urban Communities

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Little attention has been given to how members of economically, socially, and digitally disadvantaged groups experience privacy. Using a door-to-door paper-and-pencil household census of public housing communities in a major American city, this study examined three layers of digital privacy experiences among public housing residents— privacy concerns, privacy skills, and privacy-compromising activities. Results showed that privacy concerns are one of the major reasons that hinder residents from adopting the Internet. Regression analysis revealed significant gaps in digital privacy skills among residents by generation and by having private Internet access or not. Moreover, higher levels of privacy skills and relatively private Internet access contribute to more frequent engagement in digital activities that can compromise privacy. This research provides valuable insights on how privacy concerns and skills affect digital inclusion in a marginalized population.

Keywords: privacy, privacy concern, privacy skill, digital divide, digital inequality, Internet, low income, disadvantaged

Privacy has become a critical issue in all digital lives. People in marginalized and disadvantaged communities may have even greater challenges to protect their privacy. First, often on the wrong side of digital divides in terms of access, skills, or usage, many in marginalized and disadvantaged communities have greater mistrust of the Internet. Second, even though they are often the targets of data profiling (Gangadharan, 2012), they have inadequate skills to manage their information disclosure. Prejudice they experience offline can easily migrate online, resulting in a digitally enabled cumulative disadvantage (Gandy, 2009). A growing body of literature has examined how privacy concerns limit Internet users' engagement in digital activities involving disclosure of personal information (Bansal & Gefen, 2010;

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Gerrard, Cunningham, & Devlin, 2006; Zhou, 2011). Researchers have also investigated the roles that privacy skills play in mitigating such concerns and promoting digital activities (Bartsch & Dienlin, 2016; Dinev & Hart, 2004). However, existing studies have paid limited attention to how members of disadvantaged groups experience privacy. Even fewer studies have examined multiple layers of privacy issues at the margins from digital divides and inclusion perspectives.

Integrating the literature on privacy and digital divides, this research explores three layers of privacy experiences in a disadvantaged population—privacy concerns, digital privacy skills, and privacy-compromising digital activities. Specifically, drawing on a census survey of 18 public housing communities operated by one of the largest public housing authorities in a major city in the United States, this study examined (1) the extent to which privacy concerns contribute to nonuse of the Internet among public housing residents, (2) how digital privacy skills vary by social inequalities and the Internet access divide, and (3) how digital privacy skills and private Internet access affect privacy-compromising digital activities.

This study fills several critical gaps in the literature of privacy and digital divides, and has practical policy implications. First, it focuses on an extremely low-income (average annual income per household is as low as $11,000), mostly unemployed, racially and ethnically marginalized, and female-dominated population. Second, it highlights privacy concerns as a barrier to Internet adoption among members of disadvantaged communities, which has not received much attention in existing studies. Third, it examines digital privacy skills and digital activities that involve personal information disclosure in particular, compared with other studies focusing on digital skills and general digital activities. Fourth, it articulates the implications of the Internet access divide for privacy issues. The study sheds light on digital inclusion policy in terms of how to facilitate members of disadvantaged groups to better conduct their digital lives.

Privacy Concerns

Privacy refers to individuals' rights to determine when, how, and to what extent personal information can be revealed (Warren & Brandeis, 1890; Westin, 1968). It involves the selective control of others' access to the self (Altman, 1975), including physical, social or interactional, psychological, and informational access to the self (Burgoon et al., 1989; DeCew, 1997). Physical privacy is the freedom from surveillance or unwanted intrusion; social privacy refers to the control of one's encounters with others, reducing the influence of social pressure; psychological privacy protects one's thoughts, feelings, and attitudes; informational privacy is the ability to control how information about the self is gathered and disseminated (Burgoon et al., 1989; DeCew, 1997).

The development of digital technologies has greatly facilitated the collection, dissemination, storage, and usage of personal information provided online. However, parallel to this advancement are individuals' increased concerns about their various types of privacy. For instance, more than half of Americans are concerned about government surveillance of their digital communication, including activities on e-mail, social networking sites, mobile phones and apps, and search engines (Rainie & Madden, 2015). Social media users are concerned about their lack of control over the content they post (Raynes-Goldie, 2010). Users are also worried about unwanted invasion of their profile information. In addition, privacy

concerns are heightened when consumers feel uninformed about who is collecting their transactional and financial information or for what purposes their information is used (Lanier & Saini, 2008).

Studies on privacy concerns have well documented their role in discouraging self-disclosure behaviors on the Internet. Privacy concerns about finances have been a major hindrance to online purchases and banking (Gerrard et al., 2006). Users are unwilling to fully engage in mobile location-based services because of privacy concerns about the collection of location information for marketing purposes and its secondary use by unknown third parties (Zhou, 2011). With the growing popularity of social media, concerns about social privacy, such as social interaction being visible and people being tagged in unwanted photos, make self-disclosure behaviors such as status updates less frequent or force users to manage privacy settings carefully (Chen & Chen, 2015; Marwick & boyd, 2014; Vitak, 2012).

However, existing studies on privacy concerns have focused heavily on Internet users and digital natives and have investigated how privacy concerns contribute to inequalities in digital activities. Very little scholarly attention has been given to populations at the margins, who are left behind in digital access and use, and whether privacy concerns are a major cause of their Internet nonuse. Although a national survey showed that privacy concerns are the least reason why offline Americans do not use the Internet compared with other possible reasons such as lack of interest, waste of time, or physical inability (Zickuhr, 2013), it is highly possible that privacy concerns contribute to Internet nonuse for the marginalized population.

Internet nonusers from disadvantaged communities might be suspicious about privacy and security of the Internet because of their lack of digital exposure and experiences. Ostlund (1974) identifies perceived risk as an important attribute of innovation to predict its adoption besides the five attributes proposed by Rogers (1962) in his diffusion theory, that is, relative advantage, compatibility, complexity, trialability, and observability. Parasuraman's (2000) Technology Readiness Index shows that insecurity (i.e., the degree to which people distrust technology) inhibits people from digital adoption. Individuals' methods of coping with privacy threats mainly involve two strategies—approaching and avoiding (Raman & Pashupati, 2004). When concerned about digital privacy, Internet users with financial and social resources might adopt privacy-enhancing technologies or limit use of particular privacy-threatening services. By contrast, Internet nonusers from disadvantaged communities, who have limited financial and social resources as well as limited or no Internet experiences, might choose to avoid being digitally included. They might be very concerned about economic loss caused by privacy violation (Reisig, Pratt, & Holtfreter, 2009). They might also have few people in their social networks who are digitally experienced enough to help them mitigate their worries. Thus, we asked

RQ1:   To what extent do privacy concerns contribute to Internet nonuse among public housing residents?

Digital Privacy Skills

Digital privacy skills, a subset of digital skills in general, are users' ability to apply strategies for individual online privacy regulation and data protection (Trepte et al., 2015). Previous studies on digital skills have centered on operational, formal, informational, or strategic skills (Hargittai, 2010; van Dijk,

2005). More recent studies have argued that online safety or privacy skills need to be added to the repertoire because of their growing importance (Hargittai & Litt, 2013; Park & Jang, 2014; Sonck, Livingstone, Kuiper, & de Haan, 2011). If privacy concerns discourage people from Internet activities that involve disclosure of personal information, digital privacy skills on the other hand will mitigate these concerns and enable people to safely and selectively participate in digital activities that can compromise privacy (Bartsch & Dienlin, 2016; Dinev & Hart, 2004).

Studies on digital divides and inclusion have investigated inequalities of digital skills in general and their association with social inequalities among Internet users for more than a decade (Hargittai, 2002; van Deursen & van Dijk, 2011). However, little scholarly attention has been given to the uneven distribution of digital privacy skills among members of disadvantaged communities. The limited studies, which have empirically examined the patterns of digital privacy skills, have focused either on the general population or digital natives or on one single Internet platform such as social networking sites (Bartsch & Dienlin, 2016; boyd & Hargittai, 2010; Chen & Chen, 2015; Youn, 2009; Young & Quan-Haase, 2013). Questions remain unanswered about the unique patterns and causes of digital privacy skills in the disadvantaged and marginalized population.

Members of disadvantaged groups often face greater challenges in privacy issues. Corporations regularly collect data from them so as to sell them low-quality new products or risky subprime loans (Gandy, 2009; Gangadharan, 2012). Compared with middle- and high-income people, low-income people are also frequent victims of identity theft (Copes, Kerley, Huff, & Kane, 2010) and are affected much more by financial loss and emotional stress caused by such accidents. However, members of disadvantaged communities often lack privacy skills such as adjusting privacy settings, deploying privacy-enhancing technologies, or using other strategies, as they still struggle with basic Internet activities such as using a search engine and launching applications (Gangadharan, 2015). It is therefore necessary for research on digital privacy skills to focus on disadvantaged groups. This study is among the first to identify factors related to uneven digital privacy skills among low-income, racially and ethnically marginalized, mostly unemployed public housing residents.

Many studies have identified disparities related to income, education, age, gender, and employment that are strongly related to gaps in general digital skills (Hargittai, 2010; van Deursen & van Dijk, 2011). People who are less educated, elderly, or unemployed are often on the wrong side of digital skill divides (Robinson et al., 2015). When shifting attention to digital privacy skills in particular, a specific subset of digital skills, social inequalities still matter. One important study on privacy skills and practices showed that older people and females have lower levels of technical skills of privacy control; yet, education does not play a contributing role (Park, 2011). Another national survey also identified the generation gap in using digital strategies to be less visible online (Rainie & Duggan, 2016). Given limited research studying this issue, we asked

RQ2a: *How are public housing residents' sociodemographic and socioeconomic characteristics with respect to age, gender, race and ethnicity, education, and employment associated with their digital privacy skills?*

Beyond these markers of social inequalities, the digital access divide can be another factor shaping digital privacy skills. Access divide involves more than simply haves or have-nots and can be inequalities related to the quality, location, and autonomy of Internet access (DiMaggio & Hargittai, 2001; Helsper, 2012; van Dijk, 2005). Home Internet access allows convenience and autonomy (Hassani, 2006; Lim, 2009). Internet users at home can freely install privacy-enhancing applications such as firewalls or use privacy-protecting browsers to protect their data. Internet access via personally owned mobile devices also allows users to apply strategies to protect their privacy. Thus, having one or both of such relatively more private Internet accesses enables users to learn and practice privacy skills at anytime and anywhere.

By contrast, people without access to the Internet at home or on their smartphones usually access the Internet on public computers at public libraries, community computer centers, workplaces, or friends' homes, which hugely limits their digital experiences. This is prevalent in disadvantaged communities such as public housing communities because many low-income people cannot afford private Internet access and devices (Gangadharan, 2015). In public libraries or community centers, public computer users are rarely allowed to download or install any software that is not preinstalled. The content-filtering system automatically blocks websites and content deemed suspicious. In addition, users can access the Internet on public computers for only a short period of time during business hours. These restrictions keep users from learning and applying privacy skills to protect their information and data. Thus, for public housing residents, home or mobile Internet access, when compared with public Internet access, functions as private Internet access and might affect their digital privacy skills. As this has not received any scholarly attention yet, we formulated a research question to explore the issue:

RQ2b: How do digital privacy skills of public housing residents vary by whether they have private Internet access or not?

Privacy-Compromising Digital Activities

Many digital activities, such as online purchasing, online banking, using social networking sites, e-mailing, and online job application, involve self-disclosure of personal information. We term them *privacy-compromising digital activities*. Participation in these activities significantly enhances quality of life; yet, its downside is the possibility of privacy erosion. Without compromising their privacy, individuals cannot reap many benefits as claimed by the Internet service providers or even get the permission to use their services. For members of disadvantaged communities, engagement in such common digital activities is especially important. Otherwise, they will be left behind or excluded from digital life. One possible solution to balance the positive and negative outcomes of participating in privacy-compromising digital activities is to acquire and improve one's digital privacy skills.

Digital privacy skills can counterbalance risks and concerns of personal information disclosure and thus increase individuals' participation in privacy-compromising digital activities. The privacy calculus, that is, individuals' evaluation of the inhibitors and drivers associated with information disclosure behaviors, highlights the importance of risk assessment and trust (Dinev & Hart, 2006; Laufer & Wolfe, 1977). From the service providers' perspective, many studies have shown that better privacy protection policies and strategies can reduce customers' privacy concerns and increase their trust, resulting in continued use of

services that require more personal information disclosure (Culnan & Armstrong, 1999; Tsai, Egelman, Cranor, & Acquisti, 2011). From the customers' or users' perspective, having higher levels of digital privacy skills can possibly improve their confidence in handling risks and information control.

Yet, only a limited number of studies on privacy have examined the efforts users can make to let them fully engage in digital activities that can compromise privacy. Those studies that have explored these issues tended to focus on social privacy protection skills in particular, especially managing privacy settings on social networking sites, or focus on privacy-related behaviors on a specific Internet platform, especially social networking sites (Chen & Chen, 2015; Hargittai & Litt, 2013; Young & Quan-Haase, 2013). The current study focused on privacy-compromising digital activities across platforms and functions and explored how participation gaps in those activities can vary by digital privacy skills among members of disadvantaged communities.

The digital activity participation gap has gained increasing scholarly attention in the studies of digital divides. A lot of studies have tested the positive implications of digital skills for bridging gaps in digital activity participation (Correa, 2010; Hargittai, 2010; Hargittai & Walejko, 2008; Pearce & Rice, 2013). The proficiency of digital skills significantly contributes to the range and frequency of digital activities that individuals conduct (Hargittai, 2010; Pearce & Rice, 2013). Young people's digital skills are positively linked with some specific types of digital activities, such as online content creation and sharing (Correa, 2010; Hargittai & Walejko, 2008). When shifting attention to digital privacy skills and privacy-compromising digital activities in particular, it is likely that the two will be highly associated. Thus, based on the literature of both privacy and digital divides, we hypothesized

H1:   *The levels of digital privacy skills will be positively related to the frequency of conducting privacy-compromising digital activities among public housing residents.*

For members in disadvantaged communities, relatively private Internet access such as home or mobile Internet access can influence their participation in privacy-compromising digital activities as well. Home or mobile Internet access gives users greater control and autonomy (Hassani, 2006; Lim, 2009). Users do not feel like they are being watched or forced to complete their activities within a limited timeframe. By contrast, public Internet access at public libraries, community computer centers, workplaces, or friends' homes gives users less autonomy. Users may feel that they are being monitored by Internet tracking software or others such as librarian staff, coworkers, or friends. In addition, users might unwittingly put their privacy at risk by not erasing their digital footprints such as e-mail accounts they just accessed, passwords used, or websites searched. One study showed that members of marginalized groups seem to experience these inconveniences very often when using digital devices and the Internet at public libraries (Gangadharan, 2015). Therefore, without private Internet access, they might not be able to frequently conduct digital activities that involve disclosure of personal information. We hypothesized the following:

H2:   *Having private Internet access will contribute to greater frequency of conducting privacy-compromising digital activities among public housing residents.*

Building on the above discussion of the main effects of digital privacy skills and digital access on engagement in privacy-compromising digital activities as well as the relationship between digital access and digital privacy skills, we argue for a mediating effect of digital privacy skills on the relationship between private digital access and engagement in privacy-compromising digital activities. In general, both digital access and skills are required for participation in digital activities (van Dijk, 2005). Having better digital access can contribute to higher levels of digital skills, which in turn contribute to more participation in digital activities (van Dijk, 2005). Accordingly, the relationship between digital access and digital activities is channeled by digital skills. Thus, when shifting our attention to private Internet access, privacy skills, and privacy-compromising digital activities in particular, we asked

RQ3:   *Do the levels of digital privacy skills mediate the relationship between having private Internet access and frequency of conducting privacy-compromising digital activities among public housing residents?*

Method

Data and Procedure

This study drew on a census survey of public housing households in all of the 18 communities operated by one of the largest public housing authorities in a major city in the United States ($N = 1,825$) from March to September 2015. Self-administered paper-and-pencil bilingual English and Spanish surveys were delivered door-to-door and respondents were asked to return the questionnaires to onsite collection boxes within a month. This survey method had advantages of maximally reaching a low-income, predominately racial and ethnic minority, hard-to-access population that often has no landline phone or the Internet (Kempf & Remington, 2007). It also reduced the interviewer effect by allowing respondents to answer questions on their own, which increased data validity and reliability (Mangione & Van Ness, 2009). Our research team made great efforts to increase the response rate, posting fliers in community centers at housing communities, as well as participating in various community events, special resident meetings, leasing parties, training sessions, and so on. After participants returned the survey, our research team went back to the 18 communities to give each survey participant a $5 gift card. Only one adult resident per household was eligible to take the survey. A total of 402 households participated in the survey, yielding a response rate of 22%, according to the American Association of Public Opinion Research's (2016) response rate formula (RR2).

Descriptive statistics in Table 1 show that survey respondents tended to be old, female, of racial and ethnic minorities, with an education of high school or less, and not employed. They were disadvantaged in terms of education and employment. The sociodemographic composition of the survey participants was in line with that of the general population in these public housing communities.

Table 1. Descriptive Statistics.

Variable	Value	Min	Max
Age (n = 316), mean (SD)	52.1 (14.4)	20	90
Gender (n = 392), n (%)			
Male	112 (28.6)		
Female	280 (71.4)		
Race/ethnicity (n = 371), n (%)			
White	83 (22.4)		
Hispanic	134 (36.1)		
African American	133 (35.9)		
Other	21 (5.6)		
Education (n = 382), n (%)			
Less than high school	114 (29.8)		
High school or GED	117 (30.6)		
Some college or more	151 (39.5)		
Employment status (n = 384), n (%)			
Employed	59 (15.4)		
Unemployed	213 (55.5)		
Retired	52 (13.5)		
Other	60 (15.6)		
Internet users (n = 399), n (%)			
Yes	238 (59.7)		
No	161 (40.3)		
Private Internet access[a] (n = 389), n (%)			
Yes	230 (59.1)		
No	159 (40.9)		
Among Internet users only			
Having private Internet access,[a] n (%)	187 (80.6)		
Having public Internet access only,[b] n (%)	45 (19.4)		
Digital privacy skills (n = 225), mean (SD)	9.9 (3.8)	3	15
Frequency of privacy-compromising digital activities (n = 212), mean (SD)	14.5 (6.2)	6	30

[a]Having private Internet access means having at least one of the two types of Internet access, home and mobile. [b]Having public Internet access only means having neither home nor personal mobile Internet access.

Measures

Reasons for Not Using the Internet

We first asked the respondents whether they used the Internet at all. It showed that 40.3% of the respondents were not Internet users (see Table 1). Among them, we further asked how they agreed or disagreed with the possible reasons why they did not use the Internet. Ten items were adapted from a Pew report (Zickuhr, 2013) and tailored to members of disadvantaged communities (see Table 2). They were measured by a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). The item related to privacy was "I am concerned about safety and privacy."

Private Internet Access

Among all the survey respondents, we asked two original questions about private Internet access: "Do you have a home Internet connection at the place you currently live?" and "Do you have a smartphone (e.g., iPhone, Blackberry, Android phones, etc.)?" We combined the two questions, which showed that 59.1% of the survey respondents had at least one of the two types of Internet access, whereas 40.9% did not have any such private Internet access at all (see Table 1).

Among Internet users only, 19.4% had public Internet access only, that is, having neither home nor mobile Internet access, and 80.6% did have at least one type of the two Internet accesses (see Table 1). Therefore, we created a binary variable specifically for Internet users living in public housing—*private Internet access* (1 = having private Internet access and 0 = having public Internet access only). In addition, among Internet nonusers only, there were still 27.9% who did have at least one type of private Internet access and the remaining 72.1% did not have any.

Digital Privacy Skills

Among respondents who were Internet users, we asked how much they agreed with the following statements with a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*): "I feel capable of blocking spam or unwanted content," "I feel capable of adjusting my privacy settings," and "I feel capable of recognizing a phishing request." Informed by existing studies on privacy-related skills and issues (Fallows, 2007; Sonck et al., 2011), we designed the three items for members of disadvantaged communities. Digital privacy skills were a summed total score of the three items and had a Cronbach's alpha of .87 (M = 9.94, SD = 3.85, minimum = 3, maximum = 15).

Privacy-Compromising Digital Activities

Among respondents who were Internet users, we asked original questions regarding how often they did each of the following activities on a desktop, laptop, tablet computer, cell phone, and other portable devices combined: post a resume online, view or post information on job boards or sites, post photos, use Facebook, bank online, and buy something online. These activities involved sharing personal information as required by the service providers to a certain extent. Privacy-compromising digital activities

were the summed total score of the six items on a 5-point scale (1 = *never* to 5 = *daily or more often*; Cronbach's α = .81, *M* = 14.53, *SD* = 6.24, minimum = 6, maximum = 30).

Sociodemographic and Socioeconomic Characteristics

Age, gender, race and ethnicity, education, and employment status were used to represent markers of social inequalities (see Table 1). Annual household income was not asked in the survey, as only low-income families were qualified for public housing. Age was a continuous variable with a mean of 52 years old. Gender was coded as 1 for female and 0 for male, and 71.4% of the respondents were female. Race and ethnicity had three categories: White and other (28.0%), Hispanic (36.1%), and African American (35.9%). Originally, non-Hispanic White (22.5%) and other racial and ethnic groups (5.6%) were separated. Yet, the proportion of respondents in other racial and ethnic groups was very small. They also included people with mixed race and ethnicity such as White and Native American. We looked at the response patterns of people in other racial and ethnic groups. Their responses were more similar to those of Whites than those of Hispanics or African Americans. Furthermore, preliminary analysis showed that using White only or White and other as the reference category generated relatively consistent results in all models. Thus, for statistical reasons, we decided to combine other racial and ethnic groups with non-Hispanic White to form the reference category White and other (Yanow, 2003).

Education had three categories: less than high school (29.8%), high school or GED (30.6%), and some college or more (39.5%). As only 6.3% of the participants had an associate degree and 4.4% had a bachelor or more degree, the two categories were combined with some college (28.8%). There were four categories for employment initially: employed (15.4%), unemployed (55.5%), retired (13.5%), and other (homemaker, at school, or other; 15.6%). Preliminary analysis did not show any significant result of employment in all models. For the sake of parsimony, employment used in the analysis was binary: The employed (15.4%) was coded as 1 and others 0.

Results

Privacy Concerns and Internet Nonuse

Addressing Research Question 1 on the extent to which privacy concerns contribute to Internet nonuse among public housing residents, we ranked the 10 possible reasons of Internet nonuse based on the percentages of agree or strongly agree categories (see Table 2) as well as the overall means of each reason. The descriptive statistics in Table 1 showed that 40.3% of respondents were not Internet users at all. This percentage was much higher than the national average as only 14.0% of American adults did not use the Internet as of 2015 (Pew Research Center, 2017). In addition, 27.9% of Internet nonusers did have private Internet access, but they just did not go online. Both patterns revealed that it was significantly important to examine what inhibited members of the disadvantaged public housing communities from being online.

Table 2 reports that 35.6% of the Internet nonusers agreed or strongly agreed that being concerned about safety and privacy online was the reason for not using the Internet. Privacy concerns

were shown to be one of the top-five reasons for Internet nonuse, based on the percentages of agree or strongly agree responses. The other top-four reasons were Internet use being too difficult (40.7%), an Internet connection being too expensive (39.8%), having family members or friends who look things up for them on the Internet (39.8%), and having no one to teach them how to go online (37.3%). When ranked by the overall means, privacy concerns still ranked as one of the top-five reasons (M = 2.77, minimum = 1, maximum = 5), and the other four reasons remained the same. When only focusing on the category of strongly agree, 22.0% of the nonusers strongly agreed with privacy concerns as a reason for not using the Internet, which made privacy concerns one of the top-four reasons. The other three top reasons were having no one to teach them how to go online (22.9%), having family members or friends who look things up for them on the Internet (22.9%), and an Internet connection being too expensive (22.0%).

Table 2. Reasons for Not Using the Internet (in Percentages; n = 118).

Reason	Agree or strongly agree	Neutral	Disagree or strongly disagree
Using the Internet is too difficult	40.7	24.6	34.8
An Internet connection is too expensive	39.8	24.6	35.6
I have family members or friends who look things up for me on the Internet	39.8	19.5	40.7
I have no one to teach me how to go online	37.3	24.6	38.1
I am concerned about safety and privacy	35.6	20.3	44.1
I am not interested	24.6	25.4	50.0
My health conditions or physical disability make it hard to use the Internet	24.6	21.2	54.2
Most of my family members or friends do not use the Internet	22.9	21.2	55.9
I do not have enough time	22.0	31.4	46.6
I do not speak English well enough to use the Internet	16.9	20.3	62.7

The results were different from the national pattern. According to a national survey research (Zickuhr, 2013), the top reasons among the 12 possible reasons why offline American adults did not use the Internet included lack of interest (21%), no computer access (13%), and too difficult to learn (10%). However, privacy concerns (3%) were the least likely reasons cited by them. This contrast further showed that privacy concerns largely contributed to Internet nonuse among members of the disadvantaged and marginalized public housing communities.

Social Inequalities, Digital Access, and Digital Privacy Skills

Table 3 reports the results of multiple regressions regarding the factors that contributed to digital privacy skill inequalities among Internet-using public housing residents (RQ2a and RQ2b). In all models, we used White and other as the reference group for race and ethnicity and less than high school as the reference group for education. Model 1 contained only sociodemographic and socioeconomic characteristics and showed that age was the only significant factor. When private versus public Internet

access was added, Model 2 showed that age was still the only sociodemographic factor significantly related to digital privacy skills among public housing residents who were Internet users. People who were younger had higher levels of digital privacy skills ($\beta = -0.23$, $p < .01$). Other markers of social inequalities such as gender, race and ethnicity, education, and employment did not have any significant relationship with the levels of digital privacy skills. Model 2 showed that those who had private Internet access had higher levels of digital skills compared with those who could access the Internet only at public venues ($\beta = 0.18$, $p < .05$). Within this already disadvantaged population, those who were older and had neither home nor mobile Internet access were even more disadvantaged in terms of lacking adequate digital privacy skills to protect their privacy online.

Table 3. Multiple Regressions on Digital Privacy Skills Among Internet Users.

| | Digital privacy skills | | | |
| | Model 1 | | Model 2 | |
	β	SE	β	SE
Age	−0.25**	0.09	−0.23**	0.09
Female	−0.04	0.08	−0.04	0.08
Race/ethnicity (Ref: White and other)				
African American	0.00	0.10	0.01	0.10
Hispanic	−0.17	0.10	−0.16	0.10
Education (Ref: less than high school)				
High school or GED	0.10	0.11	0.07	0.11
College or more	0.14	0.12	0.12	0.12
Employed	0.00	0.08	0.02	0.08
Private Internet access			0.18*	0.08
n	147		147	
Adjusted R^2	.04		.06	
R^2 change			.03*	

*$p < .05$. **$p < .01$. ***$p < .001$.

Digital Privacy Skills, Digital Access, and Privacy-Compromising Digital Activities

Table 4 shows the results of multiple regressions, which addressed Hypotheses 1 and 2 regarding the relationships of digital privacy skills and private Internet access with the frequency of conducting privacy-compromising digital activities, respectively. Model 1 included only sociodemographic and socioeconomic variables. Private versus public Internet access was further taken into account in Model 2. Model 3 was the final model, which included both private Internet access and digital privacy skills beyond sociodemographic and socioeconomic factors. It showed that public housing residents who had private

Internet access (i.e., home or mobile Internet access or both) more frequently conduct privacy-compromising digital activities (β = 0.15, p < .05). Model 3 also showed that public housing residents who had higher levels of digital privacy skills conducted privacy-compromising digital activities more frequently (β = 0.51, p < .001). In addition, among sociodemographic and socioeconomic variables, age was the only significant variable and was negatively related to privacy-compromising digital activities (β = −0.20, p < .001, Model 3), with younger users doing those activities more.

Table 4. Multiple Regressions on Privacy-Compromising Digital Activities Among Internet Users.

	Frequency of privacy-compromising digital activities					
	Model 1		Model 2		Model 3	
	β	*SE*	β	*SE*	β	*SE*
Age	−0.35***	0.09	−0.32***	0.08	−0.20**	0.07
Female	0.02	0.08	0.03	0.08	0.05	0.07
Race/ethnicity (Ref: White and other)						
African American	0.01	0.10	0.02	0.09	0.01	0.08
Hispanic	0.02	0.10	0.04	0.09	0.12	0.08
Education (Ref: less than high school)						
High school or GED	0.06	0.11	0.02	0.10	−0.01	0.09
College or more	0.11	0.11	0.08	0.11	0.02	0.09
Employed	0.03	0.08	0.06	0.08	0.05	0.07
Private Internet access			0.24**	0.08	0.15*	0.07
Digital privacy skills					0.51***	0.07
n	147		147		147	
Adjusted R^2	0.08		0.13		0.37	
R^2 change			0.06**		0.23***	

*p < .05. **p <.01. ***p < .001.

Mediating Effect of Digital Privacy Skills

In terms of Research Question 3 about the mediating effect of digital privacy skills on the relationship between private Internet access and privacy-compromising digital activities, Figure 1 shows the results based on a Sobel–Goodman test with bootstrapping. Having private Internet access was positively related to the levels of digital privacy skills (b = 1.70, p < .05, Path a), which in turn was positively associated with the frequency of conducting privacy-compromising digital activities (b = 0.81, p < .001, Path b). Having private Internet access had a significant indirect effect on the frequency of conducting privacy-compromising digital activities through digital privacy skills (b = 1.37, p < .05, product

of Path a and Path b). In other words, digital privacy skills mediated the relationship between private Internet access and the frequency of conducting privacy-compromising digital activities. The total effect of having private Internet access on privacy-compromising digital activities (b = 3.68, p < .001, Path c) and the direct effect (b = 2.31, p < .05, Path c') were significant. Overall, digital privacy skills mediated 37.3% of the total effect of having private Internet access on privacy-compromising digital activities. The bootstrapped 95% bias-corrected confidence interval [0.071, 3.019] further showed that the levels of digital privacy skills were a significant mediator.
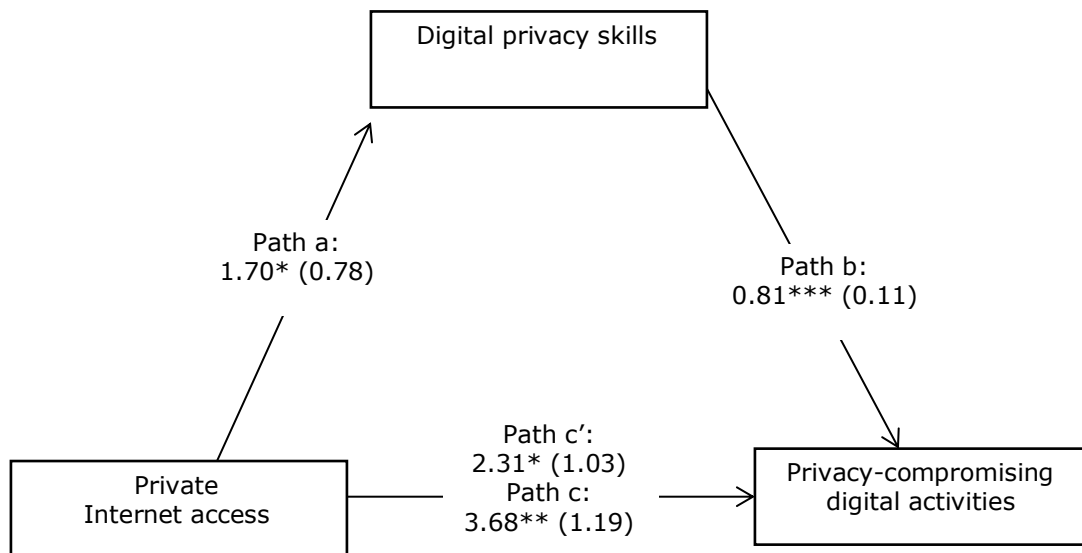

Figure 1. Mediating effect of digital privacy skills. Unstandardized coefficients with standard errors in parentheses. Sobel: 1.38* (0.66), Goodman-1 (Aroian): 1.38* (0.67), Goodman-2: 1.38* (0.65). Indirect effect: 1.38* (0.66). Proportion of total effect that is mediated: 37.3%. *p < .05. **p < .01. ***p < .001.

Discussion

This study integrates the literature on privacy and digital divides. We used a census survey of 18 public housing communities in a major city in the United States to examine multilayered privacy issues. We centered on the following questions: To what extent do privacy concerns contribute to Internet nonuse among offline members in disadvantaged communities and the relationships between digital access, digital privacy skills, and privacy-compromising digital activities among Internet-using members in these communities. Our research advances the literature by presenting a refined picture of how members of disadvantaged communities experience multiple layers of privacy issues. It also illustrates the multilayered privacy issues particularly through the lens of digital divides. The intersection of privacy and digital divides perspectives not only enhances the understanding of privacy at the margins per se, but also

provides valuable insights on digital inclusion policymaking regarding how to better engage members of disadvantaged groups in their digital life.

Privacy Concerns as a Barrier to Internet Adoption

A growing privacy literature has focused on the relationship between privacy concerns and digital use among Internet users or digital natives in the general population (Gerrard et al., 2006; Vitak, 2012; Zhou, 2011). Recent studies on digital divides and inclusion have shifted attention to variations among Internet users as the digital access divide narrows (Hargittai, 2010; van Deursen & van Dijk, 2011). However, this study shows that more than 40% of public housing residents in a major American city do not use the Internet at all. Yet, among these nonusers, more than a quarter do have one or both of home and mobile Internet accesses. The high proportion of Internet nonusers in the disadvantaged communities and the pattern that some of them do not have private Internet access as demonstrated here suggest that it is important to understand the reasons why they do not use the Internet.

This research identifies privacy concerns as a major barrier to Internet adoption in disadvantaged public housing communities. This pattern is in contrast to the national general population pattern that privacy concerns are the least-mentioned reason why offline Americans do not use the Internet (Zickuhr, 2013). This contrast suggests that privacy concerns are a particularly important reason that hinders members of disadvantaged communities from being online. It also resonates with a recent study in the rural area of a developing country that privacy concerns are a major reason restraining people from using Facebook (Wyche & Baumer, 2016). Theoretically, the result confirms the notion about perceived risks of digital technologies as an influencer of digital adoption proposed by Ostlund (1974) and Parasuraman (2000). It further suggests that this notion can be especially relevant to disadvantaged communities. Being doubly constrained by financial and social resources, members of disadvantaged communities might have higher levels of perceived risks associated with digital technologies (Reisig et al., 2009) as they cannot bear economic loss caused by privacy violation, and they often have no digitally experienced people in their personal networks to help them understand and mitigate their concerns. Thus, what they likely do to cope with perceived privacy risks is to avoid being digitally included, which is different from how general Internet users or young digital natives handle privacy concerns online through an active approach (Youn, 2009).

Digital Privacy Skill Inequality

Social inequalities affect digital privacy skills. Specifically, the levels of digital privacy skills vary significantly by age. Older people have lower levels of digital privacy skills, whereas younger people have higher. This generation gap in digital privacy skills is in line with the research studying Internet users in the general population (Park, 2011; Rainie & Duggan, 2016). Except for age, other markers of social inequalities such as gender, race and ethnicity, education, and employment do not contribute to variation in digital privacy skills in the disadvantaged population. This result partially echoes a study showing that education is not a significant contributor to technical skills of privacy control among general Internet users, but gender is a significant contributor (Park, 2011). In addition, given that many previous studies have identified these markers of social inequalities as significant contributors to digital skills in general,

the current study emphasizes the importance of investigating how digital privacy skills in particular vary by social inequalities, especially among disadvantaged groups.

Noticeably, the levels of digital privacy skills also vary by the presence of private Internet access. Among members of disadvantaged communities, people who can access the Internet at home or via personal smartphones have higher levels of digital privacy skills, compared with those who have public Internet access only at public libraries, community centers, workplaces, or friends' homes. This result confirms the importance of digital access quality as shown in many digital divides studies (Hassani, 2006; Helsper, 2012; Lim, 2009). Building digitally inclusive communities has become one of the key goals of public libraries in the United States (Thompson, Jaeger, Taylor, Subramaniam, & Bertot, 2014). The public computing and Internet services offered in public libraries provide beneficial digital resources to people who cannot afford their own (Bertot, Real, & Jaeger, 2016). Yet, the various restrictions of Internet use in public libraries and other public access points, such as time constraints and automatic content filtering, keep users from effectively learning and applying digital privacy skills. Thus, public access providers may need to think how to unlock some of these restrictions for Internet users, which may help them obtain higher levels of digital privacy skills.

Better Access and Skills, More Participation in Privacy-Compromising Digital Activities

For members of disadvantaged communities, people equipped with higher levels of digital privacy skills participate more frequently in privacy-compromising digital activities such as online job application, online banking, online purchasing, and using social networking sites. Participation in these activities often offers many benefits related to various dimensions of personal lives, economically, socially, and psychologically. However, its downside is the possibility of privacy threats. The result of this study suggests a possible solution to this problem, that is, improving one's digital privacy skills, which can help maximize the positive outcomes and minimize the negative consequences of participating in these activities. Therefore, digital privacy skills as an important subset of the digital skills repertoire deserve more scholarly and policy attention, especially in terms of their role in influencing privacy-compromising digital activity. This is particularly important in policy terms for libraries, schools, and nonprofit organizations that provide computer and Internet skills classes or training to disadvantaged people, showing the need to emphasize privacy skills training.

As important as digital privacy skills, relatively private Internet access such as home and mobile Internet access can increase engagement in privacy-compromising digital activities in the disadvantaged population. Accessing the Internet at home or via personal smartphones would increase the sense of control and autonomy (Hassani, 2006; Lim, 2009). Owning private Internet access enables users to be less concerned about putting their privacy at risk, resulting in more frequent participation in privacy-compromising digital activities. Private Internet access can also help individuals improve their digital privacy skills, which in turn contribute to more frequent participation in privacy-compromising digital activities. This indirect effect of private Internet access on participation in privacy-compromising digital activities highlights the importance of access autonomy among members of disadvantaged communities again. It further suggests that the Internet access divide has not disappeared yet, especially among members in marginalized communities

Implications for Digital Inclusion

This study provides several insights on digital inclusion efforts. First, this study identifies privacy concerns as a major and unique reason why members of disadvantaged communities do not use the Internet. Digital inclusion projects targeting these communities can put how to address privacy concerns among Internet nonusers on their agenda. Simply providing access without mitigating these concerns probably would not effectively bridge the digital divide as expected. Second, as the generation gap still exists in terms of digital skills and use in disadvantaged communities, digital literacy training programs need to design slower-paced courses to better fulfill the needs of the elderly. Third, the importance of digital privacy skills found in this study suggests the possibility of teaching these skills beside basic digital skills in digital literacy training programs. Fourth, the Internet access divide has not disappeared yet and goes beyond simply haves or have-nots. Thus, digital inclusion projects need to focus on how to provide better private Internet access. Public libraries also need to address the restrictions on their computing and Internet services, which affect the quality of engaging in privacy-compromising digital activities among members of disadvantaged communities.

Limitations and Future Directions

The present study has several limitations that call for future research to address. First, this study focused only on whether privacy concerns act as a major reason inhibiting Internet use among Internet nonusers, which has not gained much scholarly attention. In addition, it did not specifically differentiate online privacy and safety concerns or investigate different types of privacy concerns. Future studies can focus on multiple dimensions of privacy concerns among both Internet nonusers and Internet users, which can offer insights on how specific concerns differ between the two groups. Second, this study focused on privacy issues through the lens of digital divides. It did not include other possible factors affecting disclosure behaviors identified by many previous studies, such as trust and perceived risks. Future studies can include these possible factors. Third, future studies can go beyond basic measures of home or mobile Internet access and focus on more nuanced measures, such as limited versus unlimited data plans on smartphones, accessing the Internet alone or with family members at home, and so on. Fourth, this study was cross-sectional and did not allow claims on causality. Longitudinal studies are needed to examine the causal dynamics.

Conclusion

This study advances the literature on privacy by focusing on disadvantaged communities, by examining multilayered privacy issues in these communities, and by understanding privacy issues from the perspective of digital divides and inclusion. Through the lens of digital divides, it shows how privacy concerns become a major reason for not using the Internet among members in marginalized public housing communities. It also identifies the importance of quality digital access in obtaining digital privacy skills and participating in privacy-compromising digital activities. It offers valuable insights on understanding privacy at the margins and sheds light on digital inclusion policy.

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