

Getting a Second Opinion: Social Capital, Digital Inequalities, and Health Information Repertoires

Wenhong Chen

Department of Radio-Television-Film, University of Texas at Austin, 2504 Whitis Avenue Stop A0800, Austin, TX 78712-1067. E-mail: wenhong.chen@austin.utexas.edu

Kye-Hyoung Lee

Department of Educational Administration, The University of Texas at Austin, 1912 Speedway D5400, Austin, TX 78712-1604. E-mail: kyelee@mail.utexas.edu

Joseph D. Straubhaar and Jeremiah Spence

Department of Radio-Television-Film, University of Texas at Austin, 2504 Whitis Avenue Stop A0800, Austin, TX 78712-1067. E-mail: jdstraubhaar@austin.utexas.edu; jeremiah.spence@gmail.com

This research adopts a repertoire approach to examine the concept of a health information repertoire defined as a set of sources through which people get health information. Drawing on a random sample survey in Austin, TX, it borrows the concepts of cultural omnivores and univores to investigate how health information repertoire are related to social capital and digital inequalities. Results demonstrate that both the size and the composition of health information repertoires vary by social and digital connectivity. People with greater social capital have a larger repertoire and are less likely to be univores dependent on the Internet or interpersonal contacts. People with Internet access have a larger repertoire and are less likely to be univores dependent on television. More skilled Internet users are less likely to be univores dependent on interpersonal contacts, whereas frequent Internet users are more likely to be omnivores with a four-channel repertoire including the Internet, interpersonal contacts, television, and newspaper. The positive relationship between social capital and repertoire size is stronger among less-skilled Internet users. There are significant variations in health information repertoires in terms of media access and sociodemographic characteristics. Scholarly and practical implications are discussed.

Introduction

People acquire health information from a variety of sources, such as interpersonal communication, the Internet,

and traditional mass media, which in turn can affect their health literacy and health decision-making (Bishop, Tidline, Shoemaker, & Salela, 1999; Bright, Fleisher, Thomsen, Morra, Marcus, & Gehring, 2005; Chinn, 2011; Nagler et al., 2010; Rutten, Moser, Beckjord, Hesse, & Croyle, 2007). As information from interpersonal and mediated sources can have independent positive impacts on health behaviors (Ramírez et al., 2013), a better understanding of the health information repertoire—the set of sources through which people get health information—has scholarly and practical importance.

Adopting a repertoire approach, this research fills critical gaps in the growing literature on health information behaviors. First, there has been a striking lack of research on the health information repertoire (O'Keefe, Boyd, & Brown, 1998). Second, despite the growing attention to online health information searches, the literature remains underdeveloped on how the information repertoire—in general or health specific—is related to social capital and digital inequalities (Anker, Reinhart, & Feeley, 2011; Savolainen, 1995; Song & Chang, 2012). Third, the literature has focused on active search, although casual social encounters or media exposure allows people to gain information unintentionally (Case, 2012; Dutta-Bergman, 2004; Sheldrick Ross, 1999).

Drawing on a random sample survey in Austin, TX, this research focused on both the size and the composition of the health information repertoire. Borrowing from the theoretical concepts of cultural omnivores and univores (Bennett & Silva, 2011; Peterson & Kern, 1996), people with a repertoire of multiple health information sources are defined as health information omnivores and people dependent on a

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single health information source as health information univores. Accordingly, we examine the size and the composition of the health information repertoire, especially how health information omnivores or univores are related to social capital, digital inequalities, media access, and socio-demographic characteristics.

Theoretical Framework

Repertoire refers to a set or stock of behaviors, skills, tactics, or work that an actor regularly or habitually performs. Cultural repertoires include the array of cultural tastes, knowledge, activities, or resources that varies significantly reflecting social inequalities: class, gender, or race (Bourdieu, 1986; Erickson, 1996; Yaish & Katz-Gerro, 2012). The classic work on cultural capital has emphasized the role of high culture—the culture of the dominant class—in establishing class boundaries and reproducing social inequalities (Bourdieu, 1986). By contrast, recent work has demonstrated that high-status people are less likely to be cultural snobs than omnivores who have a diverse cultural repertoire, whereas low-status people tend to be univores whose cultural repertoire is limited (Bryson, 1996; Peterson & Kern, 1996.). More recent studies further reveal that instead of a uniform one-size-fits-all repertoire, there are multiple manifestations of cultural omnivorousness (Bennett & Silva, 2011).

In communication and media studies, terms such as *channel*, *information*, and *media repertoire* have been used to describe the volume and composition of media or news consumption (Reagan, 1996; Taneja, Webster, Malthouse, & Ksiazek, 2012; Yuan, 2011). For example, *channel repertoire* refers to the number of television channels accessed by a viewer, which can vary by the viewer's socioeconomic status or the genre of the content (Reagan, Pinkleton, Chen, & Aaronson, 1995).

However, few studies have examined health information repertoires (O'Keefe, Boyd, & Brown, 1998). This research adopts a repertoire approach to examine the volume and composition of information sources and uses the concept of cultural omnivores and univores to distinguish people who depend only on a single source of information (univores) from those who are able to draw on multiple sources (omnivores).

How people obtain health information varies by socio-demographic characteristics, medium (Viswanath & Ackerson, 2011), and social capital (Burt, 1992; Granovetter, 1973). The everyday life information-seeking model demonstrates that sociodemographic characteristics affect the patterns of information search (Savolainen, 1995; Spink & Cole, 2006). The comprehensive model of information seeking (Johnson, Donohue, Atkin, & Johnson, 1995) shows that whether and how a medium is used for information is based on how users perceive its features. The digital divide and inequality literature has centered on how social inequalities structure people's access to and use of

new media and communication technologies (Chen, 2013a; DiMaggio, Hargittai, Neuman, & Robinson, 2001). The online health information or eHealth literature has demonstrated that members of medically underserved groups are less likely to use the Internet for health information (Cotten & Gupta, 2004; Rice, 2006; Talosig-Garcia & Davis, 2005; Zhao, 2009).

Integrating the cultural capital literature, the repertoire approach in media studies, the information-seeking literature, and the eHealth literature, we develop hypotheses and research questions about how health information repertoires may vary in relation to social capital, digital inequalities, access to mass media, and individual socioeconomic and sociodemographic characteristics.

Social Capital

Although scholars have argued about its definition, causes, consequences, and the appropriate level of analysis, most agree that social capital can facilitate or constrain an individual's instrumental or expressive action due to his or her network's composition, structure, and embedded resources (Bourdieu, 1986; Putnam, 2000; see a review in Lin, 2001). Theorized as individuals' investments in social relations for instrumental or expressive returns, social capital affects both mental and physical health (Cobb, 1976; Ferlander, 2007) and information behaviors (Burt, 1992; Granovetter, 1973).

First, people with diverse, resource-rich networks tend to be healthier and happier (Hawe & Shiell, 2000; Kawachi, Subramanian, & Kim, 2008). It has been well documented that social support from one's network members nurtures positive health outcomes, shielding people from exposure to stress or helping them to cope with stress better (Cobb, 1976; Thoits, 2010). The adoption of new health practices increases with the amount of social reinforcement from network members (Centola, 2010). Second, interpersonal networks are channels of information and resources. Better-connected people have informational advantage as they gain timely access to high-quality and fine-grained information faster and earlier than less-connected people (Burt, 1992; Granovetter, 1973; Podolny, 1993). People with more social capital receive more job information via informal social interactions (Granovetter, 1973; Son, 2013). The information advantage enabled by social capital can translate into higher compensation, faster promotion, and better ideas. Third, the literature on cultural capital shows that diverse network contacts require and facilitate a diverse repertoire of cultural knowledge (DiMaggio, 1987; Erickson, 1996).

However, few studies have followed the calls for more research on relational factors that may affect health information behaviors (Anker et al., 2011; Savolainen, 1995; Spink & Cole, 2006). In one important exception, Song and Chang (2012) show that embedded resources in people's core discussion networks are positively related to the total number of sources and the frequency of information search

from interpersonal and online sources. Yet, the core discussion network only accounts for a small proportion of people's overall interpersonal networks (Chen, 2013a; McPherson, Smith-Lovin, & Cook, 2001). As social capital facilitates a greater number of information sources and faster information flow, we note the following:

H1a: Social capital is positively related to the size of health information repertoire.

H1b: Social capital is negatively related to being health information univores.

H1c: Social capital is positively related to being health information omnivores.

Digital Inequalities: Internet Access, Use, and Skills

Digital divides and inequalities are about people's different access to and use of the Internet and other communication technologies. About 72% of Internet users in the United States have searched for health information online in the past year (Fox & Duggan, 2013). Online health information search is related to better health knowledge, communication, and decision-making (Anker et al., 2011; Shim, 2008). Without access to the Internet, online health information search would be difficult if not entirely impossible. Even after Internet access is obtained, Internet use in terms of time, frequency, or activities is positively related to the likelihood or the frequency of online health information search (Atkinson, Saperstein, & Pleis, 2009; Renahy, Parizot, & Chauvin, 2010; Rice, 2006). Yet, a recent study suggests that frequent Internet use is not related to online health information search (Mesch, Mano, & Tsamir, 2012). Although the Internet allows unprecedented access to health information, people who lack Internet skills have difficulties when searching, evaluating, and using online health information (Dobransky & Hargittai, 2012; Morahan-Martin, 2004; Skinner, Biscope, & Poland, 2003). Thus, we suggest the following:

H2a: Internet access, use, and skills are positively related to health information repertoire size.

H2b: Internet access, use, and skills are negatively related to being a health information univore.

H2c: Internet access, use, and skills are positively related to being a health information omnivore.

Interaction Effect of Social Capital and Digital Inequalities

People's social and digital connectivity are interrelated. On one hand, although early studies suggested that Internet use decreased sociability (Nie & Erbring, 2000), there has been growing empirical evidence that the relationship between Internet use and social capital has been positive or neutral (Chen, 2013a; Hampton, Sessions, & Her, 2011). Internet use enhances social capital through facilitating information sharing, relationship maintenance, and the deployment and exploration of social networks (DiMaggio

& Bonikowski, 2008). On the other hand, social capital significantly affects whether people access the Internet and how they use the Internet; people gain skills from their network contacts (Chen, 2013b; DiMaggio et al., 2001). More specifically, as social capital and digital connectivity often mutually reinforce one another, they may jointly contribute to the health information repertoire.

Lacking social capital, people are motivated to use online health information (Mesch et al., 2012). Lacking Internet access or skills, people are more likely to rely on interpersonal sources for health information (Kukafka, 2008; Nagler et al., 2010). In other words, if the Internet and interpersonal contacts are considered as functional alternatives for health information, people may use social capital to compensate for their lack of Internet access or skills or vice versa.

As few studies have examined the interaction effects of social capital and digital inequalities on health information behaviors, we propose the following research question:

RQ1: Are there interaction effects of social capital and digital inequalities on the size and the composition of health information repertoires?

Mass Media Access

A large amount of traditional mass media use, television viewing in particular, is associated with an unhealthy lifestyle and poorer physical and mental health (American Academy of Pediatrics, 2011; Mathers et al., 2009; Sidney et al., 1998). Nonetheless, a meta-analysis shows that mediated health campaigns have a measurable effect on behavior change (Snyder et al., 2004). Mass media such as television, radio, print, or outdoor media can serve as useful channels for disseminating health information to a large audience, although the attention that health messages receive varies by medium (Viswanath & Ackerson, 2011). Importantly, users often deploy multiple modes or channels of communication across media platforms, simultaneously or sequentially, to accomplish instrumental or expressive goals (Dutta-Bergman, 2004; Haythornthwaite & Wellman, 1998). People who consume more content via one media platform tend to consume more content via other media platforms (Jennings & Zeitner, 2003; Putnam, 2000; Robinson & Martin, 2010). Thus, we propose the following research question:

RQ2: How do the size and the composition of health information repertoires vary by the access to traditional mass media?

User Characteristics

Socioeconomic status (SES; e.g., education, income, or class), race, and gender affect how people obtain information from the Internet, interpersonal communication, and mass media sources (Dutta-Bergman, 2004; Savolainen, 1995).

The Internet. Early studies showed that members of underprivileged groups—people with low SES or racial minorities—often used the Internet for health information at a lower rate (Cotten & Gupta, 2004; Rice, 2006; Talosig-Garcia & Davis, 2005; Zhao, 2009). Even after more than two decades of Internet diffusion, younger, better educated, White Americans remain more likely to access the Internet and use it more frequently than older individuals, the less educated, and African Americans (Chen, 2013). People who were native-born search health information online more frequently than immigrants (Mesch et al., 2012), and women seek online health information more actively than men (Dobransky & Hargittai, 2012). Most studies show that better educated and White Americans remain more likely than the less educated and racial minorities to search health information online (Anker et al., 2011; Atkinson et al., 2009; Jensen, King, Davis, & Guntzville, 2010). Indeed, the Internet has become the first stop of health information search for the better educated (Koch-Weser, Bradshaw, Gualtieri, & Gallagher, 2010). Yet, recent studies show a diminishing significance of SES to online health information search (Dobransky & Hargittai, 2012; Mesch et al., 2012; Renahy et al., 2010).

Interpersonal and mass media source. People with low SES and racial/ethnic minorities tend to rely more on family and friends than on health professionals due to their limited access to formal health care (Kontos, Emmons, Puleo, & Viswanath, 2011; Smith, Dixon, Trevena, Nutbeam, & McCaffery, 2009). Racial or ethnic minorities are more likely to pay attention to health information from mass media such as television or radio, whereas better educated people tend to pay more attention to health information from the print media and the Internet (Viswanath & Ackerson, 2011). As the literature is inconsistent on the relationship between demographics and health information sources, the following research question is developed:

RQ3: How do the size and the composition of health information repertoires vary by SES and other sociodemographic characteristics?

Data and Method

Data were drawn from the Austin Internet and Global Citizens Project. A self-administered paper-and-pencil survey questionnaire was mailed to 15,000 Austin households in November 2010. A mail survey was chosen because an online survey would automatically exclude people who did not have Internet access; selected households were stratified by geographic location, race, and income level. Within each household, only adult current residents were eligible. By January 2011, 1,701 questionnaires were returned. Using AAPOR's RR2 formula (American Association for Public Opinion Research, 2011), the response was 11%. Sample weights were constructed using the rake procedure in Stata. The weighting procedure adjusted the demographic distribution of the

sample in terms of gender, race/ethnicity, age, and education as close as to the Austin general population parameters based on the 2010 census and the 2009 American Community Survey. Missing value analysis suggested no systematic pattern of missing values. Common method biases were checked. Table 1 reports the sample characteristics.

Dependent Variables

The size of the health information repertoire. Respondents were asked the sources from which they "get information about health or medical issues," including interpersonal sources, the Internet, and three types of traditional mass media (offline television, radio, and newspapers), respectively. The size of the health information repertoire was measured as the total number of sources from which the respondents got health information ($M = 2.15$, $SD = 1.27$). On average, respondents used two types of health information sources. Table 1 shows that only about 30% of respondents were univores dependent on one single source and close to two thirds of respondents were omnivores who gained health information from multiple sources. Yet, fewer than one fifth of respondents used more than three types of health information sources. That is, despite the availability of multiple sources, most people settled for a relatively small repertoire of health information sources. The results were in line with studies showing that most people use two or three media to access news (Yuan, 2011).

The composition of health information repertoire. As shown in Appendix 1, respondents had 32 types of repertoires with different combinations of information sources. The Internet and interpersonal contacts were the two major health information sources. Yet, only five out of the 32 types of repertoires were used by more than 5% of the respondents, which, together, represented about 60% of the sample. We thus focused on the top five health information repertoires and grouped them into two sets of variables: univores and omnivores.

Among the top five repertoires, there were three types of health information univores: people whose single health information source was (a) the Internet, (b) interpersonal contacts, or (c) television, respectively. About 13% of the respondents were univores who used the Internet, 8% interpersonal contacts, and 7% television as their only source of health information. Only a few respondents used the radio (2%), and no respondent used newspaper as his or her only health information source. Among the top five repertoires, there were two types of health information omnivores: people who used (a) a two-channel repertoire consisting of the Internet and interpersonal contacts and (b) a four-channel repertoire consisting of the Internet, interpersonal contacts, television, and newspaper. A total of 22% of respondents used the two-channel repertoire and 9% the four-channel repertoire.

TABLE 1. Descriptive analysis.

		Mean or %	SD	Min	Max
Health information repertoire					
Size		2.15	1.27	0	5
0	5%				
1	31%				
2	31%				
3	15%				
4	13%				
5	5%				
Composition					
Univore					
Internet		13%		0	1
Interpersonal		8%		0	1
television		7%		0	1
Omnivore					
Internet + interpersonal		22%		0	1
internet + interpersonal + television + newspaper		9%		0	1
Female		47%		0	1
Age (ref: 18–24)					
25–34				0	1
35–44		19%		0	1
45–54		16%		0	1
55–64		10%		0	1
>=65		8%		0	1
Race (ref: White)					
African American		7%		0	1
Hispanic		31%		0	1
Other		9%		0	1
Foreign born		18%		0	1
Civic status (ref = Married)					
Divorced		16%		0	1
Single		29%		0	1
Number of children <=18		0.66	0.85	0	2
Education (ref:<=High School)					
Some college		22%		0	1
BA		28%		0	1
Postgraduate degree		16%		0	1
Social capital		5.64	3.37	0	16
Internet access		88%		0	1
Frequency of Internet use (square root) ^a		5.70	0.83	2	7.75
Internet skills ^a		27.76	6.01	7	35
Newspaper subscription		23%		0	1
Cable television subscription		59%		0	1
Cell phone ownership		93%		0	1

Note. *N* = 1569.

^a*N* = 1368.

Independent Variables

Social capital was measured through the position generator, which had been used in national surveys in the United States, Europe, and Asia (Lin, Fu, & Chen, 2013; Lin, Fu, & Hsung, 2001). The position generator mapped the respondents' social capital via a list of high- and low-status occupations, indicating the diversity of resources embedded in their networks. The position generator used here had 16 occupations, adapted from the original list of 22 occupations developed and tested by Lin and colleagues (2001). It included nurse, farmer, lawyer, middle school teacher, babysitter, janitor, personnel manager, hair dresser, book-keeper, production manager, factory operator, computer

programmer, taxi driver, professor, police officer, and chief executive officer of a large company. Social capital was the summed total number of occupations in which the respondent knew someone.

Internet access, use, and skills. Internet access was dichotomous, coded as 1 if respondents had access to the Internet and 0 otherwise. The frequency of Internet use was measured by the sum score of 12 items on how often the respondents used the Internet to read or send e-mail, play online games, buy a product online, pay bills online, discuss politics, listen to music or radio, watch videos, read a blog, comment on a blog, participate in a discussion forum, use

social networking sites, and visit a virtual world. The items were measured by a 1 (*never*) to 5 (*daily*) point scale and had a Cronbach's α of 0.84. As the distribution of this variable was skewed, its square root term was used as suggested by the ladder procedure in Stata. Internet skills were measured by the sum score of seven items on how much the respondents agreed with statements on their Internet skills: uploading content (e.g., videos, photos, music) to a website, blocking spam or unwanted content, adjusting one's privacy settings on a website, bookmarking a website or adding a website to one's list of favorites, comparing different sites to verify the accuracy of information, creating and managing one's own personal profile on a social networking site, and creating and managing one's own personal website. The items were measured by a 1 (*strongly disagree*) to 5 (*strongly agree*) point scale and the Cronbach's α was 0.90.

Media access was measured by three dichotomous variables, newspaper subscription, cable television subscription, and cell phone ownership, with each coded as 1 if respondents subscribed to or owned that specific medium and 0 otherwise.

Sociodemographic characteristics. Gender was coded as 1 for female and 0 for male. Age was categorical, ranging

from (a) aged 18 to 24, (b) 25 to 34, (c) 35 to 44, (d) 45 to 54, (e) 55 to 64, to (f) 65 to 97. Race had four categories: whites, African Americans, Hispanics, and other. Immigration status was coded as 1 if foreign born and 0 native born. Civic status had three categories: (a) married or living with a partner; (b) divorced, separated, or widowed; or (c) single. The variable—the number of children aged younger than 18—was also controlled. Four categories of education were included: (a) high school or less, (b) some college, (c) B.A. or B.S. degree, and (d) postgraduate.

Interaction. The interaction terms of social capital with Internet access, use, and skills were constructed with continuous variables involved in the interaction terms mean centered. Only significant interaction effects were reported.

Results

Poisson regression models were used for the size of the health information repertoires as it was a count variable (Table 2). Logistic regression models were used for the

TABLE 2. Poisson regression of health information repertoire size.

	Model 1		Model 2 ^a		Model 3 ^a	
Female	1.086	(0.052)	1.097	(0.052)	1.086	(0.048)
Age (ref: 18–24)						
25–34	0.882	(0.121)	0.864	(0.115)	0.869	(0.112)
35–44	0.888	(0.121)	0.895	(0.117)	0.896	(0.113)
45–54	0.939	(0.122)	0.958	(0.124)	0.944	(0.118)
55–64	0.931	(0.117)	1.018	(0.132)	1.009	(0.127)
≥65	0.887	(0.118)	0.981	(0.138)	0.979	(0.135)
Race (ref: White)						
African American	1.006	(0.094)	1.094	(0.101)	1.094	(0.096)
Hispanic	1.022	(0.070)	1.034	(0.073)	1.031	(0.071)
Other	1.263**	(0.104)	1.275**	(0.108)	1.251**	(0.106)
Immigrant	0.733***	(0.064)	0.744**	(0.073)	0.740**	(0.075)
Civic status (ref: Married)						
Divorced	0.937	(0.054)	0.946	(0.056)	0.964	(0.058)
Single	1.064	(0.073)	1.039	(0.071)	1.011	(0.067)
Number of children ≤18	1.054	(0.046)	1.054	(0.044)	1.060	(0.044)
Education (ref: ≤High School)						
Some college	0.988	(0.088)	0.960	(0.085)	0.937	(0.079)
BA	1.120	(0.087)	1.120	(0.088)	1.094	(0.084)
Postgraduate	1.071	(0.083)	1.060	(0.083)	1.043	(0.080)
Social capital	1.036***	(0.009)	1.031***	(0.009)	1.034***	(0.008)
Internet access	1.396***	(0.139)				
Frequency of Internet use			1.065	(0.049)	1.073	(0.043)
Internet skills			0.998	(0.005)	0.997	(0.005)
Newspaper subscription	1.197***	(0.060)	1.168**	(0.061)	1.166**	(0.061)
Cable television subscription	0.928	(0.050)	0.935	(0.048)	0.940	(0.047)
Cell phone ownership	1.180	(0.108)	1.303**	(0.125)	1.327**	(0.129)
Social capital*Internet skills					0.979**	(0.008)
Constant	1.082	(0.199)	1.023	(0.284)	1.008	(0.261)
N	1473		1275		1275	
Log pseudo-likelihood	–2449.8		–2192.2		–2186.4	

Note. Incidence-rate ratios with standard errors in parentheses.

***p < 0.001, **p < 0.01, *p < 0.05.

^aInternet users only.

TABLE 3. Logistic regression of health information univores.

	Interpersonal				Internet		Television	
	Model 1		Model 2 ^a		Model 3 ^a		Model 4	
Female	1.276	(0.406)	0.802	(0.289)	0.675	(0.211)	2.138	-1.317
Age (ref: 18–24)								
25–34	12.528	(16.915)	9.452	(11.905)	0.269	(0.185)	4.287	-4.628
35–44	12.929	(17.986)	6.466	(8.642)	0.747	(0.460)	1.495	-1.751
45–54	36.075**	(49.947)	15.064*	(20.145)	0.302	(0.228)	9.183*	-9.68
55–64	43.410*	(65.317)	10.048	(15.408)	0.301	(0.227)	7.075	-9.762
≥65	56.450*	(91.768)	11.351	(18.634)	0.268	(0.227)	8.064	-10.919
Race (ref: White)								
African American	3.053*	(1.684)	2.088	(1.090)	0.411	(0.320)	2.003	-2.019
Hispanic	1.638	(0.706)	0.768	(0.439)	1.861	(0.667)	2.046	-1.317
Other	0.810	(0.778)	0.169	(0.156)	0.871	(0.505)	—	—
Immigrant	2.504	(1.226)	7.013***	(3.440)	1.633	(0.868)	4.155*	-2.87
Civic status (ref: Married)								
Divorced	4.366*	(2.627)	2.545*	(1.101)	0.843	(0.347)	0.418	-0.34
Single	11.966***	(6.687)	9.288***	(4.317)	0.503	(0.215)	0.563	-0.434
Number of children ≤18	1.471	(0.478)	1.811*	(0.501)	0.745	(0.171)	1.12	-0.358
Education (ref: ≤High School)								
Some college	0.963	(0.414)	1.246	(0.631)	1.222	(0.550)	0.467	(0.271)
BA	0.669	(0.325)	0.639	(0.312)	0.765	(0.367)	0.169*	(0.126)
Postgraduate	1.123	(0.620)	1.112	(0.647)	1.009	(0.490)	0.165*	(0.128)
Social capital	0.818***	(0.042)	0.843**	(0.047)	0.881*	(0.046)	0.965	(0.066)
Internet access	1.159	(0.680)					0.189*	(0.156)
Frequency of Internet use			1.387	(0.295)	0.721	(0.219)		
Internet skills			0.926*	(0.029)	0.995	(0.034)		
Newspaper subscription	0.837	(0.449)	1.812	(1.051)	0.533	(0.197)	0.107*	(0.102)
Cable television subscription	2.888*	(1.370)	2.886*	(1.447)	0.879	(0.268)	0.160**	(0.097)
Cell phone ownership	0.700	(0.397)	0.448	(0.259)	0.526	(0.381)	3.045	(3.549)
_cons	0.001***	(0.002)	0.004**	(0.009)	19.363	(37.105)	0.042	(0.076)
N	1256		1170		1170		1256	
Log pseudo-likelihood	-287.9		-215.9		-498.0		-206.1	

Note. Odds ratio with standard errors in parentheses.

***p < 0.001, **p < 0.01, *p < 0.05.

^aInternet users only.

composition of health information repertoire as health information univores and omnivores were binary (Tables 3 and 4). The analysis of the composition of the health information repertoire focused on respondents who had obtained health information from at least one source.

The Size of Health Information Repertoire

Table 2 shows that people with greater social capital or Internet access had larger health information repertoires than people with less social capital or without Internet access. Other things being equal, one unit increase in social capital corresponded to a repertoire that would be about 4% larger, while having Internet access corresponded to a repertoire that would be about 40% larger (Model 1).

Taking into account the frequency of Internet use and the levels of Internet skills, Models 2 and 3 narrowed the sample to Internet users. Among Internet users, cell phone owners had larger repertoires than those who did not own a cell phone (Models 2 and 3). Having a cell phone corresponded to a health information repertoire that would be 30 to 33% larger. Overall, access to social capital and the

Internet, newspapers, and cell phone were positively associated with larger health information repertoires. Model 3 reported a significant interaction effect: The relationship between social capital and repertoire size was weaker among skilled Internet users. Across Models 1–3, White Americans, immigrants, and people without a newspaper subscription had smaller repertoires than people of other racial background, native-born Americans, and newspaper subscribers.

The Composition of Health Information Repertoires: Univores

Interpersonal sources. Model 1 in Table 3 shows that people with less social capital, cable television subscribers, people aged 45 years or older, African Americans, divorced or singles were more likely to be univores reliant on interpersonal sources. Model 2 in Table 3 narrows the analytical sample to Internet users. It shows that less skilled Internet users are more likely to be univores reliant on interpersonal sources. Each unit increase in Internet skills corresponded to a 7% decrease in the likelihood of being

TABLE 4. Logistic regression of health information omnivores.

	Two-Channel (Internet + Interpersonal)		Four-Channel (Internet + Interpersonal + Television + Newspaper)	
	Model 1 ^a		Model 2 ^a	
Female	1.014	(0.198)	2.501*	(0.924)
Age (ref: 18–24)				
25–34	1.152	(0.641)	0.233*	(0.139)
35–44	1.010	(0.591)	0.171*	(0.118)
45–54	0.785	(0.495)	0.362	(0.221)
55–64	0.428	(0.282)	1.851	(1.137)
≥65	0.233*	(0.168)	0.956	(0.763)
Race (ref: White)				
African American	0.147**	(0.094)	1.537	(1.232)
Hispanic	0.212***	(0.087)	3.417**	(1.373)
Other	0.603	(0.265)	7.384***	(3.997)
Immigrant	0.956	(0.361)	0.256	(0.207)
Civic status (ref: Married)				
Divorced	1.324	(0.396)	0.357	(0.206)
Single	1.011	(0.301)	1.307	(0.606)
Number of children ≤18	0.779	(0.106)	1.651*	(0.382)
Education (ref: ≤High School)				
Some college	1.547	(0.604)	0.264*	(0.155)
BA	0.942	(0.330)	0.491	(0.239)
Postgraduate	0.911	(0.324)	0.374	(0.195)
Social capital	1.277	(0.384)	1.118	(0.067)
Frequency of Internet use	1.039	(0.022)	1.702*	(0.454)
Internet skills	0.995	(0.032)	1.017	(0.031)
Newspaper subscription	0.621	(0.376)	1.497	(0.573)
Cable television subscription	1.006	(0.158)	0.981	(0.343)
Cell phone ownership	1.001	(0.221)	1.796	(1.174)
_cons	0.339	(0.387)	0.001***	(0.001)
N	1170		1170	
Log pseudo-likelihood	–676.4		–306.8	

Note. Odds ratio with standard errors in parentheses.

***p < 0.001, **p < 0.01, *p < 0.05.

^aInternet users only.

a univore depending on interpersonal contacts. Among Internet users, immigrants were six times more likely to solely depend on interpersonal sources. Internet users with more children aged younger than 18 years were also more likely to be univores reliant on interpersonal sources.

The Internet. Internet users with more social capital were less likely to be univores reliant on the Internet as the only source of health information (Model 3, Table 3). When other variables were held constant, one unit increase in social capital corresponded to a 12% decrease in the likelihood of being a univore dependent on the Internet as the only source of health information.

Television. Model 4 demonstrated that people without Internet access, people who did not subscribe newspapers or cable television, people aged 45 to 54, immigrants, high school or less educated were more likely to be univores reliant on television as the only source. Other things being equal, people with Internet access were 81% less likely to be a univore depending on television. Newspaper subscribers were 89% less likely and cable television subscribers were 84% less likely than nonsubscribers to be a univore

depending on television for health information. College or better educated were 83% less likely than high school or less educated to be a univore depending on television for health information.

The Composition of Health Information Repertoires: Omnivores

The two-channel repertoire of Internet and interpersonal contacts. Model 1 in Table 4 shows that Internet users aged 65 or older were 77% less likely than those aged 18 to 24 years to be omnivores whose two-channel health information repertoire consisted of the Internet and interpersonal sources; African Americans were 85% and Hispanics 78% less likely than White Americans to be omnivores using the two-channel repertoire, other things being equal.

The four-channel repertoire of the Internet, interpersonal communication, television, and newspaper. Model 2 in Table 4 shows that Internet users with more frequent Internet activities, who were women, aged 18 to 24 years, high school or less educated, of Hispanic or other racial minority background, or with more children aged younger than 18

years were more likely to be omnivores whose four-channel repertoire included the Internet, interpersonal contacts, television, and newspaper. Other things being equal, each unit increase in Internet activities corresponded to a 70% increase in the likelihood of being an omnivore with the four-channel repertoire. Hispanics were 2.4 times and people of other racial minority background were six times more likely to use the four-channel health information repertoire than white Americans.

Summary

H1a, which proposed a positive relationship between social capital and the size of the health information repertoire, was supported. H1b, which proposed a negative relationship between social capital and being health information univores, was supported for univores depending on interpersonal sources and the Internet, respectively, but was not for univores depending on television. H1c, which proposed a positive relationship between social capital and being health information omnivore, was rejected.

H2a, which proposed positive relationships between Internet access, use, and skills and health information repertoire size, was partially supported as only Internet access—but neither the frequency of Internet use nor the levels of Internet skills—was significantly related to the size of the health information repertoire. H2b, which proposed negative relationships between Internet access, use, and skills and health information univores, was partially supported as Internet access was related to a smaller likelihood of being univores relying on television while Internet skills with a smaller likelihood of being univores depending on interpersonal contacts. H2c, which proposed positive relationships between Internet access, use, and skills and health information omnivores, was partially supported as frequent Internet activities were related to a greater likelihood of being omnivores with the four-channel repertoire.

RQ1 asked whether there were interaction effects of social capital and digital inequalities on the size and the composition of health information repertoire. Results showed that the only significant interaction effect was that the relationship between social capital and the size of health information repertoire was weaker among more skilled Internet users.

RQ2 was interested in the variation of the size and the composition of the health information repertoire by access to traditional mass media. Results revealed that access to certain mass media was related to health information repertoires. Newspaper subscribers had a larger repertoire. Cable television subscribers were also more likely to be univores reliant on interpersonal contacts but less likely to be univores reliant on television. Among Internet users, cell phone owners had a larger health information repertoire.

RQ3 focused on how the health information repertoire was shaped by SES and other sociodemographic

characteristics. Results demonstrated significant variations in the size and composition of the health information repertoire by SES, immigration status, race, age, and gender. First, less-educated people were more likely to be univores reliant on television and less likely to be omnivores with the four-channel health information repertoire. Second, immigrants had a smaller health information repertoire and were more likely to be univores reliant on interpersonal contacts or on television. African Americans were more likely to be univores reliant on interpersonal contacts and less likely to be omnivores with the two-channel repertoire. By contrast, Hispanics and other racial minorities were more likely to be omnivores with the four-channel health information repertoire. Third, young people (aged 18 to 24) were less likely to be univores reliant on interpersonal sources or television. Young Internet users (aged 18 to 24) were more likely to be omnivores using the two-channel or the four-channel repertoire. Fourth, female Internet users were more likely to be omnivores using the four-channel health information repertoire.

Discussion and Conclusion

Taking a repertoire approach, this research examines how social capital, digital inequalities, and media access are related to the size and composition of individuals' health information repertoires in an increasingly mediated information environment. Drawing on a random sample survey data in Austin, Texas, the findings have made important contributions by filling critical gaps in the literature on health information behaviors.

First, our research demonstrates that the repertoire approach can better capture the complicated and nuanced pattern of health information behaviors than the one-medium-at-a-time approach (O'Keefe et al., 1998). Departing from a literature dominated by studies investigating health information sources one medium at a time, this research examines the repertoire of health information, including both active search and informal encounters. Results show that close to two-thirds of the respondents are omnivores who get health information from multiple sources, whereas only about 30% of respondents are univores depending on a single medium for health information. Yet, people tend to be moderate omnivores: A two-channel health information repertoire integrating the Internet and interpersonal sources is the most prevalent, used by more than one fifth of the respondents.

Second, answering the call for taking into account relational factors for health information behaviors (Anker et al., 2011; Savolainen, 1995; Spink & Cole, 2006), this research sheds light on the relationship between social capital and health information repertoires. The results show that social capital is associated with larger health information repertoires and a smaller likelihood of people being univores reliant on either interpersonal or online sources. The results support existing research that greater network resources are related to

a greater number of health information sources (Song & Chang, 2012). The results also resonate with the cultural capital literature that better-connected people tend to be omnivores with a greater cultural repertoire, whereas less-connected people tend to be univores with a limited cultural repertoire (Erickson, 1996). Yet, social capital is not significantly related to specific types of health information repertoires such as being omnivores using either two or four channels.

Third, this research takes into account various aspects of digital inequalities and offers a layered understanding of how health information repertoires are structured by Internet access, use, and skills. Results show that the Internet is the most prevalent health information source for omnivores and univores. Given the prominence of the Internet as a health information source, Internet access is related to larger health information repertoires and a smaller likelihood of using television as the only health information source. More skilled Internet users are less likely to be univores reliant on interpersonal contacts. More frequent Internet users are more likely to be omnivores with the four-channel repertoire including the Internet, interpersonal contacts, television and newspaper.

More important, there seems to be a compensating relationship between the Internet and interpersonal sources. People with low social capital are more dependent on the Internet while less skilled Internet users are more reliant on interpersonal contacts as the only health information source. Furthermore, the relationship between social capital and repertoire size is stronger among less-skilled Internet users. These findings support existing studies that people lacking social capital turn online (Mesch et al., 2012) but limited Internet skills push them to family and friends for health information (Nagler et al., 2010).

Fourth, the health information repertoire varies by media access and sociodemographic characteristics. The cultural capital literature shows that high status people tend to be cultural omnivores while low status people tend to be cultural univores (Bennett & Silva, 2011; Bourdieu, 1986; Peterson & Kern, 1996). In a similar vein, there are significant variations in the size and the composition of health information repertoire by education and other socio-demographic characteristics. Better education is associated with a lesser likelihood of being a univore reliant on television supporting existing findings that the better educated seek information from multiple sources (Savolainen, 1995) and pay more attention to health information from the print and digital media (Viswanath & Ackerson, 2011). Young people are more likely to be health information omnivores. Hispanics are more likely than white Americans to be omnivores with a four-channel health information repertoire. Yet, immigrants and African Americans are more likely to be health information univores.

This research has several limitations that highlight the need for further research. First, it is about the patterns rather than the impacts of health information repertoires. Second, the survey has no questions on health literacy or health need, which can be important to health information search

(Atkinson et al., 2009; Chinn, 2011; Dutta-Bergman, 2004; Marton & Choo, 2012). The size and the composition of information or media repertoires are related to demand—personal interest and the supply—the availability of news on a chosen medium (Reagan, 1996; Yuan, 2011). Repertoires can vary by topic (Reagan et al., 1995). As information need grows, people favor interpersonal over other sources of information (Lu & Yuan, 2011). Accordingly, when having a serious health issue, 70% of U.S. adults turned to health professional and 60% to friends and family (Fox & Duggan, 2013). Thus, future research needs to collect longitudinal data to examine the outcomes of health information repertoires, with health literacy, health need, and the quality and accessibility of health information controlled. Third, our survey questions allowed respondents to choose from multiple health information sources, which implicitly included but did not clearly differentiate active search and informal encounter of health information from one another. Although our research greatly expands the literature centered on active information search (Atkinson et al., 2009; Case, 2012; Dutta-Bergman, 2004; Renahy et al., 2010; Rice, 2006; Savolainen, 1995; Spink & Cole, 2006), future research should explicitly ask respondents whether they acquire health information through purposive search or unintentional encounter.

Despite these limitations, the findings have both scholarly and practical importance. First, as people use repertoires, that is, sets of multiple sources, to get health information, scholars need to develop a more holistic view of health information sources by investigating the patterns and implications of these repertoires for informational and participatory health behaviors as well as civic engagement related to public health issues (Chen & Lee, 2014; Chinn, 2011). Second, the repertoire approach reveals the necessity for and potential advantages of strategically configuring interpersonal, digital, and mass media channels to reach target health stakeholders in a cost effective manner (Case, 2012; Dutta-Bergman, 2004). It is critical to take into consideration how the size and the composition of health information repertoires vary significantly by people's access to social capital, the Internet, and mass media. The compensating relationship between the Internet and interpersonal sources suggests that carefully designed health campaigns should allow different channels to complement and reinforce one another. As importantly, target programs that help members of disadvantaged groups to develop greater Internet skills or diverse connections within and beyond their local communities would contribute to a richer, larger health information repertoire.

Moving beyond the existing literature that has focused on active information search via single, specific medium and paid limited attention to social capital, this research adopts a repertoire approach and shows that the size and the composition of health information repertoires vary by social and digital connectivity. This research has extends existing studies on health information sources. It should stimulate future research on helping people to develop diverse health information repertoires that allow the verification, elaboration, and utilization of health information for positive outcomes.

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Appendix 1

The composition of health information repertoire.

	Composition	%	SD
1	Internet + Interpersonal	22%	0.42
2	Internet only	13%	0.34
3	Internet + Interpersonal + television + Newspaper	9%	0.29
4	Interpersonal only	8%	0.27
5	television only	7%	0.26
6	Internet + Interpersonal + television + Radio + Newspaper	5%	0.22
7	Internet + Interpersonal + television	5%	0.22
8	No health information sources	5%	0.22
9	Internet + Interpersonal + Newspaper	4%	0.20
10	Internet + Interpersonal + television + Radio	2%	0.15
11	Internet + television + Newspaper	2%	0.13
12	Internet + television	2%	0.15
13	Internet + Radio	2%	0.13
14	Radio only	2%	0.13
15	Internet + Interpersonal + Radio + Newspaper	1%	0.10
16	Internet + Interpersonal + Radio	1%	0.11
17	Interpersonal + television + newspaper	1%	0.11
18	Interpersonal + television	1%	0.10
19	Internet + Newspaper	1%	0.10
20	television + Radio	1%	0.08
21	television + Newspaper	1%	0.08
22	Internet + television + Radio + Newspaper	0%	0.06
23	Interpersonal + television + Radio + Newspaper	0%	0.07
24	Interpersonal + television + Radio	0%	0.00
25	Interpersonal + Radio + Newspaper	0%	0.06
26	Internet + television + Radio	0%	0.07
27	Internet + radio + Newspaper	0%	0.04
28	television + Radio + Newspaper	0%	0.04
29	Interpersonal + Radio	0%	0.06
30	Interpersonal + Newspaper	0%	0.06
31	Radio + Newspaper	0%	0.03
32	Newspaper only	0%	0.00