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Exposure Patterns in the Digital Domain: A Demographic Analysis of Media Use and Access in the United States

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Abstract

In this study we examine and extend knowledge in a relatively neglected area of diversity research in the digital domain: exposure diversity. Specifically, we assess how different demographic groups use digital devices to consume media content and connect with one another. Two hundred and ninety-seven participants were surveyed about the digital media devices they have and what they do with them. We analyzed access and use in terms of users' age, gender, race, annual income, and education. Our results confirm the persistence of a digital divide with regard to exposure diversity and continue to verify earlier findings regarding significant differences in media use and access in different demographic groups.

Key words: Exposure; Digital; Technology; Demographic; Survey; Media; Use; Access

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INTRODUCTION

Against the backdrops of mass media research and the new millennium's digital transition, research examining the "haves" and "have-nots" of technology is certainly nothing new (Gunkel, 2003; Madden, 2003; National Telecommunications and Information Administration 2000; UCLA-CCP 2003). van Dijk (2000, 2004, 2005; also see Hacker & van Dijk, 2003) describes this phenomenon as the much discussed (but sometimes misinterpreted) "digital divide": the notion that a socio-cultural gap separates those who can (and do) embrace new technologies from those who cannot or will not. As van Dijk (2005) explains, much contemporary research highlights how the digital divide has ceased widening as access to new technologies becomes more readily available. Such scholarship often focuses on computer and Internet use, drawing broad conclusions regarding the digital transition from these media alone (Horrigan & Raine, 2002a, 2002b). For example, a national report on Internet use and diversity suggests that "the rapid uptake of new technologies is occurring among most groups of Americans, regardless of income, education, race or ethnicity, location, age, or gender, suggesting that digital inclusion is a realizable goal. Groups that have traditionally been 'have nots' are now making dramatic gains" (NTIA, 2000). In spite of this, however, van Dijk (2005) stresses an overlooked undercurrent to this trend, "that the digital divide is [still] deepening" (p.2).

Like many scholars of digital diversity, van Dijk (2005) anchors his research on the premise that inequalities among varying social classes produce an uneven distribution of digital resources, which in turn skews both access and use of technology across populations. Unlike his predecessors, however, van Dijk adds dimensionality to the access issue by deconstructing its key components—motivational access, physical access, skills access, and usage access—the latter triad of which forms the crux of the present analysis (van Dijk, 2004, 2005).

Within the context of the "haves" and "have-nots," van Dijk (2005) compares material access to both skills and usage access to help explain how the digital divide

does not disappear with mere purchase. Thus, he points out that data on material access are unclear. For instance, is it enough to own a computer, or must one master its applications and programs?

Leaving aside such debates, statistics on digital devices suggest that while their market saturation increases, their prevalence in the homes of *some* groups continues to remain stagnant (Lazarus & Mora, 2000; NTIA, 2000). Van Dijk (2005) observes that "most [demographic categorical] gaps have been wide, and increasingly so, between 1985 and 2000" (pp.49-50). Recent studies suggest that employment level may be among "the most important…categories" predictive of one's position in the digital landscape, with age, gender, education, household composition, and nationality coming in close behind (de Haan, 2003; Madden, 2003; NTIA, 2002; van Dijk, 2005; van Dijk et al., 2000; van Dijk & Hacker, 2003). The influence of such characteristics does not end with material access alone. Demographic classifications are just as telling for physical use of digital technologies as for skill level required for their use and the time spent engaging them. Van Dijk (2005) writes:

> Internet access increases between 1993 and 1997 were greater for American whites and even more for Asian Americans than for Native, African, and Hispanic Americans. Between 1997 and 2001, the gap of ethnicity in Internet access kept increasing, as Asian Americans rose from 27% to 60% (+33), whites from 25% to 59% (+34), although African Americans only increased in access from 13% to 39% (+26) and Hispanics from 11% to 31% (+20). (p.60)

This trend serves as evidence of a stratification model, where highly discrepant levels of use among various groups are perpetuated; that is, the difference between groups never actually disappears even as groups' use of particular devices grows (van Dijk, 2005). Some scholars fear such trends because they may impact a group's abilities to amass the skills necessary to use technology, thus creating a stratification effect resulting in the information elite.

In today's society, information acquisition is predicated on the ability to maneuver the digital universe—so much so that van Dijk's divide is just as much about technological inequality as it is about social disparities (i.e., economic, political) (de Haan, 2003; Tilly, 1998). Summarizing, van Dijk (2005) explains how users may meet the criterion for motivational, physical, and skills access [sic] "but nevertheless have no need, occasion, obligation, time, or effort to actually use them… This effect generally means that…those already having the most resources and best positions in society also take advantage of [them]" (p.95). As the digital transition is evident we seek to understand who is embracing it. Further, we examine what digital devices are used and how they are used by a post-millennial generation.

Following van Dijk's (2005) view that the digital divide is best studied from a relational standpoint, we analyzed "not individuals but the positions of individuals and the relationships between them" (p.10). Such a perspective stresses the impact and influence of inequality over its form and highlights discrepancies among individuals rather than the individuals themselves. We followed the same demographic categories of age, race, gender, household income, education, and marital status employed by the Office of Labor-Management and Budget (OMB). Such classifications ground our analysis in concrete terminology that has been operationalized for some time; thus data are comparable to previous diversity studies.

1. LITERATURE REVIEW

This study owes much to the history of diversity research, particularly as reviewed by Napoli (1999) who presents a framework for the present analysis. Approaching diversity as a national/collective goal and a legal construct, Napoli (1999, 1997) situates the relevance of diversity within the larger context of the marketplace of ideas. Essentially, the marketplace metaphor envisions information exchange as an open, productive forum for discussion and debate (Napoli, 1999). From a socio-political perspective, mass media available via broadcasting and the Internet are clearly among the best situated to achieve the societal goals of a robust democracy when messages are available to diverse groups of media consumers. Justice Holmes (*Abrams v. US*, 1919; also see Ingber, 1984) eloquently summarized this ideal when he suggested that "the ultimate good desired [of a democratic society] is better reached by free trade in ideas… [and] the best test of truth is the power of the thought to get itself accepted in the competition of the market." As suggested in earlier diversity research, such a perspective is often predicated on the notion that democracy functions best when all its constituents have a voice and when a totality of competing, complementary, and even conflicting voices can be fully heard and their points of view evaluated. This notion makes clear that no message can be assessed for its value to the body politic if it is made available to the public but is never accessed. Thus, exposure diversity is extremely vital in the enterprise of assessing diversity.

Though digital communication was just beginning to take shape as Holmes penned his opinion, its application to digital media is no less relevant and no less foundational than it was for print and broadcasting. Napoli (1999), for example, cites numerous examples of contemporary, "intended" diversity-enhancing regulations; a principal among them includes common law interpretations of the First Amendment and FCC edicts such as the Fairness Doctrine. As Napoli (1999) observes, the American mass media model has always envisioned diversity as a quantifiable, triadic unit of analysis: one that encompasses a citizen's freedom "to choose from a wide range of ideas (content diversity), delivered from a wide range of sources (source diversity)" (p.232) to a

wide range of channels and outlets (*exposure* diversity). In short, increase what content is created, where it is disseminated, and how it is received and the marketplace becomes a self-fulfilling prophecy: a forum of ideas that serves it citizens by physically and socially representing the diversity of its citizens (Heeter, 1985; Napoli, 1997).

However, Napoli sees some problems with the diversity construct in that it is too often grounded in the false assumption "that audiences provided with a diversity of content options [will] consume [or are able to consume] a diversity of content" (Napoli, 1999, p.246). Second, this false assumption over-emphasizes the importance of source and content diversity at the extreme neglect of exposure diversity and the role of the consumer in choosing what content to engage (Napoli, 1997; Entman, 2001). As Webster and Phalen (1994) posit, "diversity of supply does not guarantee what might be called 'diversity of consumption'" (p.35). Thus, while scholars have devoted substantial resources to examining the dissemination of information from "diverse and antagonistic sources" (Napoli, 1999, p. 232), little is known about the delivery of such information to diverse and antagonistic consumers (Napoli, 1999; Yuan, 2008). This paucity is troubling because it diminishes the role of consumers and undercuts some of the principles guiding the marketplace of ideas (Napoli, 1999).

Despite its importance in the media and cultural landscape, exposure diversity has received relatively little empirical study (Napoli, 1999). Glasser (1984) partially attributes this to what he calls the FCC's flawed perception of diversity as "strictly economic" (p.139) and solely within the broadcaster's purview (not the consumer's). He adds that by sheer virtue of the need to make diversity manageable as an end rather than a means, the FCC has emphasized source and content regulations over exposure measures because such initiatives are within the administrative grasp. Exposure diversity, on the other hand, is perceived as an "other" so detached from the broadcast process that it is beyond study or control (e.g., beyond the direct economic interests of the broadcast model). As Glasser (1984) observes, the FCC may commit to diversity from afar, but up close the view is skewed towards capitalist competition more than any other goal.

In regard to media exposure, Ferguson (1993) notes that "availability" and "use" are not synonymous. In fact, some exposure diversity research emphasizes an inverse relationship between content and exposure (see e.g., Napoli, 1999). If this is the case, the marketplace of ideas may be "undermined, rather than fulfilled" (Napoli, 1999, p.249).

Unfortunately, most research on exposure diversity has been shaped by the FCC's supply-side model and treats the phenomenon as a footnote more than a focus (Napoli, 1997). Some exposure studies ignore issues of availability and emphasize behavioral analyses of audience interactions with source and content components (Napoli, 1997). For example, as cable television was just gaining notoriety, Jeffres (1978) posited that increased availability of new and different channels would lead to polarization of viewership for preferred programs at the expense of those that were non-preferred (p.150). Comparing viewing logs and program preference surveys both before and after the introduction of cable television, Jeffres (1978) found no statistically significant differences between preferred program types viewership. Hence, the increased availability of different sources does not guarantee that viewers will change their exposure patterns. Youn (1994) suggests that Jeffres' study was limited by the novelty of the new cable medium; yet even earlier research (Heeter, 1985) suggests that cable television viewers may not consciously comprehend the nature of their interactions with TV.

Despite these findings, an equally expansive body of research suggests that viewer demographics and the availability of technologies do impact the prevalence of diversity in the media, and that studies of audience exposure merit further analysis. Hellman (1985), for instance, compared videotape rankings in the United States and Great Britain and concluded that Americans preferred more "highbrow" content than their European counterparts. He attributed this distinction to the restrictive costs of owning a VCR in the United States contrasted with the relatively inexpensive rental system prevalent in England at the time.

Similarly, Heeter (1985) surveyed viewer attribute research and developed a "program selection" study to test the validity of such findings as applied to cable users. His literature review confirmed a curvilinear relationship between age and information processing, with a peak for individuals in their twenties. Additionally, men were "more comfortable" than women with viewer technology (remote controls, viewer guides, etc.) and thus more likely "to engage in…[program] searches and reevaluations" (Heeter, 1985, p.135). Finally, differences in educational background suggested that highly educated viewers were "more discriminating and selective" and open to the possibility of program alternatives (Heeter, 1985, p.135).

Heeter (1985) analyzed 232 cable households in terms of demographics, channel familiarity, and channel surfing practices. Her results confirmed increased differences in exposure patterns across the life of the channel familiarity process (from familiarization through the development of a "personal repertoire"). While age was the only significant characteristic to be correlated (negatively) with "orienting searches," survey data confirm Heeter's expectations regarding channel reevaluation and channel familiarity. Overall, channel reevaluation, channel familiarity, and channel repertoire appear to be related to being male, young, and novelty-seeking. Repertoire development and channel familiarity are likewise linked to higher education and household income, and reevaluation

and channel repertoire are positively correlated with cable subscription. Heeter concludes that the viewing process is correlated not only to consumer demographics but also to the development of the process itself. As such, cable subscribers eventually develop a unique repertoire of "go-to" channels from which they exclusively draw (also see Webster, 1986). Heeter's (1985) analysis confirms that "expected choice process variables do explain significant amounts of variance in channel familiarity and channel repertoire above and beyond what…demographics and viewing habits account for. [This suggests] that choice process patterns influence awareness" (pp.149-150).

Webster's (1986) extended research program on viewing preferences confirms such findings in a secondary analysis of television diaries designed to examine cable's effects on media consumption. "The most widely anticipated change in audience behavior as a response to the new media environment is that the mass audience has become increasingly fragmented" (Webster, 1986, p.83). While traditional network offerings continue to corner the market in terms of channel shares, specialty cable providers now far surpass their network counterparts in ratios of channel users to all viewers *and* channel users among those with access (Webster, 1986). Though their market shares are trumped by well-established alternatives, the boutique channel offerings of cable subscription by the 1980s were "substantial items in the television diets of those who viewed them" (Webster, 1986, p.88).

This is not to suggest that creating a niche guarantees loyal viewership. Research demonstrates that an increase in the availability of religious content was ironically detrimental to its consumption (Wober, 1989). In fact, viewers wound up consuming sportscasts and game shows in far greater proportion than they had in previous decades, despite marginal growth of such programming when compared with religious fare (Wober, 1989).

Such research substantiates Ferguson's (1993) claim that viewers are critically selective of content options even when their choices are restricted. In many respects, Ferguson's (1993) analysis provides a much-needed link between Heeter's and Wober's investigations. A telephone survey of 615 households compared "total channel recall" (aided awareness of a channel) with "mindful channel repertoire" (unaided awareness) to determine whether cable subscribers were making use of all available content and how their viewing preferences were shaped by the then new medium of cable television (Ferguson, 1993). Ferguson's (1993) results suggest a tangible difference between self-recognition of a network and aided identification of the same. "Cable subscription (a media factor) and television exposure (an audience availability factor) were the most substantial single predictors of both [total channel recall] and [mindful channel repertoire]" (Ferguson, 1993, p.53). His conclusions lend credence to a major tenet of exposure diversity, namely that "audience activity as an intervening variable in media use" cannot be overlooked (Ferguson, 1993, p.57).

Given the depth of inquiry regarding the effectiveness of exposure diversity, it is both logical and disconcerting that past research has done little more than confirm Napoli's (1997) findings without examining more fully how or why issues of access impact diversity. For example, both Entman (2001) and Lozano (2006) stress how increases in sources actually led to decreases in consumption. Entman (2001) attributes this phenomenon to a viewer's cost-benefit analysis of television options, weighing the amount of energy one is willing to expend for the sake of exposure and enjoyment. Lozano (2006), conversely, believes that individuals who "find content especially suited to [their] demographic, ethnic, religious, and cultural characteristics…[will] not watch programs with other values, ideas, representation of groups, or geographic locations" (p.476). Though Lozano highlights the need to recognize the importance of exposure diversity, he does so without examining it as an independent unit of analysis.

This study aims to remedy such deficiencies, especially in the field of new digital media device access and use. In particular, we have separated use and access from content and programming in an attempt to uncover both if and how new digital media devices are used by a diverse group of consumers, including college students and selected household members. Separating use and access from content and programming allows us to understand the audience as an important intervening variable between content and dissemination (Ferguson, 1993). It explicates more fully how issues of access contribute to the goals of democracy and assesses the ways in which US mass media content is either utilized by selected sectors of the viewing public or lost to its intended audience.

2. RESEARCH QUESTIONS

Based on the foregoing rationale and literature review, the questions of interest are:

For college students and selected household members, what digital devices are used most across several demographic categories of interest (age, gender, race, occupation, education, and income level)?

What is the nature of the uses to which these devices are put, both in the aggregate and across the aforementioned demographic categories?

How much time is spent using such devices for selected functions/features?

3. METHODS

3.1 Subject Selection

In April 2008, fifteen Communication professors from across the United States were contacted by telephone and email; twelve agreed to assist with data collection, representing geographic regions including California (4 locations), Michigan (2 locations), Illinois (2 locations), Maryland (1 location), Connecticut (1 location), Ohio (1 location), and Pennsylvania (1 location). Each professor was asked to distribute an online survey link to his or her students. Students completing the survey were also asked to select a member from their household (age twelve or older) to complete the same survey. The total sample of participants represents a convenience sample of American college students and selected household members from a dozen locations across the US.

3.2 Data Collection

Exposure diversity was gauged using an 85-item inventory developed via a series of focus groups with college students and graduates about their access and use of digital media devices (the complete survey is available upon request from the authors). Respondents were asked questions related to access, amount of time spent using various digital technologies, and their preferences and satisfaction levels for twelve media devices and services, including television, radio, streaming radio, cell phones, computers, MP3 players, digital cameras, digital video cameras, digital video editing systems, video games, and Internet providers. Respondents were also asked to provide demographic information (age, zip code, education level, gender, ethnicity/race, marital status, and total annual household income).

After obtaining Human Subjects' approval, data were collected over a three-month period for all 297 participants. Participation was voluntary. Over 90% of those who accessed the link completed the survey.

3.3 Data Analysis

Responses were analyzed by computing frequency scores and percents for each question for totality (N = 297) and for each demographic group isolated for analysis. Selected measures of central tendency and dispersion were also computed to summarize results; finally, in cases where marked differences were observed across groups, follow-up (chi-square) tests were conducted to determine whether observed disparities across demographic groups were statistically significant.

4. RESULTS

Table 1 reports frequency and proportion scores for all participants surveyed and includes selected measures of central tendency and dispersion. Since respondents were not required to answer all questions, some group totals differ for some variables. For example, only 275 individuals responded to the question regarding age, while 296 reported marital status.

Table 1
Grand Totality of Demographics for 297 Online Survey Respondents

Demographic	N # / %[a]
AGE	
<18	1/.03
18-24	232/.78
25-34	16/.05
35-44	8/.03
45-54	9/.03
55+	9/.03
Total Valid Responses	**275**
ANNUAL INCOME	
<$10,000	70/.24
$10,000-$19,999	88/.30
$20,000-$29,000	24/.08
$30,000-$39,000	17/.06
$40,000-$49,000	5/.02
$50,000-$59,000	12/.04
$60,000-$69,000	4/.01
$70,000-$100,000	10/.03
$100,000+	28/.09
I don't know	36/.12
Total Valid Responses	**294**
MARITAL STATUS	
Single	257/.87
Married	33/.11
Separated	1/<.01
Divorced	4/01
Widowed	1/<.01
Total Valid Responses	**296**
ETHNICITY	
White	198/.67
Black	26/.09
Hispanic	25/.08
Asian	29/.09
Native American	16/.05
Total Valid Responses	**294**
EDUCATION	
Some High School	1/.01
High School Diploma	133/.45
2-year College Degree	47/.16
4-year College Degree	100/.34
Post-Graduate Degree	11/.04
Total Valid Responses	292

[a]Total number of online survey respondents in each category coded per totality and percent composition of category. Percentages are expressed in decimal form.

As Table 1 suggests, nearly 90% of respondents identified themselves as single. Eighty-three percent were between the ages of 18 and 35 and just over two-thirds (67%) classified themselves as White. Married persons totaled 11% of respondents. Only 1 survey respondent was a minor below the age of 18. Only 5% of respondents identified themselves as Native Americans, followed closely by Hispanics (8%), Blacks (9%), and Asians (11%).

Seventy percent of respondents reported earning less than the US median income of $50,000 (US Census Bureau, 2008: < www.census.gov/Press-Release/www/releases/archives/ income_wealth/012528.html >); only 30% earned more.

Of the many relationships examined, those involving gender featured some of the most striking differences. For example, Table 2 shows the top three regular uses of a cell phone comparing men, women, and the totality. As the table shows, while men and women are about equal in their use of cell phones for talking, one clear difference between them is the greater time women use them for texting compared to men. A follow-up chi square test suggests that texting is a practice women engage in more than men. As totality of use decreases, however, so too does use by men. Only 63% of male respondents, for example, answered that they use their cell phones as alarm clocks compared with 80% of females.

Table 2
Frequency and Percent Distribution of the Regular Uses of a Cell Phone Coded by Gender for 293 Online Survey Respondents

	Regular cell phone uses			
	Talking	Texting	Alarm clock	Total
Male # / %[a]	82/.95	69/.80	54/.63	86/.29
Female	206/1.0	184/.89	165/.80	207/.71
n[b]	288	253	219	293

[a]Total number of online survey respondents in each category coded per gender and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

In order to see whether variations of use were due to chance or to some association with gender, a chi-square test was performed for all of the top-three choices. With d.f. = 1 for each, a X^2 of 6.29 was computed for talking, 3.86 for texting, and 9.21 for use as an alarm clock. These outcomes are associated with probability levels of 0.01, 0.05, and 0.002, respectively, indicating significant differences between men and women for cell phone use, particularly as regards texting and timekeeping. Chi square calculations for all data are reported in the last table.

Data regarding the amount of time spent using or avoiding a particular digital device represents the second major facet of our study. Table 3 displays the average time spent surfing the web on one of the most pervasive digital devices, the personal computer. Almost half of all respondents surf the web for 30 minutes to two hours per day. Only 6% of respondents do no web browsing with a computer at all.

Table 3
Frequency and Percent Distribution of the Daily Time Spent Surfing the Web With a Computer Coded by Marital Status for 296 Online Survey Respondents

	Average daily time spent surfing the web with a computer						
	None	<30 mins.	30 mins.- <1 hour	1 hour- <2 hours	2 hours-<3 hours	3+ hours	Total
Single # / %[a]	11/.04	58/.20	51/.20	81/.32	31/.12	25/.10	257/.87
Married	5/.15	11/.33	8/.24	6/.18	2/.06	1/.03	33/.11
Separated	0/.00	0/.00	0/.00	0/.00	1/1.0	0/.00	1/<.01
Divorced	1/.25	2/.50	1/.25	0/.00	0/.00	0/.00	4/.01
Widowed	1/1.0	0/.00	0/.00	0/.00	0/.00	0/.00	1/<.01
n[b]	18	71	60	87	34	26	296

[a]Total number of online survey respondents in each category coded per marital status and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

Marital status is a demographic category that seems to differentiate singles from others when it comes to web browsing. For example, singles seem far more likely to spend long periods of time (one hour or more) web browsing than any other marital group. As Table 3 shows, 54% spend more than an hour a day surfing the web with a computer. Further, nearly one in five of these relatively heavy users web-surf for more than three hours a day. By contrast, only 4% of singles do not use computers to surf the web at all, compared with 15% of married respondents.

This is not to suggest, however, that all persons free from relational commitment are likely to use the Internet for extended periods of time. Married persons are the next heaviest surfers, with over a quarter spending more than an hour a day using a computer to web browse. At the same time, more than half (57%) of married respondents surf for less than 60 minutes a day. Though the number of divorced and widowed respondents is small, all of them web surf for less than one hour daily. A chi square test revealed that there is a statistically significant difference between the time spent web surfing by different martial groups (d.f. of 20, $X^2 = 40.43$, $p = 0.004$).

Table 4 displays similar media use differences based on marital status as related to the time spent uploading

pictures and videos to the web with a computer. Of all respondents surveyed, almost half (48%) spend less than 30 minutes a day uploading content to the web with a computer. As the data suggest, marital status is predictive of some differences. Specifically, singles are far more likely than others to spend long periods of time uploading digital content. As the table shows, 15% do so for more than 30 minutes a day.

Table 4
Frequency and Percent Distribution of the Daily Time Spent Uploading Pictures and Videos on the Web With a Computer Coded by Marital Status for 296 Online Survey Respondents

	Average daily time spent uploading pictures and videos on the web with a computer						
	None	<30 mins.	30 mins.- <1 hour	1 hour- <2 hours	2 hours-<3 hours	3+ hours	Total
Single # / %[a]	85/.33	134/.52	24/.09	9/.04	3/.01	2/.01	257/.87
Married	27/.82	5/.15	1/.03	0/.00	0/.00	0/.00	33/.11
Separated	1/1.0	0/.00	0/.00	0/.00	0/.00	0/.00	1/<.01
Divorced	1/.25	3/.75	0/.00	0/.00	0/.00	0/.00	4/.01
Widowed	1/1.0	0/.00	0/.00	0/.00	0/.00	0/.00	1/<.01
n[b]	115	142	25	9	3	2	296

[a]Total number of online survey respondents in each category coded per marital status and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

To determine whether differences associated with uploading were statistically significant as a function of marital status, a chi square test was performed. With d.f. = 20, a X^2 of 33.94 was computed; this outcome is associated with a probability level of 0.03, indicating that the differences observed among subgroups go beyond mere random chance variations.

Perhaps not surprising given uploading trends, marital subgroups are also divided in how long they spend recording content. Table 5 shows the average daily time spent using a digital video camera as a hobby for all respondents by totality and by marital subgroups.

Table 5
Frequency and Percent Distribution of the Daily Time Spent Using a Digital Video Camera as a Hobby Coded by Marital Status for 295 Online Survey Respondents

	Average daily time spent using a digital video camera as a hobby						
	None	<30 mins.	31 mins.- 1 hour	>1-2 hours	>2-3 hours	3+ hours	Total
Single # / %[a]	207/.81	35/.14	5/.02	7/.03	2/.01	0/.00	256/.87
Married	28/.85	5/.15	0/.00	0/.00	0/.00	0/.00	33/.11
Separated	1/1.0	0/.00	0/.00	0/.00	0/.00	0/.00	1/<.01
Divorced	3/.75	1/.25	0/.00	0/.00	0/.00	0/.00	4/.01
Widowed	0/.00	0/.00	1/1.0	0/.00	0/.00	0/.00	1/<.01
n[b]	239	41	6	7	2	0	295

[a]Total number of online survey respondents in each category coded per marital status and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

For the relatively small proportion of respondents engaged in this activity, singles were again the most likely to use digital video cameras as a hobby. Among those singles who use video cameras at all, 6% do so for 31 minutes to three hours a day. Divorced and widowed respondents are the most likely to engage in "light" use of digital cameras as a hobby. Twenty-five percent of those divorced record content for less than 30 minutes a day. A chi square test revealed significant differences among marital subgroups (d.f. = 16; X^2 = 50.95; p = 0.00).

Table 6 presents similar findings on the daily time spent editing videos comparing men, women, and the totality. Once again, few respondents (16%) do any video editing at all. Of those who do, most (10%) spend less than 30 minutes a day engaging in such pursuits.

Table 6
Frequency and Percent Distribution of the Daily Time Spent Editing Videos Coded by Gender for 292 Online Survey Respondents

	Average daily time spent editing videos						
	None	<30 mins.	31 mins.- 1 hour	>1-2 hours	>2-3 hours	3+ hours	Total
Male # / %[a]	65/.76	11/.13	5/.06	1/.01	4/.05	0/.00	86/.29
Female	181/.88	18/.09	3/.02	1/.01	2/.01	1/.01	206/.71
n[b]	246	29	8	2	6	1	292

[a]Total number of online survey respondents in each category coded per gender and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

Though a woman is the only respondent to report spending three or more hours a day editing video, men are still more likely to perform such tasks. Five percent of men, in fact, report doing so for two to three hours a day and almost one in five (19%) report editing for up to one hour. By contrast, almost nine out of ten women (88%) report spending no time whatsoever editing video content. To see whether such outcomes were due to chance or a probable gender association, a chi square test was performed. The probability associated with this data was 0.049 (d.f. = 5, X^2 = 11.12), indicating a significant difference between time spent editing videos.

In contrast to trends reported thus far regarding gender dominance in the use of digital media devices, Table 7 shows that in some cases women can indeed outnumber men in measures of exposure for time spent social networking. Almost half (48%) of all respondents spend no more than one hour using their computer to social network (16%, in fact, refrain from doing so altogether). Only 15%, furthermore, would be classified as comparatively "heavy users," those spending two hours or more social networking with a computer.

Table 7
Frequency and Percent Distribution of the Daily Time Spent Social Networking with a Computer Coded by Gender for 293 Online Survey Respondents

	Average daily time spent social networking with a computer						
	None	**<30 mins.**	**31 mins.- 1 hour**	**>1-2 hours**	**>2-3 hours**	**3+ hours**	**Total**
Male # / %[a]	15/.17	33/.38	14/.16	15/.17	5/.06	4/.05	86/.29
Female	31/.15	41/.20	54/.26	43/.21	28/.14	10/.05	207/.71
n[b]	46	74	68	58	33	14	293

[a]Total number of online survey respondents in each category coded per gender and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

As Table 7 shows, men and women mirror the average for totality almost exactly. Notice that nearly equal proportions of men and women (17% of men and 15% of women) do no social networking at all, while 5% of each gender does so for more than three hours a day. However, men appear to engage in social networking for less time (54% at one hour or less), while women do so more (35% for one to three hours daily). These differences are statistically significant (d.f. = 5, X^2 = 14.60). The probability level associated with them was 0.01, indicating a fairly significant discrepancy between the genders in terms of time spent social networking.

Gender and marital status appear as determinants of differential exposure patterns but they are not the only ones. As van Dijk (2005) posits, level of education is just as telling for differences in the use of digital devices. Like Table 3, Table 8 shows selected measures of central tendency for the time spent surfing the web with a computer—here as broken down by education level.

Table 8
Frequency and Percent Distribution of the Daily Time Spent Surfing the Web With a Computer Coded by Education for 292 Online Survey Respondents

	Average daily time spent surfing the web with a computer						
	None	**<30 mins.**	**31 mins.- 1 hour**	**>1-2 hours**	**>2-3 hours**	**3+ hours**	**Total**
Some High School # / %[a]	0/.00	1/1.0	0/.00	0/.00	0/.00	0/.00	1/.01
High School Diploma	7/.05	35/.26	26/.20	35/.26	15/.11	15/.11	133/.45
2-year College Degree	2/.04	9/.19	8/.17	19/.40	5/.11	4/.09	47/.16
4-year College Degree	7/.07	20/.20	22/.22	31/.31	13/.13	7/.07	100/.34
Post-grad. Degree	1/.09	5/.46	2/.18	2/.18	1/.09	0/.00	11/.04
n[b]	17	70	58	87	34	26	292

[a]Total number of online survey respondents in each category coded per educational level and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

Totality proportions are nearly identical to those reflected by Table 3 and are not repeated here. One difference in usage patterns as a function of education level appears to be among Associates Degree recipients, 40% of whom spend one to two hours surfing the web compared with only 30% of the totality. Respondents with some high school education and those possessing a post-graduate degree are also notable exceptions. It is clear from the table that post-graduates are less likely to web browse for long periods of time than any other groups differentiated along educational levels. Nearly half (46%) of these respondents, in fact, do so for less than half-an-hour daily. When a chi square test was performed to explore whether persons with varying degree qualifications differed from one another

with respect to time spent surfing the web with a computer, fairly significant differences were found (d.f. = 3; X^2 = 12.37; p = 0.015).

It seems that education level is also associated with the use of another digital device, one that provides connectivity as much or more than content—the cell phone. Table 9 reports the number of text messages sent daily comparing the totality of respondents and several educational subgroup.

Table 9
Frequency and Percent Distribution of the Number of Text Messages Sent Daily Using a Cell Phone Coded by Education for 292 Online Survey Respondents

	Number of text messages sent on an average day							
	None	1-5	6-10	11-15	16-20	21-25	25+	Total
Some High School # / %[a]	0/.00	1/1.0	0/.00	0/.00	0/.00	0/.00	0/.00	1/.01
High School Diploma	14/.11	20/.15	18/.14	17/.13	11/.08	12/.09	41/.31	133/.45
2-year College Degree	7/.15	12/.26	7/.15	4/.09	5/.11	0/.00	12/.26	47/.16
4-year College Degree	9/.09	23/.23	18/.18	11/.11	10/.10	8/.08	21/.21	100/.34
Post-grad. Degree	6/.55	3/.27	1/.09	0/.00	0/.00	0/.00	1/.09	11/.4
n[b]	36	59	44	32	26	20	75	292

[a]Total number of online survey respondents in each category coded per educational level and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

What is perhaps most interesting about responses to this item is that the majority of respondents are clustered at extremes of device use. The largest group (26%) sends more than 25 text messages daily, but the second largest group (20%) sends fewer than five. The number of people sending fewer than ten messages (35%) or more than twenty messages (33%) is fairly even. As for subgroups, most are within a few percentage points of the totality. On the whole, high school graduates are slightly more likely than any other groups to send eleven or more text messages a day. Post-graduate degree recipients are the only respondents to stray substantially from texting trends. Over half (55%) of such persons send no text messages at all, while just over a fourth (27%) send fewer than five per day. Finally, it is clear from the table that not all highly educated persons avoid texting: almost 10% of post-graduates send messages in excess of 25 daily.

To assess whether variations in texting habits were due to chance or some association with education level, a chi square test was performed. This outcome indicates that any difference observed is only slightly significant (d.f. = 24, X^2 = 12.37, p = 0.04).

We conclude our analysis with exposure data on one of the more controversial diversity demographics: ethnicity. Table 10 shows central tendency measures for the amount of time spent playing video games daily on the weekends comparing five of the Labor Department's six ethnic classifications (no responses for "Indian" were observed). Overall, nearly three-fourths (73%) of respondents do not play online video games at all during weekdays. Of the respondents who do, most (18%) do so for less than 30 minutes a day. All other time segments are comprised of respondents in single digit proportions.

Table 10
Frequency and Percent Distribution of the Amount of Time Spent Playing Online Video Games During Weekends Coded by Race for 293 Online Survey Respondents

	Average daily time spent playing online video games during the weekends						
	None	<30 mins.	31 mins.- 1 hour	>1-2 hours	>2-3 hours	3+ hours	Total
White # / %[a]	152/.77	29/.15	6/.03	5/.03	5/.03	0/.00	197/.67
Black	14/.54	8/.31	1/.04	1/.04	1/.04	1/.04	26/.09
Hispanic	19/.66	6/.21	3/.10	1/.03	0/.00	0/.00	29/.10
Asian	18/.72	4/.16	1/.04	2/.08	0/.00	0/.00	25/.09
Native American	10/.63	5/.31	0/.00	1/.06	0/.00	0/.00	16/.05
n[b]	213	52	11	10	6	1	293

[a]Total number of online survey respondents in each category coded per race and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

As for subgroups, Whites are the most likely respondents to mirror overall trends in the data, though even here their numbers are slightly more clustered at the "light" end of device use (77%, for example, do not play online video games at all on weekends). Blacks, on the other hand, are far more likely to engage in what might be classified as "heavy" use of online video games during weekends. Eight percent of Black respondents spend two hours or more playing online games on weekends—more than any other demographic combined. This is not to suggest, however, that Black respondents are wholly dissimilar from the other subgroups. The largest majority

of every demographic spending some time playing online video games during weekends does so for less than 30 minutes. Blacks, in fact, are tied with Native Americans at 31% each for the largest majorities in this category. When a chi square test was performed to explore whether different ethnic groups do in fact differ in their use of online video games during the weekend, statistically significant differences were confirmed (d.f. = 20; X^2 = 35.66; p = 0.017).

It also seems likely that such differences extend into the use of other digital devices—the cell phone, for example. Table 11 reports the number of text messages sent by respondents on an average day comparing the totality and each ethnic subgroup. The totality of responses are nearly identical to those reflected in Table 9, where the majority of respondents were clustered at either pole of the use spectrum. Once again, White respondents are the most likely group to follow overall survey trends. Also, respondents who self-identified as Black remain prone to text messaging in the extreme: 42% of respondents send 25 text messages or more daily, a clear majority second only to Native Americans (56% of whom are clustered in this category). Conversely, Asian respondents report sending far less text messages than most demographics. Thirty-six percent send less than five messages daily and only 16% send any more than 21. Interestingly enough, a third subgroup, Hispanics, constitutes the proportional majority of what might be considered moderate texters. Twenty-eight percent of Hispanics (the largest single grouping for this ethnicity) send eleven to fifteen text messages on any given day.

Table 11
Frequency and Percent Distribution of the Number of Text Messages Sent Daily Using a Cell Phone Coded by Race for 294 Online Survey Respondents

	Number of text messages sent daily							
	None	**1-5**	**6-10**	**11-15**	**16-20**	**21-25**	**25+**	**Total**
White # / % [a]	25/.13	42/.21	30/.15	22/.11	16/.08	17/.09	46/.23	198/.67
Black	3/.12	4/.15	3/.12	0/.00	4/.15	1/.04	11/.42	26/.09
Hispanic	3/.10	6/.21	4/.14	8/.28	2/.07	1/.03	5/.17	29/.10
Asian	3/.12	9/.36	3/.12	3/.12	3/.12	0/.00	4/.16	25/.09
Native American	2/.13	0/.00	4/.25	0/.00	0/.00	1/.06	9/.56	16/.05
n [b]	36	64	44	33	25	20	75	294

[a]Total number of online survey respondents in each category coded per race and percent composition of category. Percentages are expressed in decimal form.
[b]n= total number of responses for each category

Table 12
Summary of Chi Square Calculations for Presented Tables

	Degrees of freedom (d.f.)	**Chi square** (X^2)	**Probability** (p)
2			
Talking	1	6.29	0.01
Texting	1	3.86	0.05
Alarm Clock	1	9.21	0.002
3	20	40.43	0.004
4	20	33.94	0.03
5	16	50.95	0.00
6	5	11.12	0.05
7	5	14.60	0.01
8	4	12.37	0.02
9	24	37.15	0.04
10	20	35.66	0.02
11	24	37.34	0.04

In order to see whether texting differences were again due to chance or to some ethnic association, a chi square test was performed. With d.f. = 24, a X^2 of 37.34 was computed; this outcome is associated with a probability level of 0.04, indicating that there is a slightly significant difference between the number of text messages sent by ethnic subgroups.

5. DISCUSSION

The Latin phrase, suum cuique, meaning “to each his own” is a fitting summary (sans the gender bias) of this digital diversity research. Our findings confirm that there are tangible and meaningful differences between both how and how often different groups use digital media devices. We believe they are endemic to larger variations in exposure patterns confirming Napoli’s (1997) and van Dijk’s (2005) concerns that the digital divide is still very much alive.

Some exposure patterns, particularly those related to the top uses for cell phones, are comforting in that they suggest only slight differences between how the genders use them. At the same time, the top-two uses (talking and texting) are very much at the heart of why individuals buy and use cell phones. Any disparities between how men and women use other cell phone functions (i.e., alarm clock) suggests that women may be more open to their phones’ functions than men.

Exposure data on the time spent using devices is also compelling in terms of gender differences. Men, for example, are more likely to spend longer periods of time editing videos but less likely to use computers for social networking. The preferences among females for social networking evidenced in our results corroborate the data regarding cell phone use for talking and texting.

Women appear more likely to use digital devices for communicative purposes, and the increased time spent social networking may be another example of this trend.

Napoli (1997) notes that education level may be the most determinative factor of one's place within the digital divide. To some extent, our analyses confirm this perspective, but any differences should not imply that higher education automatically translates into greater technologic mastery. Respondents without a high school diploma were least likely to spend time web surfing, but post-graduates (the highest education level polled) were the next least likely.

High school graduates and respondents with Associate degrees were most likely to use computers for social networking. Perhaps differences in the use of digital devices for social networking and connectivity are less a product of education alone than the combination of education and age, with twenty-somethings pursuing college degrees as among the most likely to embrace digital technologies. Findings such as this suggest the need for further study.

Some groups corroborate Napoli's concern that the digital divide continues to grow (see Table 9). It appears that cell phone use for texting is not evenly distributed across education groups but is heavier at the extremes. This suggests in part that moderation may be falling out of style: perhaps users text in excess or not at all.

The factors of age and education may challenge some research suggesting that annual income is the most determinative factor of one's place within the digital divide. Data from this study indicate that high school graduates (as opposed to college and post-graduates) are the most likely to use digital devices for the longest period of time. Perhaps this finding supports the view that users in these groups are still benefitting from their parents' economic largesse.

Data regarding ethnicity is particularly interesting because it shows that certain traditional minorities (Blacks, for example) are actually more inclined to avail themselves of digital technology than Whites. For video game use and the number of text messages sent daily, Blacks were overwhelmingly represented as heavy device users when compared with the survey total or the White majority of respondents. Looking at these data from the perspective of the digital divide, we suggest either (i) that the use of such devices by Whites has perhaps stabilized with average use trends or (ii) that certain minorities lead the way in time spent using digital technology, or both. If the former, does this imply that minority use can (or will) moderate over time? If the latter, what does this mean for developmental differences among races in the US? Are traditionally underserved groups actually more technologically advanced than originally envisioned? Given the national and international attention to development of science and mathematics in Asia, data collected from Asian respondents indicates such trends may be national, not global.

Not only are exposure patterns dependent upon demographic factors over which we have no control, it appears they may also be impacted by such factors as marital status. The obvious explanation for digital trends coded by this type of relationship is that single, separated, divorced, and widowed persons may devote less time to a partner, mate, or spouse, and may therefore have more free time to devote to new digital media devices. This does not explain, however, why married persons were found to be the second most likely group to use devices for extended periods of time. Once again, it may be that the data are less a reflection of marital status than a reflection of age: 87% of respondents were single and 78% were between the ages of 18 and 24, suggesting that the likelihood that most single respondents fit this age bracket is comparatively high.

As the data indicate, however, these trends are not universal. Though time spent using such devices appears small, non-single respondents are receptive to other technologies (i.e., digital video cameras). By contrast, few spend more than 30 minutes uploading content to the web. Notice differences between Tables 4 and 5 with respect to the use of devices (such as a digital camera) for their own value compared to their use for uploading to the web. It remains to be seen whether any disjunctions between recording content versus uploading such content are due to a lack of motivation, skills, or a combination of factors. Clearly further study is warranted.

Overall, it is notable that communication devices appear to come in for heavier use for connectivity than for consumption of media content. Perhaps this is because students and working professionals have less time for fun and games and attach greater value to the communicative aspects of digital devices.

CONCLUSION

While "suum cuique" is an excellent principle of liberty and freedom, it does not help communication scholars better understand regularities in how new digital media devices are shaping our future. The question driving this study is not whether each can do his or her own but rather whether each has the means to reap the rewards and benefits of social, political, and economic opportunity. This survey was distributed online and completed by a sample of respondents that was largely young, female, single, and White. Perhaps the mere fact that most respondents fell within these parameters suggests how the digital divide is currently manifested.

The results of this study both confirm and inform certain issues in Napoli's (1999) framework. Across exposure patterns, significant differences were discovered both in use and in the time spent using various digital devices. In contrast to past research, some groups once considered underserved may not be as disadvantaged as previously believed. Put simply, van

Dijk's (2005) stratification model may not be as salient as it once appeared.

Gender-based gaps also appear to be closing, but they still reflect variations between (a) how men and women use devices and (b) what types of devices they choose to use for longer periods of time. Similarly, our brief examination of devices such as digital video cameras corroborates Ferguson's (1993) belief that availability and use are not synonymous. Digital forums for user-created content now abound, but it does not appear that all demographic groups are equally availing themselves of the opportunity to have their voice (or image) heard (or seen).

More broadly, our study shows that the principles undergirding the marketplace of ideas are tenuous at best—most especially when almost every item presented has a clear demographic majority comprising its heavy users. If the nation desires a robust and thriving democracy, then perhaps scholars, practitioners, and media regulators should focus less on diversity of content as sent and more on diversity of content as received.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Several limitations temper our findings and should be mentioned. First, our sample was not random; it was a convenience sample with a networked component starting with college students and including selected household members from 12 locations around the US. Future studies should make an effort to include more representativeness of digital media device users. Additionally, future research should continue to include new devices as they are adopted in the marketplace. We know now what aspects of a digital device are readily accessed, but which of these do users find essential? Which do they use most often? Furthermore, is the time spent using a device correlated with the volume of work performed or the effort it takes to perform it? Differentiating between use and skillful use would be a welcome addition to exposure pattern research.

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