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**CENTER FOR BUSINESS AND
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With data generated from research by the Center for Media Design at Ball State University and Sequent Partners LLC for the Council for Research Excellence, this analysis examines the ways media is used in the workplace. It reports relationships between places of work and media exposure. This report was prepared by the Center for Business and Economic Research in the Miller College of Business at Ball State University.

REPORT

Media in the Workplace:

An Analysis of the Video Consumer Mapping Study Data

AUGUST 2010

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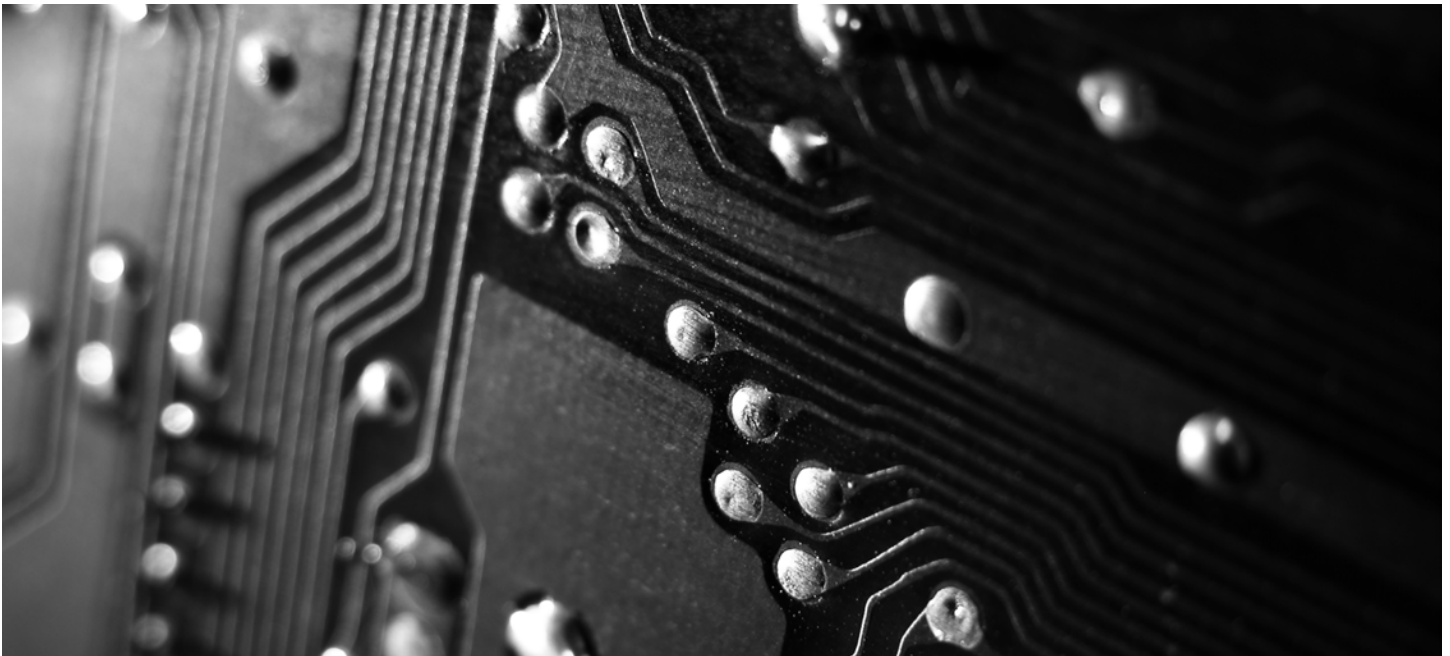
Center for Business and Economic Research & Center for Media Design

Design provided by the publications staff at the Center for Business and Economic Research.

* The Video Consumer Mapping (VCM) study was made possible by the Nielson-funded Council for Research Excellence (CRE), administered through Ball State University's Center for Media Design and conducted by the CMD and Sequent Partners.

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Introduction

Over the past half century the cost of information processing has decreased dramatically, encouraging businesses to integrate more information into work processes and thereby substantially changing work practices. According to Brynjolfsson and Hitt (2000, 24): “As computers have become cheaper and more powerful, the business value of computers is limited less by computational capability and more by the ability of managers to invent new processes, procedures and organizational structures that leverage this capability.” Information technology, in general, refers to computers, both hardware and software, and related communication equipment. We focus on technologies that facilitate communication and information transfer.

This represents a wide variety of technologies that we generally refer to as media. These media have implications for all aspects of business particularly marketing and management. Some media are widely available for work and for personal use. As new media are integrated into the workplace, few studies have systematically examined the prevalence, use, and impact of media at work or the preferred media bundle at the worker level.

Purpose of the Study

The purpose of this study is to examine the prevalence of and exposure to media at work. We use observational data that, to our knowledge, is the most comprehensive behaviorally-based dataset currently available on media exposure across platforms and across locations. This analysis explores the types of questions that can be answered with observational data. We are particularly interested in examining the relationship between media and how people work, when they work, where they work, and the variety of activities in which people, when using media, are engaged at work. It has yet to be empirically determined if there is a link between media adoption and increased organizational productivity. Anecdotally, this has been supported, and this underlying belief has likely led to the rather piecemeal adoption of media technologies in the workplace. To more directly examine this anecdotal belief, empirical work must address some of these assumptions by answering questions regarding the impact of media on where and when employees work, how access to media has influenced the concept of a “traditional” work day, the pervasiveness of media in low and semi-skilled industries/jobs, and the role of the organizational environment and context in shaping media adoption and behaviors. This report is a first step in addressing these issues.

Media Exposure and Work Relevant Literature

This section provides a brief review of the literature on digital media in the workplace. Most literature on this topic either emphasizes IT media with business functions or highlights productive time lost in non-work-related media use (such as personal web browsing or interactive media), but this report differs in including both these exposures.

We begin with studies examining the effect of information technology generally and communication devices in particular on aggregate productivity and then proceed with a discussion of studies examining particular media in the workplace.

Information technology and productivity growth in the U.S.

Through the mid 1990s researchers studying U.S. productivity growth puzzled over the contribution of information technology to aggregate productivity in the U.S. This “productivity paradox” was that despite high levels of spending and improvements in technology, there appeared to be no benefits in terms of aggregate output.¹ Oliner and Sichel (1994) argue that this paradox occurred because in the early 1990s computers were a small share of the total capital stock and therefore had only a small impact on productivity growth. Aggregate measures of productivity growth surged in the late 1990s. Annual productivity growth in the early 1990s was in the 1 percent range, increased to the 2.8 percent range the latter half of the 1990s, continued to rise through mid 2004 and then dropped to the 1.3 percent range through 2007 (Jorgenson, Ho and Stiroh 2008). Earlier, Jorgenson, Ho and Stiroh (2002) reported that IT capital and related total factor productivity explained more than three quarters of the post-1995 increase in productivity growth. In their estimates of the contribution of computer hardware, software and communication equipment to real business output from 1974 through 1999, Oliner and Sichel (2000, 12) found that communications equipment contributed the smallest share of these three components.

The rapid increase in IT-related productivity growth resulted in part from substantial price declines in IT assets and from businesses making “complementary investments” to better integrate this technology into various business processes and human capital.² The doubling of

computer chip density every 18-24 months allowed each generation of computer equipment to outperform prior generations—referred to as Moore’s law (Jorgenson, Hu, and Stiroh 2008). Work by Brynjolfsson and Hitt (1996) using firm-level data of spending on information systems showed that IT spending did have a large, positive impact on firm output, and Brynjolfsson and Hitt (2003) show that investment in computers and complementary investment at the firm level have an even larger impact on productivity and output over a longer time period (5 to 7 years).

We include the aforementioned statistics and analysis to emphasize the following: Much of the work examines the effects of information technology on aggregate productivity growth and more limited work examines the effect at the firm level. The underlying point is that the workers’ ability to effectively integrate this technology into their daily work routines ultimately results in productivity growth, and yet there has been less work examining the role of information technology at the micro (worker) level.

Few publicly available studies have examined how workers interact with new media – particularly how access to new media affects worker behavior. The technological environment in which workers operate has changed dramatically over the past 20 years. With access to the internet, email and cell phones, many workers are available 24/7. With this increased access to information and time-saving technology, economic theory predicts that worker productivity should increase. Increased productivity is usually reflected in higher compensation. Bott, Montagno and Lane (2008) show that employers are willing to pay higher wages to workers with skills in emerging (new) media.

Little research has examined employee interaction with and perceptions of the new media environment. Workers of different ages, (digital natives vs. non natives) are likely to have different responses and perceptions. For example, a 2008 survey by the Pew Internet and American Life Project finds a substantial difference in internet use by age. For respondents 18-29 years old, 87 percent used the internet while only 41 percent of respondents aged 65+ used it. Loges and Jung (2001) find that older respondents use the internet to pursue fewer goals and activities, use fewer internet applications and use the internet in fewer places than younger people.

1. Productivity is measured as output per hour worked and generally focuses on the nonfarm sector. Solow (1987) summarized this computer productivity paradox as “you can see the computer age everywhere but in the productivity statistics.”

2. Examples of complementary investments are internet access, various enterprise software applications like enterprise resource management (ERP), customer relationship management (CRM), and enterprise content management (ECM), resulting modifications in business processes to incorporate this software, and the training of workers to use this software. Investment in internet access, software, management, and training are necessary to achieve increases in productivity.

Research suggests that different management styles are necessary in media-intense environments. Florida (2002) documents that workers in creative occupations (which are also likely to be media-rich environments) expect/require more flexible schedules and better workplace amenities that in turn impact organizational structure, management techniques and technology available in the workplace.

Communication Devices

We divide the literature on media technologies in the workplace into three categories: internet-based, digital media and mobile communications. Many of the studies we include are conference proceedings, indicating the newness and limited study of these technologies in the workplace. Most either focus on one technology or compare two technologies.

Internet-based technologies (Web, blogs, email, IM)

Few studies examine the use of internal corporate blogs. Huh et al. (2007) conducted a small study (14 individual bloggers) to investigate the use of IBM's internal blogging for knowledge management and found that employees use blogging to collaborate and provide feedback, share expertise and acquire tacit knowledge in addition to personal stories and opinions. Brody and Wheelin (2005) discussed various options for organizations that are victims of negative, malicious blogging. While most blogging content is protected under free speech doctrines or whistleblower protections, organizations have limited recourse to stop those who are defaming the character of an organization. Positive employee practices can limit the nature of negative blogging.

Email is the widely used form of computer-mediated communication. It is fundamentally an interpersonal and organizational communication tool (Dabbish and Kraut, 2006). Email is used for a wide variety of tasks—communication, reminders, contact management, task management and information storage. Implementation-oriented research has attempted to design and deploy email systems to assist with the deluge of email and better support the tasks email serves. Dabbish et al. (2005) focused on categorizing messages, determining what is important to the user, and how users respond to email. They studied the email usage of 124 people and found that, on an average, 30 messages were read per day by each person, 14 were sent and each person checked their email an average of 19 times per day. They found that email users rate emails about work that require action as important but this rating has only a modest impact on whether workers save or reply to the message. Other factors such as the social nature of the content determine the response.

IM (Instant Messaging) is a computer program that allows users to exchange short text messages with their list of contacts. This type of media allows conversation to range from synchronous, with rapid exchanges of messages, to asynchronous, with hours and even days passing between

messages. This semi-synchronous nature of IM allows users to multitask while engaged in communication (Avrahami 2008). Nardi et al. (2000) investigated the IM usage of 20 people and found that the central use of IM at work was to support quick questions and clarifications about ongoing tasks, coordination and scheduling, arranging impromptu social meetings, and keeping in touch with friends and family. The study reveals immediacy and visual persistence as reasons why IM is preferable to other channels, such as telephone or email, for certain work tasks. A study of 437 people by Isaacs et al. (2002) using IM at the workplace revealed that 61.8 percent of the conversations were either for work or work-related activities contrary to the perception that IM is primarily used for social purposes. Only 28 percent of conversations were simple, single-purpose interactions and only 31 percent were about scheduling or coordination. Their study resulted in the discovery that people worked together using IM for a range of complex work related collaborative activities. One of the advantages of IM is the presence awareness feature, which allows the users to know exactly who among their contact list is available at the workplace.

Email and IM alert interruptions affect worker productivity. Iqbal and Horvitz (2007) conducted a field study of the computing activities of 27 users over a two-week period, exploring the suspension, recovery and resumption of tasks in participants' natural work settings. They found that a user's primary tasks were interrupted by an average of 4.28 email alerts and 3.21 IM alerts per hour. Users spend on average nearly 10 minutes on switches caused by alerts, and another 10 to 15 minutes before returning to the disrupted task. Even though users feel they are in control, they appear to be largely unaware of the amount of time they spend on the alerting application. Even when users respond immediately with the intention of resuming the current task as soon as possible, they often take significantly more time to return to the task than the time taken to respond.

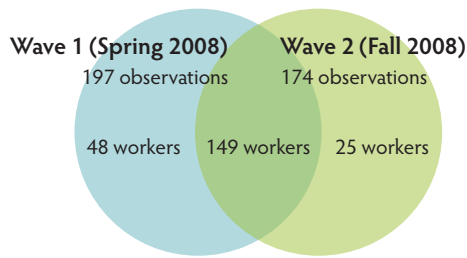
Mobile communications (cell phones, laptops)

The literature on the use of mobile communication devices is vast. Fewer articles examine the use of mobile communication devices to increase worker productivity. Callahan (2007) described Needs-Based Calling software that can be used with smart phones to automate calling clients based on geography, last contact with a client or a variety of other factors. These complementary technologies allow mobile professionals and other workers to make the best use of their time and ultimately generate additional sales or clients.

Digital media (media players, podcasts)

The numerous notifications that are broadcasted regarding podcasts, webinars and other media training, are evidence of widespread and proliferating use of these media in the workplace. In the absence of published research, this anecdotal evidence is the only indicator on the impact of media players or podcasts in the workplace.

FIGURE 1: Observation Waves
(222 workers = 371 observations)



The VCM Data Survey Method

The Video Consumer Mapping Study (VCM) was conducted by Bloxham, Holmes, and Moul, and Spaeth (2009) to analyze how consumers interact with media, what role media play in their daily lives and to promote understanding of consumer exposure to multiple media. The survey method used in this study is similar to the ones used in the Middletown Media studies conducted by Papper et al. (2005) and Holmes, Papper, Popovich, and Bloxham (2005). In the first Middletown Media Study, Papper, Holmes and Popovich (2004) showed that the amount of time people self report for various media types is significantly different from actual exposure when observational techniques are employed. The VCM research was performed using a computer assisted observational technique to collect data on media use over the course of a day. The observations were collected in 10-second intervals.

Observers trained in naturalistic research and the operation of the equipment were paired with participants and observed the participants for a day—as soon as the participant agreed to be observed in the morning until as close to bedtime as agreeable with a shift change around 3 PM. The dataset includes 11 broad media categories such as TV, video playback, radio, Web, email, instant messaging, software, computer media, land phone, mobile phone, portable video, music, print, games, digital transfer, cinema and others. These are defined in Table 1. The dataset also captured 15 life activities (media only, work, meal preparation, meal eating, travelling or commuting, personal needs, household activity or chores, care of another, personal/household services, shopping, education, religion, organizations, social activities, exercise/sports/hobbies, and others) and seven potential locations (own home

TABLE 1: Media Categories

Media	Components
TV	News program, sports program, entertainment/info program, commercial/program promotion, channel surfing, and TiVo/DVR
Video	DVD/VHS player, DVD on computer, DVD on game console, portable - DVD and non-DVD, digital video stored, digital video streaming, video on mobile phone, and other video
Radio	Broadcast radio, satellite radio, and satellite radio via GPS
Audio	CD/tape/stereo, CD on computer, digital audio stored, digital audio streaming, portable audio, audio via GPS, audio on mobile phone, and other audio
Web	Web news and sports, retail/shopping, web search, social network, online gaming, media source, and web other
Email	Online electronic mails via PCs, laptops, cell phones etc.
Software	Any offline software that is not gaming, including word processing, spreadsheets, statistical software, CAD, etc.
Phone	Landline talk, landline other, mobile talk, mobile text/multimedia messaging, mobile web, and mobile other
Print	Newspaper, magazine, book and other print
Gaming	Console offline/online games, Web online gaming, software offline/online games, portable games, and other games
Other	In-cinema movie, GPS navigation, GPS others, and others

and its rooms, other's home and its rooms, car, public transportation, work, school, and others).

The VCM study includes 476 participants from six dispersed Designated Market Areas (DMAs)—Philadelphia, Chicago, Dallas, Atlanta, Indianapolis³ and Seattle. The participants recruited⁴ for the study were American media consumers (former Nielsen TV People Meter panelists). As shown in Figure 1, a total of 222 people with work activity during the two waves (days) of observation were included in the sample. The two waves of observations were held in the spring and fall of 2008. Of the 222 people observed, 149 had work activity during both waves of observation, while 48 had work activity during Wave 1 only, and 25 had work activity during Wave 2 only. In total there were 371 observed days of work activity.

3. Indianapolis sample (100 participants) was involved in a media acceleration study aimed at learning the new consumer attitudes and behavior towards successful media measurement, device adoption, penetration growth etc. They had an opportunity to buy new media devices /services with half the retail price subsidized by the study. These participants were also observed in two waves with the first wave on May 2008 and second on November 2008 (i.e., 100 participants x 2 = 200 observations)

4. Except for Indianapolis sample, where the participants were recruited from Indianapolis general population by CMD.

Entire Data Set

Descriptive statistics (n=476)

Figure 2 compares the sub-sample of workers used in this analysis with the entire VCM sample. For the entire VCM dataset (476 participants), 100 participants (21.0%) are in Indianapolis, 77 (16.2%) are in Dallas, 81 (17.0%) are in Philadelphia, 84 (17.7%) are in Chicago, 58 (12.2%) are in Atlanta, and 76 (16%) are in Seattle. Participants included 222 (46.6%) males and 254 (53.4%) females. The age of participants ranges from 18 to 95 with an average of 46.3 years. Educational attainment is high with 83.2 percent of participants having some or more college. The dominant race/ethnicity is Caucasian with 72.48 percent of participants falling into this category followed by 10.92 percent African American and the remainder of the participants in other categories.

Sample limited by work activity (n=222)

The VCM dataset contains separate variables for work location where the participant may engage in a variety of activities including eating, socializing, and personal (discussed later) and work activity, which may occur at any location. We are primarily interested in work activity at the work location and the home location. For our analysis of media exposure for work, we limit the sample to those participants who report ‘working’ as their employment status and are observed for at least nine hours. These constraints limit the sample to 330 people (660 observations). Further, out of 660 observations, we selected only those who had some work activity during the day of observation. This reduced the sample size to 371 observations. We treat these 371 observations as unique workers because each represents a distinct work day. We refer to these 371 observed work days as workers in the remainder of the report.

Sample Data

Sample descriptive statistics (n=222)

The descriptive statistics for the sample of workers are shown in Figure 2 and Table 2. The average age is 42.8 years. Over half of the participants (51.8%) are male. The largest portion of participants (31.8%) were in Indianapolis, with 15.4 percent in Dallas, 10.2 percent in Philadelphia, 16.7 percent in Chicago, 10.5 percent in Atlanta, and 15.4 percent in Seattle. The majority of the participants are homeowners (86.0%) and Caucasian (77.0%). The average day observed is 16.6 hours. The workers self-reported media use for the period before

FIGURE 2: VCM Study vs. Sample

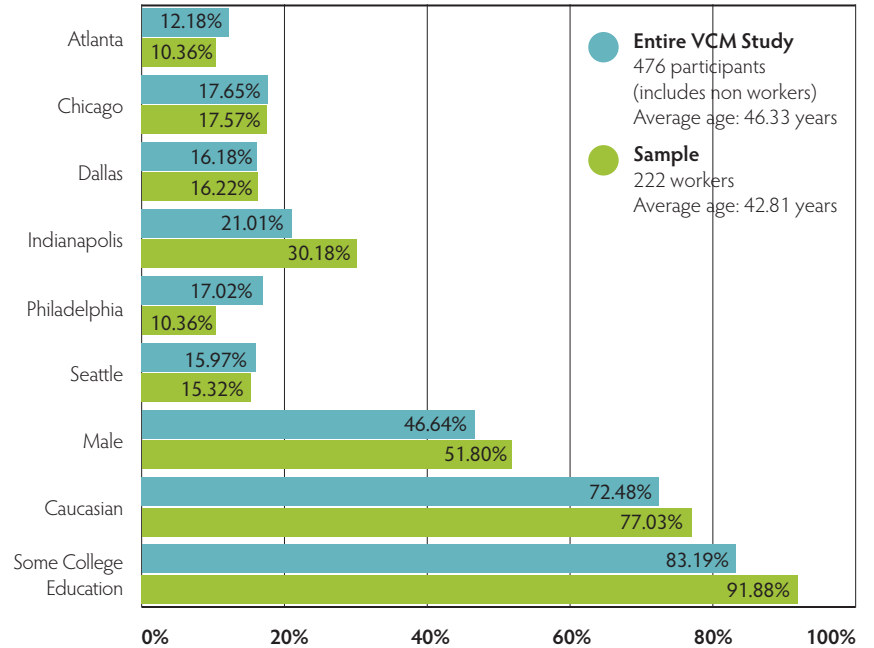


TABLE 2: Descriptive Statistics of the Sample (n=222)

Variable	Mean	STD	Min	Max	Sum	Participants**	Non-Response
Gender (1=male; 0=female)	0.52	0.50	0	1	115	222	0
Age (years)	42.81	11.48	18	71	9419	220	2
Children	1.10	1.28	0	7	241	219	3
Home (1=own; 0=rent)	0.86	0.35	0	1	190	221	1

Variable	Mean	STD	Min	Max	Sum	Workers	Non-Response
Length of observed day (hours*)	16.58	1.30	13.33	26.00	6150.86	371	0
Time observed at own home location (hours*)	6.44	4.06	0.13	16.64	2363.79	367	4
Time observed at work location ^o (hours*)	6.15	3.08	0.003	13.28	1624.47	264	107
Total time on work activity (hours*)	5.21	3.06	0.003	12.66	1933.54	371	0
Time on work activity at own home location (hours*)	2.38	2.71	0.003	11.59	381.16	160	211
Time on work activity at work location ^o (hours*)	5.59	2.84	0.003	12.34	1448.87	259	112
Time on work activity in car (hours*)	0.08	0.24	0.003	1.54	8.34	106	265

* For variables measuring time, the decimal point denotes a fraction of an hour, not minutes or seconds.

^o Formal assigned work location

** Participants with work activity on observed day.

the observer arrived in the morning and the period after the observer left at the end of the day. An average of 6.4 hours was observed at workers’ own homes and an average of 6.2 hours at the work location. Over the observed day, an average of 5.2 hours was spent on work activity. At the work location, an average of 5.6 hours was spent on work activity and an average of 2.4 hours on work activity at the own home location.

FIGURE 3: Sample Demographics (n=222)

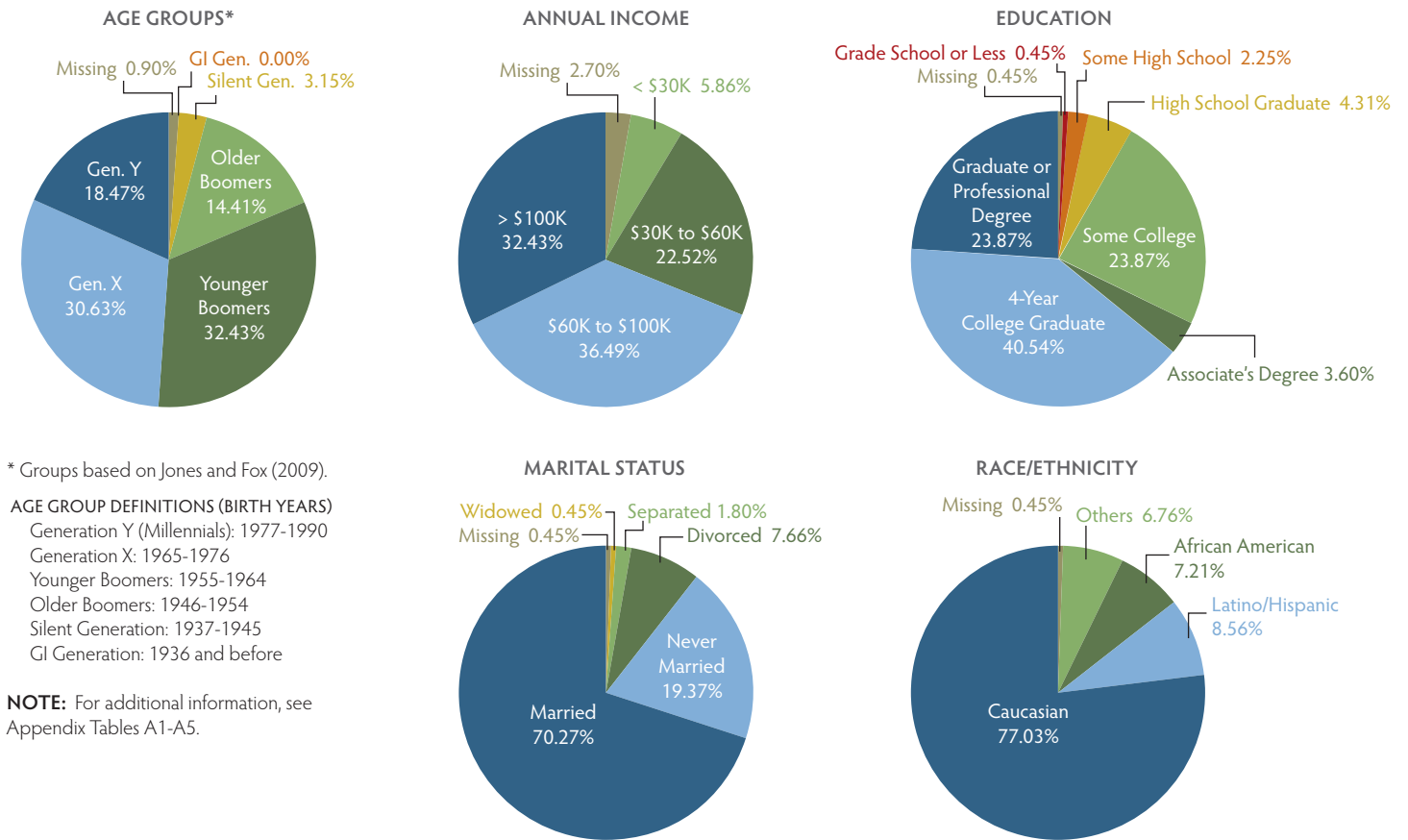


FIGURE 4: Media Exposure During Work Activity at Any Location by Gender (Female=170 observations, Male=201 observations)

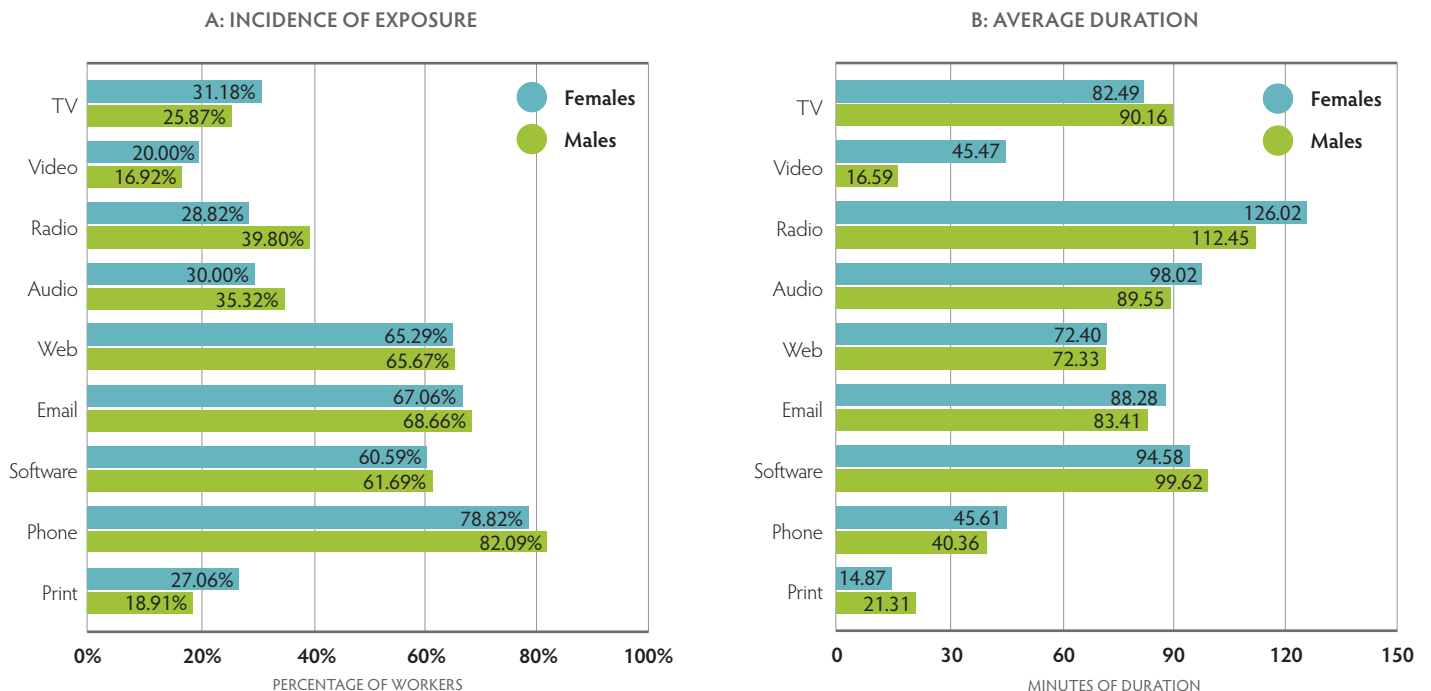


FIGURE 5: Incidence of Media Exposure During Work Activity (n=371)

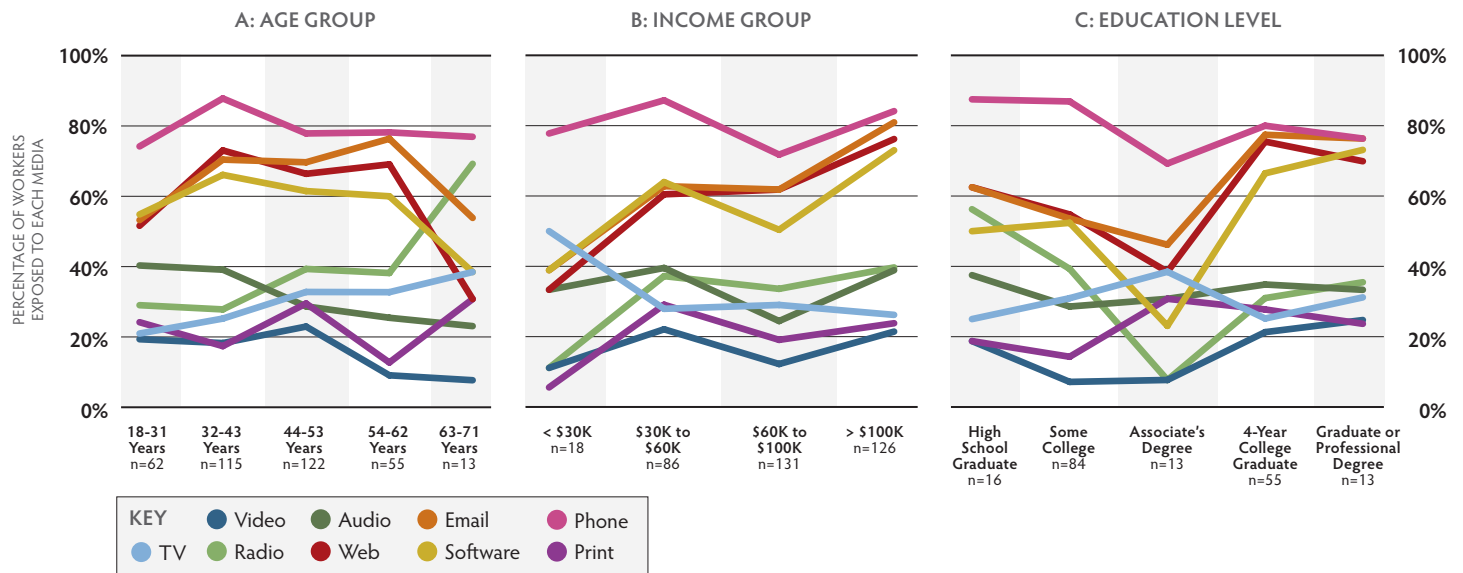


Figure 3 shows distributions of various socio-demographic characteristics for the sample of workers. Thirty-one percent of workers are from “Generation X” (age 32-43) and 32 percent from “Young Boomers” (age 44-53). The majority of workers is Caucasian (77.0%) and currently married (70.3%). The largest portions of workers (40.5%) are college graduates, and 68.9 percent of workers earn more than \$60,000 per year.

Media Exposure by Gender

Figures 4A and 4B show media exposure by gender. Exposure to Web, email, and software measured as the percentage of time on work activities is similar for males and females. Males are more likely to use phones and for less time than females (82.1% of males for an average of 40.4 minutes vs. 78.8% of females for an average of 45.61 minutes over the course of a day). Men have higher exposure to radio (39.8% male vs. 28.8% female), but for less time than women (average of 112.5 minutes male vs. 126 minutes female). The same is the case with audio (35.3%, 89.6 minutes male vs. 30%, 98 minutes female). Females have higher exposure to TV (31.18% female vs. 25.87% male) and video (20% female vs. 16.9% male) than males, but the average duration for males is higher for TV (90.2% male vs. 82.5% female) and lower for video (16.6 minutes male vs. 45.5 minutes female). Males are also more likely to be exposed to software and Web for a longer time than females (Figure 4B). We do not have information to determine if these differences are related to gender-specific preferences or gender-specific differences in the types of work being performed.

Media Exposure by Age, Income and Schooling

Figure 5A shows exposure to media for different age groups. Younger workers have higher exposure to audio (40.3%). Exposure to email increases with age, while tapering off after age 62. Phones are used predominantly by Generation X (87.8%). For Generation Y, incidence was lower for TV (21%), email (53.2%) and software (54.8%) when

compared to other age groups, but their exposure was comparatively higher—163.1 average minutes, 103.1 minutes and 126.5 minutes respectively. Average duration for radio usage was high among all age groups. Radio exposure increased with age.

Figure 5B shows media use for different income groups. For most media categories media exposure is highest (measured as the percentage of workers exposed) for workers earning \$30K to \$60K and workers earning \$100K or more. TV is the exception. Though incidence of radio was less for the lowest income workers (11.1% vs. 39.7% for workers earning \$30K-\$60K), duration was higher for the same group (200.5 minutes vs. 90.7 minutes for the highest income workers). We do not have information to determine if these findings are due to difference among industries, occupations, or job hierarchy.

Figure 5C shows media exposure by level of schooling. Media exposure for work activity tends to be highest for workers at the extremes of the education spectrum. Email and Web browsing was predominant among college graduates and graduate/professionals. The proportion of workers exposed to email tends to be higher among participants with a bachelor’s degree or higher (77.4% for college graduates and 76.3% for graduate/professional). The findings for the Web are similar, although there is more variability in the types of Web activities. Workers who are high school graduates and people with some college education are most likely to use phones (87.5% and 86.9% respectively) while engaging work activity. Incidence of exposure to software among those with only some college was lower than post-graduate or professionals (52.4% and 73.1% respectively), the average duration of exposure to software was highest among college graduates (124.5 minutes) as opposed to post-graduates or professionals (79.1 minutes).

The Way We Work

The increased prevalence of media and innovations in media have changed the way people work. Many workers have immediate exposure to a variety of media today.⁵ Media has increased workers' flexibility in choosing their work location in a given day—at the traditional work site, at home or other location. With wireless technology allowing widespread access to email and cell phones and increased availability of laptop computers, the necessity of working at the traditional work location with face-to-face contact has decreased for many occupations.

We examine nine media categories and report results for these broad categories.

How We Work

Workers have unprecedented access to information through the World Wide Web and to several communication technologies including email, a variety of phones, and instant messaging (IM). Computers have become an integral part of daily life. In the sample, 80.6 percent of participants were exposed to computers on the observed day, and 47.4 percent of the total time on work activity included exposure to a computer.

Figure 6 compares media exposure during work activity at home or at the traditional work location. Phone, email, Web browsing, and software are the dominant media used to do work in terms of the percentage of workers who are exposed to these media (80.6%, 67.9%, 65.5% and 61.2%, respectively). Software applications, email and Web browsing are the media categories with the highest exposure (minutes or percent of time) for work activity at home or work location (18.59 and 15.15, respectively).

Another striking finding is the number of workers in the sample who are not exposed to certain media for work activities during the observed day. Just over 32 percent of workers have no exposure to email. Almost 35 percent have no exposure to the Web for any purpose. This suggests that there are potential differences by industries and/or occupations in the availability and intensiveness of media exposure.

5. We purposely use the term *exposure* instead of *watching*, *use*, or *engagement*. The term *“exposure”* captures the time that a TV, for example, may be on but that the participant is not explicitly focused on it. It is difficult to differentiate the focus of attention in an observational setting.

Where We Work

The observational method and the electronic device that was used to track media exposure enabled the collection of detailed data on media exposure and location of work activity over the course of a day, so we are able to provide a detailed analysis of where people work. Media technologies have affected the choice of where people work. Wireless technology allows workers to access work applications on the Web and communicate with coworkers from a variety of locations so that many workers are not necessarily “tied to the office” to do work. Figure 6 also shows media exposure for work activity at the traditional work location or home location. See Telecommuting section (p.10) for more information.

At Work

The number of people exposed to particular media for work activity at the work location (Figure 6A), exposure is highest for phone (78% of workers), email (64.1%), office/work software (62.2%) and Web browsing (60.2% of workers). Of these four media, the largest amount of time on an average (Figure 6B) is spent on software (97.8 minutes) and email (average 94 minutes).

At Home

The data on work activity at the home location includes both nontraditional hours and people who work exclusively at home. Email and Web browsing are the dominant computer-based media with 60 percent and 58.1 percent of workers exposed to these media types respectively (Figure 6A). While working at home (Figure 6C), a higher proportion of time is spent on office/work software (26.7%), TV (23.9%), phone (19.7%), and email (25.8%) relative to the proportion of time on these media while at the work location. Greater exposure to communication media (email and phone) at the home location (Figure 6C) as a percentage of work activity in comparison to the work location is expected as they are required to maintain contact with colleagues in the workplace for work-related cooperation and coordination.

FIGURE 6: Media Exposure During Work Activity by Location

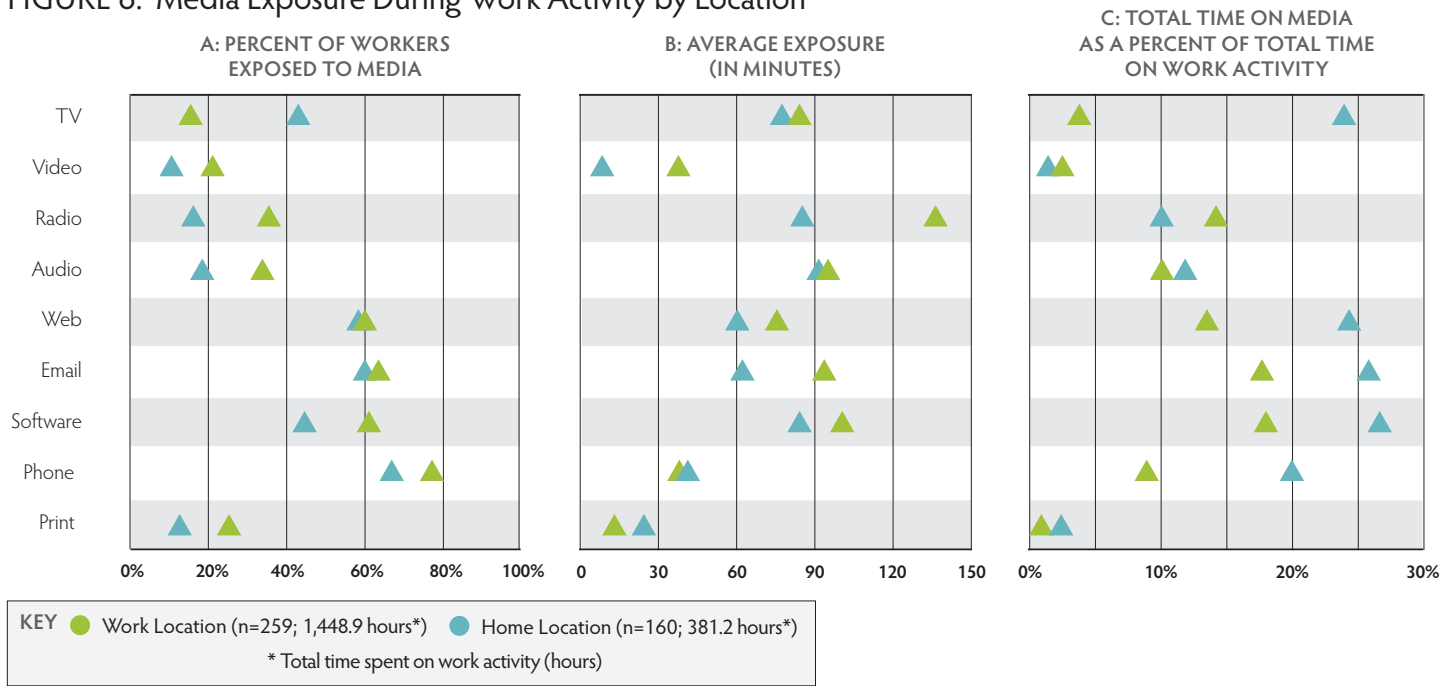


TABLE 3: Descriptive Statistics for Workers Working Nontraditional Hours (before 8 AM and after 6 PM, n=193)

Variable	Mean	STD	Min	Max	Participants**	Non-Response
Gender (1=male; 0=female)	0.561	0.498	0.00	1.00	132	0
Age (years)	43.061	11.786	19.00	71.00	132	0
Children	1.108	1.234	0.00	6.00	130	2
Home (1=own; 0=rent)	0.886	0.319	0.00	1.00	132	0
Variable	Mean	STD	Min	Max	Workers	Non-Response
Length of observed day (hours*)	16.784	1.375	14.136	25.998	193	0
Total time on work activity (hours*)	1.101	1.204	0.003	7.001	193	0
Time on work activity at own home (hours*)	0.723	0.911	0.003	3.901	71	122
Time on work activity in car (hours*)	0.020	0.078	0.003	0.378	23	170
Time on work activity at work location (hours*)	1.134	1.220	0.003	7.001	122	71
Time on work activity at school (hours*)	1.413	1.494	0.003	2.978	3	190

* For variables measuring time, the decimal point denotes a fraction of an hour, not minutes or seconds.

** Participants with work activity during nontraditional hours on observed day.

When We Work

The availability of media technologies also affects when people work. Workers are no longer tied to the traditional work day. We define non-traditional work hours as before 8AM and after 6PM. Table 3 shows the demographic characteristics, media usage and work location for people working during these hours. We do not have information on the standard hours that participants worked, so we are not able to identify those workers whose usual hours are outside the traditional 8AM to 6PM workday.

Of the 371 observed workers in the dataset, 193 (52%) engage in work activity during nontraditional hours. More than half are male and the

average age is 43.1 years. Of these 193 workers, 122 were doing work activity during nontraditional hours at the work location and 71 at their own home location. An average of 1.1 hours was spent for work activity during nontraditional hours.

During nontraditional hours, the percentage of workers exposed to each media and the average duration of exposure was lower for each media type with the exception of print and video. Phone, email, and Web are still the dominant media. More workers are exposed to the Web for information browsing during nontraditional hours. In terms of the number of people who use particular media for work activity (Figure 7), exposure was highest for TV (13.8% of workers), radio (12.8% of workers), Web (13.1%) and email (12.4% of workers).

FIGURE 7: Percent of Total Work Activity Time Spent on Media During Nontraditional Hours
(before 8 AM & after 6 PM)

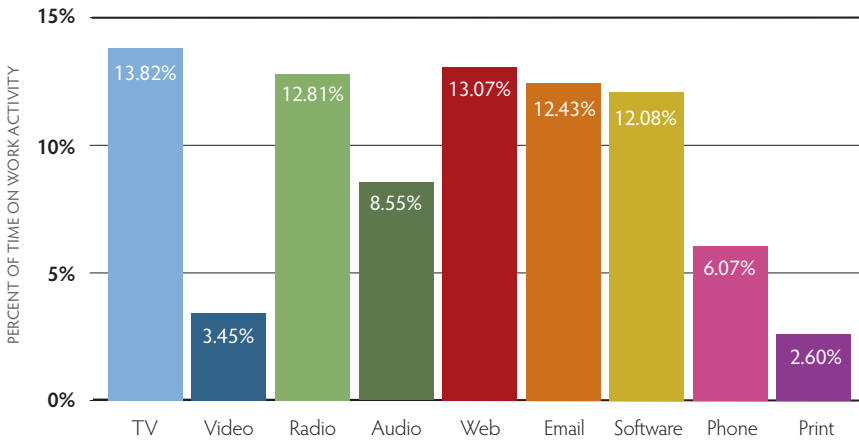
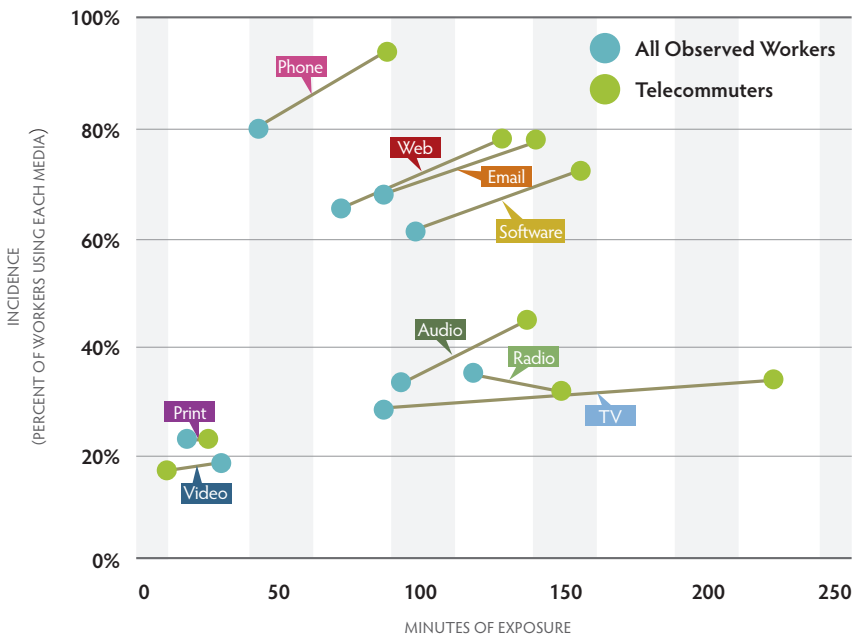


FIGURE 8: Media Exposure at Work
(Telecommuters, n=36 and All Observed Workers, n=371)



Telecommuting

Of the 371 observed workers in the sample, we identify 36 workers who work four or more hours per day at home. We classify these workers as telecommuters. While this sample is too small to draw firm conclusions about telecommuting behaviors, we include it to demonstrate the type of analysis that can be done with observational data. The statistics presented in Figure 8 show that for most media categories a larger portion of telecommuters are exposed to media and for a longer duration than workers in general. The majority of telecommuters use phones (94.4%) for an average of 88.9 minutes. Most (77.8%) telecommuters also use the Web for a duration of 129.3 minutes. Email (77.8%) and software (72.2%) had an average exposure of 140.9 minutes and 156.9 minutes respectively.

Concurrent Media Exposure

Holmes, Papper, Popovich, Bloxham (2005) define concurrent media exposure (CME) as “exposure to content from multiple media simultaneously available through shared or shifting attention.” This definition avoids complications surrounding the chronicling of the participant’s level of use or engagement. Figure 9 shows the percentage of workers experiencing concurrent media exposure for various media pairs.

We limit our analysis to pairings of media although in reality exposure to more than two media simultaneously is common. For work activity, the most common media pairings are email and telephone; email and Web; Web and telephone; email and software; software and telephone; and Web and software. For example, 50 percent of participants in the study were exposed to both email and phone concurrently while working. Almost 43 percent were exposed to email and the Web concurrently. As Holmes et al. (2005) emphasize the high level of CME among computer media is not surprising since today’s computer applications are designed to allow work with multiple computer-based media simultaneously through multiple and overlapping windows.

Other Activities at the Work Location

One of the advantages of the VCM data is that it tracks a variety of activities that engage people over the observed day. Figure 10 shows media exposure for some of the most common nonwork activities in which people engage at the traditional work location and their media use during these activities. Work activity at the home location is not included. Workers spend about 10.8 percent of the time at the work location on nonwork activities. The nonwork activities that we consider are meal preparation and eating, personal needs, social activities, travel/commuting, and other media use. “Travel time/commuting” is the time that certain workers such as sales people or construction workers, spend commuting between job sites during the work day. “Other activities” is defined as the exposure to media that does not correspond to any of the other life activities (i.e. personal needs, meal eating, etc.) included in the database. “Recreational browsing” is included in this category. Software, Web and email were the dominant media for workers engaged in each activity both in terms of reach and duration. Print media is dominant when traveling or commuting. For the other activities included, exposure to web, email, and software are common. Radio is especially pervasive.

FIGURE 9: Concurrent Media Exposure for Major Media (371 observations)

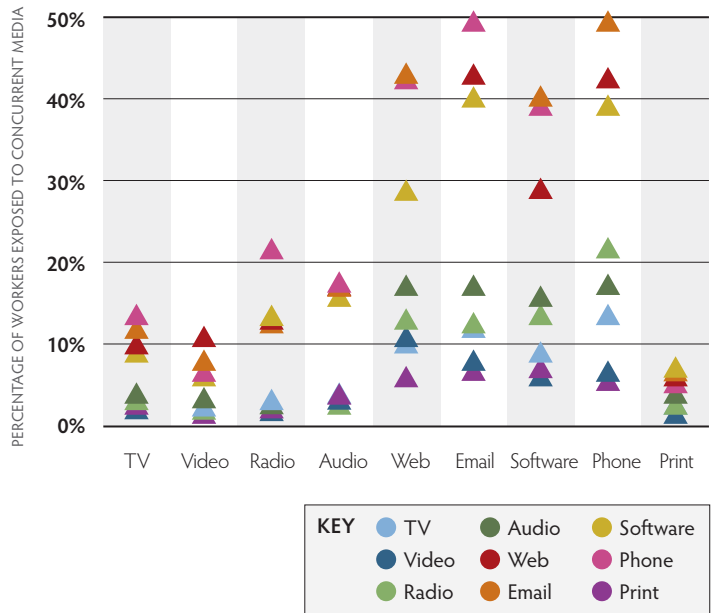
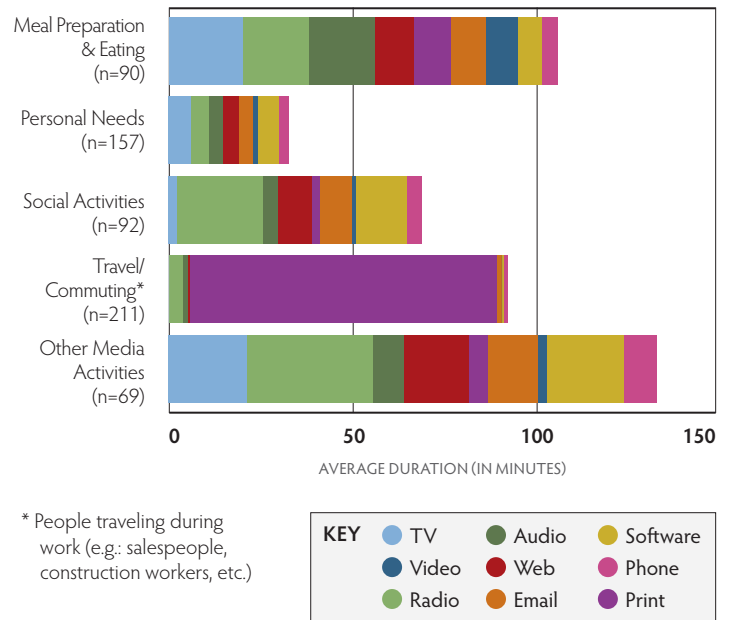


FIGURE 10: Media Exposure for Other (Nonwork) Activities at Work Location (259 observations)



* People traveling during work (e.g.: salespeople, construction workers, etc.)

Summary of Results

Analysis of the VCM data has shown that workers spend just over 30 percent of the observed day (5.2 hours) on work activity and much of this activity involved media. Email, software, and Web browsing are the predominant forms of media for work. Workers spend 19.0 percent of their time on work activity exposed to office/work software. Other media commonly used during work activity include email (18.6% time), Web browsing (15.2% time), radio (13.1%), phone (11.0%), audio (9.8%), and TV (7.8%). All other media totaled less than 5.5 percent.

At both the work location and at home, phone and email are the most commonly used media in terms of the number of workers who use these media for work-related activities. Software is the predominant media used for work-related activities at the home location.

A large portion of workers are not exposed to certain media for work activities during the observed day. Just over 32 percent of workers have no exposure to email. Almost 35 percent have no exposure to the Web for any purpose.

For many workers the work day extends beyond traditional hours (8AM to 6PM). More than half (52%) of workers spend time on work activities outside traditional hours with an average of 66.1 minutes (420.1 minutes max) spent on work activity and an average of 68 minutes (420.1 minutes max) spent at the work location.

Workers spend about 10.8 percent (175.6 hours) of their time in the work location engaged in non-work activities. The most common non-work activities are addressing personal needs, eating, and social activities. The most common media used for non-work activities are email, office/work software and Web browsing.

Thirty to 50 percent of workers included in this analysis are commonly exposed to at least two media simultaneously.

Conclusions

The findings from this study are generally applicable to workers and show that media exposure is pervasive regardless of industry, work place structure or full-time employment status. Information technology media are now widespread in the United States, and Americans are commonly exposed to media in their daily activities.

OFFICE/WORK SOFTWARE, PHONE, EMAIL AND THE INTERNET ARE THE DOMINANT MEDIA EXPOSURES AT WORK.

While computers are one of many informational technologies observed in this study, they are integral to daily life in the U.S., with 80.6 percent of observed workers exposed to computers. It is wrong, however, to conclude that this computer access provides all workers with communication technologies such as email and internet. Surprisingly, the findings indicate almost a third (32%) of the observed workers had no access to email and even more (35%) were without the internet at work. This may indicate differences by industries or occupations and warrants further investigation.

WORKERS ARE CONCURRENTLY EXPOSED TO MEDIA AT WORK.

In addition to computing and internet technologies, more than 20 percent of workers are also exposed to TV, radio or other audio media at work. This occurs concurrently with other media and is a further indication of the pervasiveness of electronic media in the work place.

INCOME AND EDUCATION LEVELS ARE LINKED TO SPECIFIC TYPES OF MEDIA EXPOSURE.

We conclude that workers with the most education will have the most access to the interactive media of computing software, email and Web communication technologies. While these media may be required by the nature of work activity, it is interesting to note that the highest exposure to these three particular media (software, email and Web) are also present in the highest income levels. The lowest income group has more exposure to the more static medium of TV than any of the other more interactive media except the telephone. TV is now tightly woven into the fabric of U.S. culture during work or non-work activity at all incomes levels.

WORK IS AS LIKELY TO BE PERFORMED DURING NON-TRADITIONAL HOURS AS DURING THE "USUAL" BUSINESS HOURS.

The findings indicated that over half (52%) of the observed workers spend time on work activities outside the traditional work hours (8AM to 6PM). These observations did not determine if this time was scheduled work or additional work, but work hours are no longer "business as usual."

TELECOMMUTERS ARE MORE MEDIA CONNECTED AT WORK THAN WORKERS IN TRADITIONALLY STRUCTURED WORK.

As expected, telecommuters have more office/work software, phone, email and internet at their work site, but they also have a higher percentage of exposure to audio, radio and TV. They are the most "connected" workers.

WORKERS USE INTERACTIVE MEDIA FOR NON-WORK ACTIVITY.

The worker observations also yielded findings that lead us to conclude that the more interactive communication media of email, office software and Web browsing invites non-work activity. Findings indicated that U.S. workers spend more than 10 percent (10.8%) of their time at work engaged in non-work activity with these media.

AS MORE MEDIA ARE INTRODUCED, TRADITIONAL MEDIA ARE LIKELY TO HAVE A WEAKENED PRESENCE AND SOME MAY BE DISPLACED.

Media exposure and use continually change as new media are introduced. This is apparent from data indicating that print media now claims a relatively small share (22.6%) of media exposure.

Limitations

The VCM study was not originally designed to examine work activity. As such, information on occupation, industry, and characteristics of the workplace was not recorded. We analyze those observations that included work activity on the observed day and those who report their employment status as ‘working’. Other choices for employment status were: temporarily laid off, unemployed, retired, permanently disabled, homemaker, and student. We do not know if participants work part-time or full-time, their tenure at their current job, the educational or training requirements for their job, employer policies or efforts to integrate new media into the workplace, employer policies about use of technology or working off site, or employer expectations about work effort outside of the traditional work day. We are not able to determine if firms that are more flexible in terms of when and where employees work (home or work location for example) experience higher market returns. We plan to investigate these issues in future research.

In addition, workplace representation was not a recruitment criterion for the study. A review of the data by the Council for Research Excellence’s Media Consumption and Engagement Committee showed that the VCM sample under represents workers at the work location compared to the American Time Use Survey (Council for Research Excellence 2009). This may reflect participants selecting “out of the workplace” days when the observation is scheduled in order to avoid the complications of workplace permission for the observer’s presence. Despite these limitations, to our knowledge this dataset contains the most accurate and comprehensive data on the types of media used during the workday and activities for which workers use media during the day.

Further Research

This review of the extensive dataset from the VCM to determine the prevalence and exposure to media at work suggests several other questions for further research.

1. *How does the prevalence, access to and use of informational technology differ by industry, occupation or job hierarchy?*
2. *The VCM data provided a “snapshot” view of media but how does the prevalence of specific media change over time?*
3. *As the prevalence of specific informational technology media increases, how do expectations for their use change?*
4. *What is the link between media prevalence, use and productivity?*
5. *Are wage premiums attached to use of specific media?*
6. *Does access to and familiarity with media create or merely reflect differences in economic status?*
7. *Is media pervasiveness signaling telecommuting as the expected norm for work activity?*

The foregoing observations and questions indicate a need for a longitudinal study to determine trends in both the presence and use of specific media by various demographic categories.

We are only beginning to understand the role and synergies attributable to media in the workplace as part of the information technology revolution. The continued integration of media into work processes, the complementary innovations that result, and the entrance of digital natives into the workforce are likely to lead to dramatic changes in the way that business is conducted. This research should be extended to examine how the preferred media bundle has changed the effects on worker productivity and organizational outputs and productivity. We plan to further investigate these issues.



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Appendix

TABLE A1: Age Groups*

Birth Years	Age Groups	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Generation Y (Millennials) 1977-1990	18-31 years	62	16.71	62	16.71
Generation X 1965-1976	32-43 years	115	31.00	177	47.71
Younger Boomers 1955-1964	44-53 years	122	32.88	299	80.59
Older Boomers 1946-1954	54-62 years	55	14.82	354	95.42
Silent Generation 1937-1945	63-71 years	13	3.50	367	98.92
GI Generation 1936 and before	72+ years	0	0	367	98.92
Missing	—	4	1.08	371	100

* Groups based on Jones and Fox (2009)

TABLE A2: Annual Income

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Less than \$30,000	18	4.85	361	97.30
\$30,000 to \$60,000	86	23.18	343	92.45
\$60,000 to \$100,000	131	35.31	257	69.27
Greater than \$100,000	126	33.96	126	33.96
Missing	10	2.70	371	100

TABLE A4: Marital Status

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Married	268	72.24	268	72.24
Separated	5	1.35	273	73.58
Divorced	30	8.09	303	81.67
Widowed	2	0.54	305	82.21
Never Married	64	17.25	369	99.46
Missing	2	0.54	371	100

TABLE A3: Education

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Grade School or Less	1	0.27	1	0.27
Some High School	7	1.89	8	2.16
High School Graduate	16	4.31	24	6.47
Some College	84	22.64	108	29.11
Associate's Degree	13	3.50	121	32.61
4-Year College Graduate	155	41.78	276	74.39
Graduate or Professional Degree	93	25.07	369	99.46
Missing	2	0.54	371	100

TABLE A5: Race/Ethnicity

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Caucasian	291	78.44	291	78.44
African American	23	6.20	314	84.64
Latino/Hispanic	32	8.63	346	93.26
Others	23	6.20	369	99.46
Missing	2	0.54	371	100

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