Part III

Finding Time for the Internet

Internet Use, Interpersonal Relations, and Sociability

A Time Diary Study

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Abstract

Using exciting new time diary data, we explore the complex ways in which the Internet affects interpersonal communication and sociability. Rather than dwelling on the increasingly stale debate about whether the Internet is good or bad for sociability, we analyze when and where Internet use impacts face-to-face interactions. Internet use at home has a strong negative impact on time spent with friends and family, while Internet use at work is strongly related to decreased time with colleagues (but has little effect on social time with friends and family). Similarly, Internet use during the weekends is more strongly related to decreased time spent with friends and family than Internet use during weekdays. Our findings offer support for a "displacement" or "hydraulic" theory of Internet use – time online is largely an asocial activity that competes with, rather than complements, face-to-face social time – but it is the location and timing of Internet use that determines which interpersonal relationships are affected.

Authors' Note

Introduction

Few would dispute the idea that the Internet has transformed economic and social life. At the same time, however, the Internet's impact on interpersonal communication and sociability remains a source of heated debate. One group of researchers conclude that the Internet leads to more and better social relationships by creating an additional medium of communication with friends and family, and by enabling the creation of new relationships through Internet interactions. In contrast, other researchers find Internet use to be socially isolating, because time on the Internet replaces other social activities and face-to-face interaction. In this chapter, we try to move the debate beyond this dichotomous view and delineate more specific contours of the relationship between time spent on the Internet and time spent in face-to-face interaction with people. Using a new dataset that relies on more detailed and definitive time diary information than the data available in previous studies, we are better able to explain the complex ways in which the Internet affects interpersonal communication and sociability.

The debate about the impact of Internet use on the quantity and quality of interpersonal communication and sociability has focused on four different academic surveys conducted in 2000. Most of the findings in these surveys have been concurrent with one another. All four studies show similar Internet connection rates – more than half of American households are connected to the Internet. All describe similar patterns of Internet use among those connected: sending and receiving email is ubiquitous; searching for products, news, weather, stock quotes, and entertainment is frequent. All four studies find evidence of a digital divide cut by education, wealth, and generation. The studies diverge, however, in their conclusions regarding the social repercussions of Internet use. At the heart of this debate is whether Internet use is a potentially isolating activity, or one that leads to more communication among people and thus enhances human connectivity and sociability.

Two theoretical paradigms dominate the debate. Franzen (2000) argue that the Internet has made everything – including socializing – more efficient. The efficiency hypothesis holds that the Internet offers an additional technology for engaging in social interaction and coordinating social activities. Additionally, the Internet may make other activities more efficient, freeing up additional leisure time. For instance, if an individual shops online, this may free up time to spend with friends. The alternative theoretical perspective is a displacement

hypothesis, or "hydraulic" model – time on one activity cannot be spent on another activity. Time is a zero-sum phenomenon, like a hydraulic system – it can be reshaped and redistributed like a fluid, but it cannot be expanded like a gas. Thus, because there are only 24 hours in a day, time spent on one activity must be traded off against time spent on other activities. Time online, thus, is an asocial activity that competes with, rather than complements, social time.

A third paradigm sometimes discussed in connection with the Internet and its social consequences may be called the communitarian hypothesis. It has to do with the quality, rather than the quantity, of time associated with Internet use and its effects. This view focuses on the unique ability of the Internet to eliminate physical distance and to establish and maintain linkages between individuals on the basis of almost any conceivable shared interest (or even a rediscovery of extended family ties with distant relatives, or a revival of contacts among long-lost friends and neighbors) – thereby creating virtual "communities" of social exchange and support as social networks that extend well beyond the reach (and the need?) for face-to-face contact. In effect, this view seeks to turn the possible loss of real interpersonal interactions displaced by time spent on the Internet into an advantage – not unlike the debate over the alleged compensatory benefits of limited amounts of "quality time" spent by working mothers with children in day care.

The distinction between virtual and real communities, or between real and mediated social interaction, raises the question of what exactly is meant by such categories as sociability and social or personal interaction. If it is true that man is a social animal (such that, e.g., exile or pillory were considered some of the most severe forms of punishment in ancient times), then clearly it is the need for the presence of others in one's everyday life (not always pleasant and rewarding) which is an essential ingredient of human existence – i.e., the physical proximity of people both as individuals and in the form of social groups and institutions. Therefore, in examining the social consequences of the Internet, we focus on the primary social environment, without thereby denying the novel possibilities of global social networks or "communities."

Previous Research

Existing empirical research provides support for both views. One of the earliest surveys examining the social consequences of the Internet

was the "Internet and Society" study we conducted through the Stanford Institute for the Quantitative Study of Society (SIQSS) in February 2000 (Nie and Erbring, 2000). This nationally representative study revealed that Internet users (especially heavy Internet users) report spending *less* time with friends and family, shopping in stores, reading newspapers, and watching television – and *more* time working for their employers at home (without cutting back on hours in the office).[1] Our finding concerning the quantity and quality of interpersonal communications and sociability quickly became the focus of further scholarly attention and controversy.

Following our study, three other groups conducted nationally representative surveys on the implications of increased Internet use: Pew, UCLA, and NPR/Kaiser/Harvard's Kennedy School. Like the SIQSS study, the NPR/Kaiser/Kennedy School Study finds an inverse relationship between computer use and sociability. They report that "58% of all adult Americans reported that computers led people to spend less time with friends and family . . . furthermore, the study found that slightly fewer than half of Americans, 46 percent, say that computers have given people less free time," while only 24 percent believe the contrary (National Public Radio, Kaiser Family Foundation and Kennedy School of Government, 2000). In contrast to this finding, as well as our findings at SIQSS, both the Pew and UCLA studies conclude exactly the opposite. The UCLA study concludes: "concerns that the Internet reduces household time together appear nearly groundless" (2000: 7).

There are three main criticisms of the existing research, however. First, most of these studies ignore the *amount* of Internet use.[2] They simply divided the population into users and non-users, and then made comparisons of sociability along these lines. It seems grossly inappropriate to assume that "users" spending one hour per week on the Internet are equivalent to those spending 20 hours on the Internet. As a result, any effects of Internet use are likely to be concealed or diluted.

A second criticism of these studies is that they are largely limited to bivariate analyses, ignoring the importance of controlling for demographic factors such as education, age, marital status, or work status.

1   An Internet user was defined as a respondent with Internet access, either inside the home, or at work, at school, or another location. A "heavy" Internet user was one who spent at least 5 hours per week on the Internet.
2   There are some exceptions in this regard (Nie and Erbring, 2000; Wellman et al., 2001).

As argued in Nie (2001), analyses regarding the relationship between Internet use and sociability must include multivariate controls. Bivariate analyses ignore the possibility of spurious correlations between Internet use and sociability. A simple bivariate analysis, for example, could not elucidate whether Internet users have more social contacts because of the Internet, or because they are more highly educated (given that more highly educated individuals tend to have more social contacts *and* are more likely to be Internet users).

Finally, previous research has not done an adequate job of measuring Internet use. Previous studies have relied on respondent estimates of daily or weekly Internet use, but such estimates are undoubtedly fraught with error. Respondent time estimates may be problematic because individuals do not keep a running tally of the number of minutes or hours spent on particular activities, and certainly not for the specific periods (day/week/month) requested by the researcher (Franzen, 2000). Respondents may give their best guess, but in addition to errors of judgment, such estimates are prone to distortion by social desirability concerns (e.g., individuals might not want to admit watching too much TV, or they might want to overestimate time spent on charitable and civic causes).

The analysis reported in this chapter builds on a new dataset that overcomes most of these problems by measuring time and Internet use more directly, and thus may help to reconcile the competing hypotheses by identifying the specific conditions under which Internet use affects sociability.

Research Design

Our research design addresses the problems discussed above through an improved survey instrument and a more complete analysis. We use multivariate analyses to clarify the relationships between time spent online and time spent socializing. And we have developed a novel survey methodology that allows us to differentiate amount, location and type of Internet use, and to generate more accurate measurements of respondents' time use.

The survey is based on a time diary approach. Robinson et al. (2001) argued that a judiciously administered time diary study is necessary to measure time spent on various activities accurately. The diary procedure avoids the problems of a "time estimate" approach by preventing "guesstimate" errors, and by helping to prevent respondents

from purposefully distorting activity estimates. Respondents can no longer easily manipulate survey responses to portray themselves in a particular light (for example, as only moderate TV viewers, or as being particularly socially active). With a time diary approach, respondents would have to manipulate their entire diary, not just one report of time spent on a particular activity.

However, there are limitations to a traditional diary approach. Perhaps the principal shortcoming of diary studies is the exhaustive toll they take on respondents. Most diary studies require respondents to report every activity they engaged in for 24 hours. In the traditional 24-hour design, just a few hours into the day, respondents may stop giving details about their activities because they know they still have so many hours to go before the survey is over! The typical phone-implemented time diary places the highest burden on respondents and thus severely limits the number of follow-up questions that can be asked for each activity. In these studies, fatigue and sheer repetition lower the quality of data.[3] Moreover, the phone is an extremely awkward and blunt instrument for constructing detailed activity diaries; phone-implemented surveys do not provide the respondent with any memory recall assistance, such as a diary form or a checklist of secondary or parallel (multi-tasking) activities.[4]

For all these reasons, SIQSS, in consultation with time diary expert John Robinson, developed a research design that combines the best of both worlds – the superior time use estimates of the diary approach without the respondent burden of a 24-hour diary. While closely following the basic methodology of phone implemented diary studies, we adapted these techniques to take advantage of the superior methods of Knowledge Networks' survey instrument for online survey administration, conducted via the Microsoft Web-TV set-top box. In May 2001, Knowledge Networks fielded the SIQSS Time Diary

3   This is particularly evident by the low level of feedback received from the question "were you doing anything else at the same time?" While previous time diary surveys conducted by phone have found only a handful of secondary activities during the day, we find 1.7 secondary activities *per main activity*.
4   Mailout, paper diary designs also have numerous limitations, including lack of investigator control, low response rate resulting in biased data, long turnaround time, and high expenses related to data entry and follow-up. Such a design also results in lower quality time diary data because the survey must be simplistic, and it is not possible to ask for clarification or probe to ensure accurate data.

Study to a representative sample of approximately 6,000 Americans between the ages of 18 and 64.[5]

The SIQSS modified time diary study asked respondents about their activities yesterday during six randomly selected hours of the day – one in each of six time blocks (strata): night, early morning, late morning, afternoon, early evening, and late evening. We structured the sampling design to collect an even distribution of days of the week for the total sample, and of hours over the course of the day for each respondent.[6] With a 6-hour design, and an average interview length of about 15 minutes, the survey is much less tortuous and burdensome for respondents than a complete 24-hour diary. Thus, we were able to go into great detail about the social context of each activity without exhausting respondents. We were also able to engage a much larger sample so that we have high-quality comparable data for each hour of the day. This also permits more follow-up questions, including information on social context and interaction for each and every primary activity.[7] In other words, we not only get higher-quality data, we also obtain more detailed data about each specific activity, developing a more fine-grained picture of time use that becomes the backbone of this study.

The Data

This survey design allows us to probe the fundamental questions of how varying amounts of Internet use relate to time spent in interpersonal, face-to-face relationships with family, friends, or colleagues. We have collected data that allow us to compare Internet use

5   Respondents in the Knowledge Networks (KN) panel are randomly selected through Random Digit Dial (RDD) sampling methods on a quarterly-updated sample frame consisting of the entire US telephone population. All telephone numbers have an equal probability of selection, and sampling is done without replacement. Detailed information on the Knowledge Networks methodology can be found at www.knowledgenetworks.com. Though surveys are conducted over the Internet, respondents are a random probability sample of the United States population, in households provided with Internet terminals by Knowledge Networks for that purpose.
6   The sampling time blocks were hour 1: midnight–5am; hour 2: 6–9am; hour 3: 10am–1pm; hour 4: 2–5pm; hour 5: 6–8pm; hour 6: 9–11pm
7   We asked how long the activity lasted, where the activity took place, who was with the respondent, if the respondent was doing anything else at the same time. See appendix 7.1 for more detailed description.

- at home versus at work;
- in the evening versus other times of the day;
- on weekends versus weekdays;
- for work or for leisure.

At the same time, we can control for various demographic background factors, such as education, age, work hours, or household composition, and for other key activities that might affect the relationship between time online and time with people. Finally, we have collected information on email use both for work and for personal matters, to allow us to begin analyzing the potential social benefits of email. Given the magnitude of this rich and detailed survey, however, we can only begin to touch on some of the resulting insights in this chapter. We focus here on the relationship between Internet use and measures of sociability; we do not explore a number of other interesting items in the data – such as the incidence of multi-tasking, gender differences in time utilization, tradeoffs between work and social time, and the fascinating role that sleep plays in shaping the amount of time and the number of daily activities.

   We have been careful to improve on previous measures of our main independent variable, time spent on the Internet. We compute Internet use by summing the number of minutes spent on Internet/email *as a main activity* across the 6 diary hours.[8] Based on our diary measures, we find that the average American spends nearly 25 minutes per day on Internet and email. Thirteen percent of the sample report using Internet/email as a main activity yesterday. This percentage is larger than the 8 percent reported by the Robinson study, but it is much less than the 50 percent that report having used the Internet/email at some point yesterday in the usual recall studies.[9] This may be because,

8   For ease of interpretation, all diary measures have been expanded to 24-hour estimates from the 6-hour data. As this is almost a linear transformation of the variables, all regression results are nearly identical – only the context of interpretation has changed. The only (slight) departure from perfect linearity is due to the differing lengths (and hence weights) of the six daily time blocks (strata). Such an expansion does not change the relationships, but does assume that the sampled hour is representative of the entire time block.

9   We have a couple of different hypotheses about the differences in the measures. First, the follow-up measure relies on summary recall and thus is susceptible to all of the estimation problems, such as over reporting, that we have already mentioned. At the same time, however, we believe that our diary measure may underestimate time spent on the Internet because respondents choose main activ-

unfortunately, the way we compute our time estimate omits Internet/ email use that occurs incidentally, and therefore is coded as a *secondary activity*. We miss, for instance, the individual who reported talking on the phone as a main activity, but who checked his/her email briefly at the same time. We may be able ultimately to account for some of the apparent under-estimation by examining the secondary activities in our data – but that is a substantial task that will take us some time to accomplish.

Given the rich and fine-grained nature of the data, there are a variety of different ways to measure sociability. For ease of exposition, we measure sociability as the number of minutes spent actively engaging or participating in an activity with friends, with family, or with colleagues. We have replicated our analysis on other measures of sociability (e.g., time spent on social activities such as movies, parties, and so on) with identical results, but feel our active engagement measure is the most general and complete definition of interpersonal interaction. These active interpersonal interaction measures serve as the main dependent variables in our analysis of the relationship between Internet use and sociability. For comparison, we also construct a measure of the number of minutes spent alone – defined as the time in which the respondent is *not* actively engaged in an activity with another person.

Table 7.1 presents the basic distributional characteristics of our independent variable (time spent using the Internet) and our four main dependent variables (time spent on social activities). For each measure, we present the mean, median, percent at "zero" (i.e., the percentage never engaging in a given type of activity), and the standard deviation of the extrapolated minutes spent on each activity during 24 hours.

Preliminary Analysis of Data

Before moving to a more detailed analysis of the relationship between Internet use and sociability, we provide a brief analysis of the baseline relationship between our social activity measures and total time spent

ity by substance rather than by mode. In other words, our current research design requires that an individual who was, say, doing research on the Internet must choose between reporting their activity as research or reporting it as Internet, not both. We have improved our estimate of such Internet use in subsequent surveys.

Table 7.1   Descriptives of time-use variables (in minutes)

	Mean	Median	Std deviation	N	% at 0
Estimated total time spent using the Internet yesterday	25.0	0	75.6	6,146	87.0
Estimated active time with family yesterday	272.9	180.0	279.3	6,146	29.7
Estimated active time with friends yesterday	89.5	0.0	184.6	6,146	72.2
Estimated active time with business associates yesterday	124.8	0.0	228.5	6,146	69.7
Estimated time alone yesterday	465.6	480.0	322.1	6,146	12.1

on the Internet. Table 7.2 presents the results of the regression of sociability on Internet use, with Internet use based on the respondents' diary responses. At the same time, we must control for basic demographic characteristics which might be related to both Internet use and sociability and thus distort the relationship between time online and time with others. Our baseline regression models, therefore, control for marital status, gender, age, education, race/ethnicity, single parenthood, and living alone.

The baseline relationship between time on the Internet and time actively spent in activities with friends, family, and colleagues is negative (See table 7.2). For each minute spent on the Internet during the last 24 hours there is a reduction of approximately one-third of a minute spent with family members. The effect is strong and highly significant. With a mean Internet use for the whole adult population (18–64) of about 25 minutes a day, or almost 3 hours a week, the average reduction in time spent with family members approaches 1 hour per week.

The patterns for time spent with friends and colleagues at work are parallel, but not as dramatic. For every minute spent on the Internet, the average person spends about 7 seconds less with friends and 11 seconds less with colleagues. Thus, Internet use subtracts an additional 18 minutes a day, or almost an hour a week, in active participation with others at both work and play. There is, of course, a complementary impact on the other side. For every minute spent on

the Internet, there is an additional 45 seconds of time spent alone (measured as the total number of minutes a day spent actively engaged with no one else).[10] Over a week of Internet use, this amounts to about 2 hours and 20 minutes of additional time spent alone. These findings concur with the earlier findings of the SIQSS and the Kennedy School studies. However, they are now based on more detailed and robust data.

The results in table 7.2 also verify that the statistical controls, while predictable and interesting in their own right, do not eliminate the underlying "hydraulic" relationships between amount of Internet use yesterday and the amount of active face-to-face time. As might be expected, we find that men are significantly less likely to spend time with family than women (and more time with friends, colleagues, or alone); that married people and single parents spend more time with family, while those living alone spend less time with family or friends (an average of 1 hour and 23 minutes a day less!); and that age, even well before 65, begins to reduce face-to-face interactions with family members, and even more so with friends, though not with colleagues. Looking at the complementary time alone regressions, only very few demographic variables have any statistically significant impact on time spent alone. Marriage is, of course, related to less time alone, and most notably, living alone has a very large positive effect on time spent without active interaction with others. Turning to the other time controls, we find, as expected, that sleep has a negative relationship with all measures of sociability. Work has a negative relationship with family and friends, and a positive effect with colleagues and time spent alone.[11]

In short, no matter how time online is measured, and no matter which type of social activity is considered, time spent on the Internet reduces time spent in face-to-face relationships, and concomitantly

10   The small difference between the cumulative 0.64 minute decrease in social time (0.34 + 0.11 + 0.19) and the 0.75 minute increase in time alone (for each minute of Internet use) can likely be attributed to our exclusion of "active interaction" with strangers and "others" (user-defined) as dependent variables.

11   For comparison, we also repeated the analysis using recall estimates from our follow-up questions (see appendix 7.1) as an alternative measure of Internet use. This is equivalent to measures used in previous works and is simply the response to the question: "How much time did you spend on the Internet/email yesterday?" Even with this cruder measure, we find that the baseline results are the same – the more time spent on the Internet, the less time spent with family, friends, or colleagues.

Table 7.2 Analysis of diary minutes

	Active time with . . .							
	Family		Friends		Colleagues		Time alone	
	β	t	β	t	β	t	β	t
(Constant)	298.83	7.24***	235.45	8.58***	12.52	0.36	267.13	5.56***
Education	2.29	1.69	1.39	1.54	−0.10	−0.09	−2.81	−1.77
Male	−72.40	−10.22***	3.76	0.80	57.93	9.64***	19.56	2.37*
Married	106.84	10.51***	−29.05	−4.30***	−17.19	−1.99*	−39.50	−3.34***
African–American	−17.36	−1.50	5.34	0.69	22.18	2.26*	−1.55	−0.12
Hispanic	0.19	0.02	−4.24	−0.51	9.51	0.89	2.92	0.20
Asian and other	−18.20	−1.11	−7.04	−0.65	24.06	1.73	10.12	0.53
Age	−3.36	−1.65	−6.61	−4.90***	7.32	4.26***	7.44	3.15**
Age-squared	0.04	1.71	0.07	4.24***	−0.11	−5.34***	−0.05	−1.74
Live alone	−86.45	−7.15***	−16.60	−2.07*	−6.72	−0.66	91.98	6.53***
Single parent	49.70	3.62***	−4.60	−0.50	−18.59	−1.60	−15.75	−0.99
Total time online	−0.34	−7.35***	−0.11	−3.55***	−0.19	−4.95***	0.75	13.96***
Adjusted R-square	0.09		0.02		0.03		0.07	
F	54.20		9.64		18.70		41.26	
N	5,737		5,737		5,737		5,737	

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

increases time spent alone. With the exception of some potentially small overlap between friends and colleagues, all of this time above is strictly additive. Time can be reallocated – from time spent with friends, family, or colleagues to time spent on the Internet – but not expanded; it is indeed like a hydraulic system, where increases in activity in one area reduce time available for other activities.

Context of Internet Use

To advance an understanding of the complex effects of the Internet on sociability, we must move beyond simple analyses of total Internet time. It is overly simplistic to look for *one* effect for *all* Internet use. Where and when an individual uses the Internet is as important as how much he or she uses it. Moreover, differentiating Internet use by location and time should sharpen the results of our analysis and test the validity of our assumptions. For instance, we would expect that Internet use at work has little effect on time spent with family members. And while the *displacement* hypothesis predicts that Internet use at home has a negative effect on social time with friends and family, the *efficiency* hypothesis, predicts no relationship, or even a positive relationship between Internet use and sociability, regardless of time or location. The following multivariate regression analysis will help us to identify which hypothesis, on average, more closely reflects the observed relationships between Internet use and sociability.

Time Constraints

Significant portions of daily life cannot be traded because they are devoted to necessary life activities, like earning a living, taking care of the home, sleeping, and eating. As a result, we expect that Internet use (particularly at home) does not affect time spent on these "fixed" activities but comes disproportionately at the expense of discretionary time that could otherwise be spent in face-to-face social engagement. Thus, we include two controls: time spent on sleep and time spent on work. Time spent on sleep is important because it defines the length of the conscious day. In terms of our "hydraulic" model, time on sleep reduces the denominator of time available. Sleep is like an accounting variable, in that the more of it you do, the less you are able to engage

in any other activities. It is the only activity that behaves in this manner, and is unique in the way it expands or contracts the day.

Second, work time is an important control because of the potential spurious relationship between time spent working and sociability. For instance, we would expect that individuals who work more are likely to spend more time on the Internet (at work). We would also expect that those who work more spend less time with their friends and family. Thus, work hours should be included in the regression model so we can identify the direct effect of Internet use on sociability, independent of time spent working.

Third, we include time spent watching TV in the regression model as an interesting comparison. The comparison with time spent on TV viewing is particularly intriguing because Internet and TV use have often been thought of as equivalent or substitutable uses of time. All previous studies have found a negative relationship between TV time and Internet time (which we also find – correlation of –0.27). This, in and of itself, casts some doubt on the efficiency hypothesis. If Internet use has the effect of giving us *more* leisure time (to spend with friends and family, the argument goes), then we would also expect that it would give us more time to watch TV – the number one leisure activity of Americans. A further discussion of the effects of TV versus the Internet is included below.[12]

In the following sections, we present the results of our expanded regression models.

Home versus Work Use

Does it matter where Internet use takes place? Does, for example, time spent using the Internet at home have a greater impact on face-to-face time with family members than time spent on the Internet at work? Table 7.3 presents the findings from the multivariate regression analysis of effect of Internet use, differentiated by use at home and use at work, on active time spent with friends, family, colleagues, and time spent alone.

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12   The tradeoff with TV time and Internet time is likely to be exaggerated in our data due to the hardware constraints of our online data collection technology: in households without prior Internet connection, where the TV set-top box installed for online survey administration serves as the only Internet access, simultaneous Internet and TV use is difficult or impractical.

Table 7.3 Home versus work Internet use

| | Active time with . . . | | | | | | | | |
| | Family | | Friends | | Colleagues | | Time alone | |
	β	t	β	t	β	t	β	t
(Constant)	532.73	13.83***	381.20	13.58***	116.55	3.62***	457.94	9.45***
Education	1.24	1.03	0.20	0.23	-0.18	-0.18	-1.01	-0.67
Male	-30.26	-4.75***	19.56	4.21***	16.75	3.14**	-1.93	-0.24
Married	100.29	11.21***	-35.06	-5.38***	-13.09	-1.75	-34.94	-3.10**
African–American	-18.17	-1.78	6.64	0.89	13.65	1.60	-10.31	-0.80
Hispanic	-5.44	-0.49	-7.78	-0.97	5.28	0.57	1.48	0.11
Asian and other	-19.35	-1.35	-5.88	-0.56	21.44	1.78	6.30	0.35
Age	3.08	1.71	-5.02	-3.83***	-1.54	-1.02	1.61	-0.71
Age-squared	-0.05	-2.34*	0.05	3.06**	0.01	0.29	0.01	0.38
Weekday	-94.36	-13.13***	-38.01	-7.26***	5.67	0.94	82.78	9.16***
Live alone	-84.57	-7.96***	-18.00	-2.33*	-12.91	-1.45	89.86	6.72***
Single parent	35.74	2.96**	-12.79	-1.45	-11.33	-1.12	-14.78	-0.97
TV time	-0.01	-0.58	-0.18	-11.99***	-0.05	-3.00**	-0.22	8.32***
Sleep time	-0.33	-18.77***	-0.17	-13.09***	-0.08	-5.59***	-0.40	-18.00***
Work time	-0.38	-31.84***	-0.12	-13.54***	0.37	36.68***	0.08	5.58***
Time online at home	-0.50	-10.49***	-0.16	-4.60***	-0.07	-1.75	0.66	11.05***
Time online at work	0.00	0.01	-0.07	-0.89	-0.47	-5.58***	0.60	4.72***
Adjusted R-square	0.30		0.09		0.28		0.17	
F	154.73		35.87		136.95		71.68	
N	5,738		5,738		5,738		5,738	

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

Table 7.3 shows that distinguishing Internet use by location makes the statistical relationships stronger and clearer. As the displacement model predicts, Internet activity appears to come directly out of time spent actively engaging with others. Home use comes out of time with family and friends, and office use comes from time with co-workers. As is immediately apparent in the first equation, *only* time spent on the Internet "at home" has any impact on time spent with family. Once the number of hours spent at work (for pay) has been taken into account, the amount of Internet use at work has absolutely no impact on time spent face-to-face with family members. This is consistent with the displacement hypothesis. Home is the critical environment where users face the direct tradeoff between Internet/email use and actually "being with" with family. The relationship is identical, though substantively weaker, for time spent with friends.

For the relationship between location of Internet use and time spent with co-workers, the dynamics are different, though entirely equivalent. As shown in table 7.3, the amount of Internet use at work affects *only* the amount of time spent with colleagues. When work time is in the equation, the amount of time spent on the Internet at work has a major negative impact on time spent face-to-face with colleagues. The individual who works 40 hours a week with one hour of Internet use each day can expect to spend 2.5 additional hours a week in isolation from fellow workers. Internet and email clearly deliver a superior and more efficient communication medium for business, but human interactions in the office – whether gossiping, deliberating, or mentoring – may concurrently be sacrificed.

Time spent using Internet/email both at home and at work also plays a substantial role in increasing time spent alone, the complement of social time. The last equation in table 7.3 demonstrates that for every minute spent on the Internet at home, time spent alone increases by 40 seconds (35 seconds for Internet use at work). These findings are all the more impressive because we simultaneously control for marital status, living totally alone, amount of TV viewing, and hours spent at work yesterday. Additionally, time on Internet/email is more highly correlated with time spent alone than either work or TV time. Internet use, more than almost any other activity, isolates people from simultaneous active engagement with others. One simply cannot be engaged with others while being engaged on the Internet.

Interestingly, time on TV is related positively and significantly to time spent alone. Given the frequent comparisons between the

Internet and TV with regard to tradeoffs in time, we detour slightly to compare this particular relationship.

Internet versus TV

Many have written about the deleterious effects of television on sociability inside and outside the home (Robinson and Godbey, 1997; Putnam, 1995). We believe that the Internet has much more isolating potential than TV. Television is fundamentally different from Internet use in that the TV can easily retreat from the foreground of attention to background noise. Activities, even interpersonal ones, can occur while the television is on. In many homes, the TV is always on and may shift from the foreground to the background while other activities take place.

The Internet, on the other hand, is an interactive device and is, therefore, a more demanding activity. Unlike TV, the Internet is necessarily user-driven. While interruptions can certainly still occur, it is much more difficult for the Internet to become a background activity. Furthermore, TV sets are often in central locations in the home – living rooms or family rooms, for example – while computers are often in more private spaces where interruptions are less likely to occur. It also seems much less likely for Internet use to be a group activity, while TV, at the very least, invites several family members to watch together.

Figure 7.1 shows evidence of the uniquely isolating effects of the Internet. It presents a bar chart comparing those who watched TV yesterday to those who used the Internet yesterday. It shows the percentages, within each group, of people who report that at least some of each activity was done alone, with others passively present, or actively engaging in the activity with others. We can clearly see the fundamental difference between TV viewing and Internet/email as primary activities. Of those people who watched TV yesterday, only 39 percent watched TV alone at some point. Of those who used the Internet yesterday, by contrast, 64 percent used the Internet alone at some point. At the opposite end of the spectrum, we see that a full 59 percent of those who watched some television report that they watched some of it actively with others, while only 10 percent of Internet users report that any of their Internet use on the previous day was done actively with others.
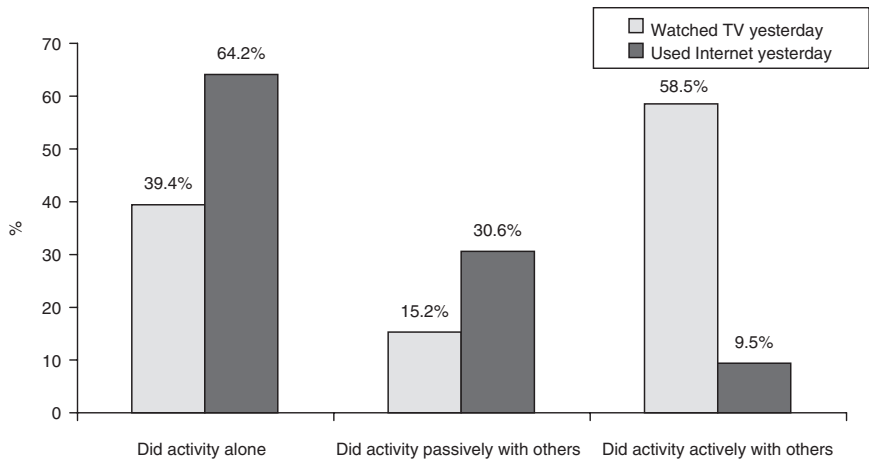
Figure 7.1 Sociability of Internet versus TV
Note: For those who spent time on TV, N = 3,304. For those who spent time online, N = 757. Percentages can sum to greater than 100% because categories are not mutually exclusive.

Internet Use and Leisure: Weekdays versus Weekends

For most people, the weekend presents at least a partial respite from work and household duties. The weekend typically holds many more discretionary moments in the day, in which individuals can choose how they wish to spend their time and with whom they wish to spend it. Certainly not all weekend time is leisure time because of certain chores, family, and social obligations, and even an occasional work deadline, but most people have many more opportunities to spend time with friends and family during the weekends than during the weekdays. If our hydraulic model is correct, the amount of home use of the Internet should have its strongest impact on time spent with both friends and family on weekends, when people have more freedom to choose what they wish to do and with whom, if anyone, they wish to spend their time.[13]

13   It should be remembered that weekday vs. weekend was used as a dichotomous variable in our prior analyses so as not to distort or bias the results. But using a dummy variable as a control averages out its impact across the sample. Here we are looking for structural changes in the strength of the relationship by splitting the sample into weekday vs. weekend.

The relationship between time spent on Internet/email at home on the weekend and time spent with family is the strongest we have yet observed: the coefficient is 0.755 (see table 7.4). This means that for every minute spent online, there is a corresponding 0.48 seconds less spent with family members. Given that the average American spends 14.3 minutes on the Internet over the weekend, there is a 26 percent, or 11-minute, average loss of time spent with family on Saturdays and Sundays. The weekday regressions, too, find that time spent on the Internet at home has a strong, significant, negative influence on time spent with family members, but the strength of the relationship is only about half of what it is on weekends, once again offering support for the hydraulic hypothesis.[14]

Email and Sociability: A Closer Look

Many believe email to be the most important breakthrough in human communication since the invention of the telephone. From the perspective of businesses, email may be responsible for much of the reported growth in productivity that accompanied the last decade of rapid economic expansion, and organizational intranets are perhaps the most important set of advancements in business communication since the introduction of the telegraph and telephone. There is also robust evidence that many people use and enjoy email. The UCLA study, for instance, reports that 76 percent of email users report checking their email at least once each day. The Pew study finds that 49 percent of Internet users report exchanging email with family members at least once per week, and that 49 percent of email users report that they would "miss it a lot" if they no longer had email available to them. Email reduces the personal costs and risks of written communications: less committal than a letter and less personal than a telephone conversation. Exchanging greetings and information by email rather than by phone is also much easier when many time zones separate the correspondents and make synchronous communication difficult. There also appears to be a greater motivation to send email, knowing that it will be received in a matter of minutes, rather than days.

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14 Similarly, we replicated the analysis for time of day (evening Internet use vs. daytime Internet use). We find that primetime (6–8pm) Internet use has a much stronger effect than Internet use during the rest of the day.

Table 7.4 Weekend versus weekday Internet use

	Active time with . . .							
	Family		Friends		Colleagues		Time alone	
	β	t	β	t	β	t	β	t
Weekend regressions								
(Constant)	660.28	8.43***	523.23	8.39***	−16.25	−0.36	390.45	4.50***
Education	−1.00	−0.38	1.81	0.87	1.94	1.27	−2.31	−0.80
Male	−40.71	−3.04**	27.23	2.55*	10.95	1.40	18.98	1.28
Married	124.95	6.56***	−54.42	−3.58***	−13.94	−1.25	−34.55	−1.64
African–American	−27.19	−1.36	10.45	0.66	−5.45	−0.47	6.15	0.28
Hispanic	4.85	0.22	−12.45	−0.71	9.33	0.73	9.69	0.40
Asian and other	−12.94	−0.42	10.51	0.43	24.38	1.36	−8.42	−0.25
Age	4.32	1.17	−9.56	−3.25**	1.92	0.89	0.79	0.19
Age-squared	−0.07	−1.50	0.10	2.77**	−0.02	−0.98	0.01	0.29
Live alone	−101.14	−4.35***	−35.74	−1.93*	−5.03	−0.37	105.10	4.08***
Single parent	20.30	0.82	−34.23	−1.73	−6.57	−0.45	15.26	0.56
TV time	−0.19	−4.56***	−0.22	−6.67***	−0.04	−1.66	0.33	7.08***
Sleep time	−0.46	−13.36***	−0.24	−8.79***	−0.04	−1.97*	−0.30	−7.70***
Work time	−0.62	−23.28***	−0.20	−9.43***	0.37	24.16***	0.26	8.81***
Time online at home	−0.75	−6.59***	−0.36	−3.94***	−0.11	−1.65	0.96	7.60***
Time online at work	0.17	0.39	−0.03	−0.09	−0.42	−1.65	0.51	1.07
Adjusted R-square	0.35		0.11		0.31		0.19	
F	58.17		13.49		47.85		25.49	
N	1,645		1,645		1,645		1,645	

Weekday regressions

(Constant)	387.33	9.15***	281.97	9.53***	181.25	4.41***	565.72	9.85***
Education	1.60	1.23	−0.47	−0.52	−0.98	−0.78	−0.31	−0.18
Male	−29.51	−4.21***	15.09	3.08**	20.01	2.94**	−8.27	−0.87
Married	90.41	9.268**	−28.92	−4.23***	−11.14	−1.17	−36.11	−2.72**
African–American	−15.46	−1.34	6.18	0.76	23.14	2.06*	−19.48	−1.24
Hispanic	−10.12	−0.82	−5.98	−0.69	2.63	0.22	−1.44	−0.09
Asian and other	−20.21	−1.29	−11.18	−1.02	20.44	1.34	11.03	0.52
Age	1.71	0.86	−3.38	−2.43*	−3.23	−1.67	2.86	1.06
Age-squared	−0.03	−1.43	0.03	1.84	0.02	0.88	0.00	−0.04
Live alone	−78.38	−6.84***	−11.97	−1.49	−16.52	−1.48	84.74	5.45***
Single parent	43.11	3.23**	−6.04	−0.65	−11.59	−0.89	−28.23	−1.56
TV time	0.09	3.82***	−0.16	−9.66***	−0.06	−2.50*	0.15	4.75***
Sleep time	−0.26	−13.14***	−0.13	−9.45***	−0.10	−5.28***	−0.45	−16.76***
Work time	−0.29	−22.52***	−0.09	−9.59***	0.37	28.93***	0.02	1.02
Time online at home	−0.39	−7.89***	−0.09	−2.66**	−0.06	−1.23	0.55	8.17***
Time online at work	−0.04	−0.46	−0.07	−1.03	−0.48	−5.07***	0.63	4.81***
Adjusted R-square	0.22		0.06		0.25		0.14	
F	78.02		16.72		92.06		44.09	
N	4,091		4,091		4,091		4,091	

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

Despite these tremendous social benefits there remains an empirical question as to the effect of personal email on the amount of time spent face-to-face with friends and family. Are those who communicate via email more gregarious people? Are they generally better communicators across all media, and with richer social lives in every sphere, as some of the prior literature suggests? Is personal email activity positively associated with spending more time with friends and family as the UCLA and Pew studies suggest? Or is time spent on email, even personal email, subject to the same "hydraulic" constraints as other types of time spent on the Internet? Table 7.5 provides some of the answers.

The results of our now familiar equations in table 7.5, instead of examining time spent online as the main independent variable, initially examine the impact of the number of work versus personal emails (sent and received) on time spent in active face-to-face interactions.[15] Within each column of our dependent variables – time spent with family, with friends, with business associates, and alone – we then estimate a second regression by adding total Internet time to the equations in order to identify any remaining effects of email beyond being a simple surrogate measure for time spent online.

The number of work-related emails has no significant impact on the amount of time people spend with their family members (nor should it). However, for each personal email message sent or received, there is almost a 1-minute drop in the amount of time spent with family. With a mean of 13 personal emails sent and received, that amounts to about 13 minutes less of family time a day, or about 1.5 hours a week. The results in the right panel of each dependent variable column suggests, however, that the separate analysis of email provides no new information. Once we control for total time on the Internet, the effect of email becomes statistically insignificant and the coefficient for total time on the Internet is unaltered from prior equations. When time online is included in the regression, number of personal emails likewise has no significant effect on the amount of time spent with friends, colleagues, or time alone. In other words, these email measures do indeed appear to be simple proxies of time spent online.

As we have demonstrated repeatedly, Internet use is time spent alone, and personal emails too are fundamentally time spent online.

15   If the respondent reported more than 100 emails, their number was truncated to 100 to control for outlier influence on the regression coefficients.

Table 7.5 Email analysis by content

	Active time with . . .							
	Family		Friends		Colleagues		Time alone	
	β	β	β	β	β	β	β	β
Constant	524.81***	538.55***	361.99***	365.77***	70.76*	75.24*	510.84***	490.74***
Education	1.66	1.76	1.46	1.48	0.61	0.64	-2.52	-2.66
Male	-38.96***	-34.03***	17.22***	18.57***	13.86*	15.47**	8.21	1.01
Married	106.46***	101.95***	-35.06***	-36.30***	-16.02*	-17.50*	-33.34**	-26.74*
African–American	-20.34	-22.31*	8.30	7.75	19.76*	19.11*	-12.65	-9.76
Hispanic	-12.25	-7.15	-10.09	-8.69	12.70	14.36	7.89	0.44
Asian and other	-19.50	-16.07	-9.44	-8.49	26.70*	27.82*	3.89	-1.13
Age	3.17	3.08	-4.67**	-4.70**	-0.13	-0.16	-0.46	-0.32
Age-squared	-0.05*	-0.05*	0.04*	0.04*	-0.01	-0.01	0.04	0.03
Weekday	-96.90***	-92.22***	-38.22***	-36.93***	3.80	5.32	85.80***	78.95***
Live alone	-83.96***	-82.96***	-19.11*	-18.83*	-21.38*	-21.06*	95.59***	94.13***
Single parent	29.63*	28.73*	-14.48	-14.73	-21.15*	-21.45*	-3.24	-1.92
TV time	0.00	-0.01	-0.19***	-0.19***	-0.05**	-0.05**	0.21***	0.23***
Sleep time	-0.33***	-0.34***	-0.17***	-0.18***	-0.07***	-0.07***	-0.41***	-0.38***
Work time	-0.37***	-0.38***	-0.11***	-0.11***	0.37***	0.37***	0.07***	0.09***
Work emails	-0.50	-0.27	-0.62***	-0.56**	-0.19	-0.11	1.11***	0.77*
Personal emails	-0.98***	-0.30	-0.31	-0.12	0.02	0.24	1.33***	0.33
Time online		-0.44***		-0.12***		-0.14***		0.64***
Adjusted R-square	0.29	0.30	0.09	0.09	0.27	0.28	0.15	0.17
F	129.65	128.58	31.53	30.39	117.49	111.53	55.53	59.76
N	4,960	4,960	4,960	4,960	4,960	4,960	4,960	4,960

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

The benefit of email in helping individuals stay in touch people whom they would otherwise not contact is a benefit in its own right, separate from the face-to-face interactions considered here – but it comes at the expense of some of those "real" personal interactions. We do not mean to trivialize the importance of having another means of reaching out to individuals; users who spend their days online or check email very frequently certainly do have a new supplemental way to reach out. This social benefit of email, however, does not mean that these individuals' social interactions and relationships on email are the same as traditional personal interactions. Nor does it mean that email will have effects comparable to traditional social activity.

While email may promote a sort of "contact" with friends and family, that virtual contact may be more superficial than that which occurs in more personal settings. Interpersonal communications have a purpose far different from the instant, asynchronous control and coordination purposes of email in the business world. Face-to-face and even telephone communication among friends, family, and colleagues, are as much about affect as information. Although empathy, tenderness, reassurance, flirtation, sadness or happiness can be written into email messages, email misses the eye contact, body language, facial expressions, vocalization, hugs, tears, embraces, and giggles that are the fundamentals of our socio-emotional evolution. Email thus appears to imply an obvious tradeoff between quantity and quality of social interaction. Similarly, even the most gratifying telephone calls cannot replace a personal visit. To be sure, writing letters, too, is an activity between self and mind, all the while imagining the recipient and his or her reactions. Email, in this regard, is more like letter writing, as we have understood it through the ages – but in a more casual mode, with less emotional involvement or exposure.

Unquestionably, more detailed analysis of the context of email communication is something to consider as we continue to pursue the manner in which Internet use affects sociability.

Conclusion

We find that the results from our recent time diary survey offer strong support for the "hydraulic" or displacement hypothesis – and no evidence to support the efficiency hypothesis. On average, the more time spent on the Internet, the less time spent with friends, family, and colleagues. Alternatively, the more time spent on the Internet, the more

time spent alone. Even more compelling, perhaps, are our findings regarding location of Internet use. Internet use at home has a strong negative impact on time spent with friends and family, while Internet use at work is strongly related to decreased time with colleagues (but has little effect on social time with friends and family). Similarly, Internet use during the weekends is more strongly related to decreased time spent with friends and family than Internet use during weekdays, for it is during these hours – evenings and weekends – that time on Internet and email competes most directly with time spent in face-to-face interactions with others. And while email undeniably brings some social benefits, time on the Internet – email or otherwise – is fundamentally time spent alone.

It is always difficult in an empirical work, primarily designed to test competing hypotheses, to stand back and rise above the specific findings to consider the larger social implications. The concerns we raised in this chapter, and with the original SIQSS study about the potential social consequences of the Internet in reducing the density and heterogeneity of face-to-face social relationships, were not predicated on the Internet as a single social invention, but rather, as part of on ongoing sociological trend. Much of the social history of the nineteenth and twentieth centuries is a story about the dissolution of community and family connections – the social support networks that linked individuals to one another and to their communities. It is a central theme among those who study modernity. Moreover, much of this decline in face-to-face social connectedness has arisen from one technological change after another. The mobility made possible by the railroad and automobile also made possible sub-urbanization and the atomistic bedroom community. Likewise, airplanes, highway systems, and the telephone made it feasible for the modern corporation to exist in many places at once, and, consequently, made it necessary to move its managers (if not its workforce) from one city or country to another. In stark contrast with just a generation or two ago, it is common for people to be born and raised in one community but live their adult lives in another (or a series of several others). All of these innovations have had unintended negative effects on lifelong family, extended family, and friendship ties. Siblings, parents, children, aunts, cousins, grade school and high school friends are no longer present daily, and they no longer form the lifelong support and friendship groups they once did.

To be clear – we are not offering a doomsday warning about any immediate threat of extinction of face-to-face interpersonal relation-

ships. Rather, we want to emphasize that Internet use – whatever its possible benefits to virtual communities – involves a time tradeoff in which time on the Internet at home and (to a lesser extent) at work displaces face-to-face social interactions. We do believe that it is particularly important to be conscious and aware of this tradeoff because Internet use in American society continues to grow as bandwidths and connection speeds increase. Moreover, in a world of DSL and beyond, increasing commuting times, and ever more expensive office space, workers may increasingly be telecommuting from home – and yet another rich source of human interactions will have slipped away. Coupled with the fact that single member households are the fastest growing type of American household, it seems possible that a growing portion of the population may soon live as well as work alone. Within such a context, the unintended social consequences of the Internet become more pervasive.

The human psyche evolved under a much richer and enduring social world – kith, kin, and community were both daily and enduring interactions of life. The Internet is not, by any means, itself responsible for the transformation to a world in which people spend more of their waking hours alone than with others. But, the Internet follows a long string of technological innovations that each have had the unintended consequence of reducing the number and meaningfulness of emotionally gratifying face-to-face human interactions.

Appendix 7.1

Respondents were asked about their *main* activities during six randomly selected hours, distributed over the course of the previous day ("yesterday"). Respondents could select from a list of 13 main activities, or enter one of their own:

Main activity	*Definition*
Work (for pay)	Any work or business activity
Education	In class, doing homework, other school activities
Housework	Cleaning, chores, cooking, home finances
Childcare	Feeding, clothing, playing with children
Errands/shop	Groceries, appointments, offices
TV/Internet/ media	Watch TV, Internet/email, read
Social outing	Socializing, parties, events, movies

Recreation/ hobby	Sports, fitness, outdoors, hobbies, games
Organizations	Church, volunteer, or club activities
Travel	All traveling and commuting (including walking)
Eat	Meals or snacks
Dress/wash	Dress, shower, bathe, groom
Sleep	Sleep, nap, or doze
Other	*User defined*

Respondents were then asked to identify their *specific* activity categorized under the main activity they selected. For instance, if they selected housework as their main activity the were asked to select among the following specific activities: cooking, kitchen cleanup, laundry, repairs, yard work, internet/email, telephone calls, plant/pet care, paperwork, organize/unpack, other (*user defined*).

For each of the main activities, Internet/email, telephone, computer work was included as an option. Thus, we are able to pick up Internet use whether that use was, say, educational, professional, or simply recreational use. The respondents were then asked *how long* the activity lasted (10 mins to 1 hour+), *where* the activity took place (home, other's home, office/factory, vehicle, store, outdoors/park, school, restaurant/bar, theatre/stadium, other), and *with whom* the activity was performed (whether alone, with other people present but not participating, or with others participating – and in addition, the specific individuals participating: spouse, children, other family, roommates, friends, business associates, strangers, or other).

Respondents were finally asked if they did *anything else* at the same time as this (*primary*) activity. Respondents were provided with a checklist of 21 (*secondary*) activities (including user defined other) and were asked to identify any or all that they did at the same time as the main activity. After each sampled hour, respondents were shown a diary form that was filled out and completed based on their answers, to facilitate orientation.

After finishing these questions for each of the activities recorded in each of their six randomly selected hours, respondents were then asked a series of follow-up questions including estimates of the amount of Internet use, content and number of emails (personal vs. work related), type of Internet use (for example, type of websites browsed), amount of TV watching, sleep, and social interactions. Besides providing supplemental information, these follow-up questions provided an additional measure of our independent and

dependent variables (and analyses were replicated using these measures with identical results) as well as an accuracy checking mechanism for the time diary estimates.

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