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The Internet: Is It Changing the Way Canadians Spend Their Time?

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By Ben Veenhof

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Abstract

This study aims to develop a better understanding of the social impacts associated with Internet use in Canada. Although much work has been accomplished on the penetration and use of the Internet, this study uses data from the *General Social Survey (GSS), Cycle 19: Time Use* to better understand how personal use of the Internet fits in the day-to-day lives of Canadians. The survey provides a time-diary account of respondent activities over a 24-hour period, enabling detailed comparisons among heavy Internet users, moderate users, and non-Internet users and their time allocation decisions.

Heavy Internet users - defined as those spending more than one hour on the Internet for personal use during the diary day - lead lifestyles that are considerably different from non-Internet users and even moderate Internet users. The greatest difference is that they spend significantly less time at paid work. They also spend less time on domestic work and on personal care activities such as sleep and relaxation. Students and the unemployed are most likely to be heavy Internet users. In addition, they are typically young and a considerable proportion are male (59%).

Heavy Internet users spent more time alone during the diary day than non-Internet users, even when compared to people of the same social and demographic background. Although they spent less time with family and friends, many heavy Internet users participated in online activities involving social interaction, such as email or chatting with others.

The Internet: Is It Changing the Way Canadians Spend Their Time?

By B. Veenhof

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1. The Internet in our daily lives

With the commercial introduction of Web browsers in the early 90s, the Internet became a social phenomenon that has changed the lives of many users. Today, people use the Internet for email, instant messaging, e-commerce, web-based research, videoconferencing, online dating and blogging, among other things. Most of these activities are interactive and much different from the largely passive radio, television and print media. Users can tailor their Internet experience to suit their needs and even publish their own content. Never before has this freedom and scope of interaction been available, and there is no question that people - and the way in which they interact - have been changed by the use of the Internet. The question is *how* have they been changed?

Depending on the extent and nature of use, the Internet has the potential to change the way people spend their time, how they live their lives and even how they perceive their own health, happiness and stress. Even non-users can be affected, as the information society is all around them. Whether or not these changes represent an improvement over life before the Internet is an important question, but not one that can be easily answered.

The aim of this study is to better understand *how* the Internet has changed daily life for Canadians and to explore the impacts associated with these changes. In particular, it describes how Internet users differ from non-users in terms of their socio-demographic characteristics, as well as their work, domestic and personal lifestyles. The study is based on data from the 2005 *General Social Survey (GSS)* on time use which captures respondent activities over a 24-hour period.

Using a variety of analytical approaches, the study finds that the majority of those who used the Internet for more than an hour during the diary day were young and male. They also spent significantly less time working, sleeping, relaxing and resting. In addition, Internet users spent significantly less time socializing, with heavy users spending about 2 hours more time alone during the day than non-users. Despite this finding, Internet users did interact with others in different ways, and enjoyed participating in clubs, organizations and social events more than non-users. The study also reveals that although the Internet potentially competes with traditional sources of information and entertainment, Internet users were in fact avid consumers of television and print media.

The next section reviews existing research on the relationships between Internet and time use patterns, and their potential social impacts. Section three provides a general overview of time use patterns based on the diary day data, followed by more detailed analyses for selected activities, behaviours and attitudes.

2. A summary of existing research

In Canada, research on Internet users and their time allocation patterns has produced some important findings. Using Statistics Canada's 1998 *General Social Survey: Time Use*, Pronovost (2002) found that individuals using the Internet over a 24-hour period spent more time reading, corresponding, and doing hobbies than non-users, and less time working, socializing and sleeping. Other Canadian studies, based on the 2000 *General Social Survey Cycle 14: Access to and use of Information Communication Technology*, described how some Canadian adults spent less time on various activities, including watching television, reading, sleeping and doing leisure and household chores, once they started using the Internet (Dryburgh 2001, Williams 2001).

Note to readers

This study is based on the 2005 time use data collected in Cycle 19 of the *General Social Survey (GSS).*

Time use estimates in this study are based on information reported in the 24-hour time use diary portion of the survey. The diary provides a comprehensive accounting of participation in, and time spent on, all activities that the respondent participated in the day before the interview. In addition, information was collected on the location where respondents performed these activities (e.g., at home, at work), as well as the presence of other people (for non-personal care activities), (e.g., spouse, children, family, friends).

The questionnaire collected additional information on perception of time, time spent on child care and other unpaid work, paid work and education, cultural and sport activities, social network and trust, media use and transportation, as well as a number of socio-economic characteristics. Readers should note that in cases where respondents were performing a number of activities simultaneously, only the primary activity was recorded so that the total time allocated to all activities was the same for all respondents.

The target population included all people aged 15 and over, except full-time residents of institutions and residents of the Yukon, Nunavut and the Northwest Territories. Data were collected each month from January 2005 to December 2005 using a computer-assisted telephone interview system. Over this period, a total of 19,600 people were successfully interviewed, yielding a response rate of 59%.

This survey was previously conducted in 1998, 1992 and 1986.

Respondents were asked to report all episodes of activities that were at least five minutes in duration. For the purpose of this study, *"internet use"* refers to personal use of the Internet (e.g., email, web browsing, chatting, other Internet communication) and does not include use of the Internet for other purposes (e.g., work, school).

Since the diary is limited to a 24-hour period, there will be a number of respondents who fall into the *'non-user'* category who in fact would be considered users of the Internet on a regular or semi-regular basis if the survey window were to be extended beyond the 24-hour time frame. For this reason, results from the survey cannot be used to infer Internet penetration or use rates for the population at large. Readers interested in the characteristics of the entire Internet-using population in Canada should refer to Statistics Canada's *Canadian Internet Use Survey*. Results for 2005 are scheduled to be released in August 2006 through *The Daily (***www.statcan.ca**).

The 'time displacement' theory considers that time spent on the Internet must necessarily come from time previously allocated to other activities (Kwan 2003, Nie and Hillygus 2002, Robinson, Kestnbaum, Neustadtl and Alvarez 2000, 2002). Television viewing is frequently cited as an activity that is displaced by Internet use, whether respondents are personally asked about their viewing habits (Dryburgh 2001, Williams 2001, Nie and Erbring 2000) or whether the findings result from longitudinal analysis of users (Kraut, Kiesler, Boneva and Shklovski (forthcoming)) or one-time diary studies (Robinson, Kestnbaum, Neustadtl and Alvarez 2002). Others concur that Internet users watch less television than non-users, but conclude that much of the difference is explained by demographic differences between the two groups (Cole and Robinson 2002a, Neustadtl and Robinson 2002). Other studies find that sleep is another activity displaced in part by Internet use (Fu, Wang and Qiu 2002, Robinson, Kestnbaum, Neustadtl and Alvarez 2002) and that Internet users tend to work less (de Haan and Huysmans 2002, Fu, Wang and Qiu 2002, Robinson, Kestnbaum, Neustadtl and Alvarez 2002, Pronovost 2002) and also to spend less time on domestic work (de Haan and Huysmans 2002). When interpreting results from cross-sectional studies it is important to note that Internet use is not necessarily the *causal* mechanism driving change. For example, it is quite likely that some users spent extended periods of time online *because* they worked less and therefore tended to have more free time at their disposal. Correspondingly, some researchers describe Internet use as an integrated part of daily life, with the potential to affect other activities but also to be affected by them (van Zoonen, Walczuch, Aalberts and Fjelsten 2003, Haythornthwaite 2001).

Supplementing the time displacement perspective however is the idea that the Internet, if used efficiently, frees up time for other activities. Some have called this the 'efficiency' hypothesis (Nie and Hillygus 2002). Time saved by shopping online rather than travelling to a store, for instance, may provide the online shopper with more time to call friends or colleagues or to do household chores. There is also the argument that use of the Internet may 'stimulate' other activities, such as use of other media, rather than suppress them (Neustadtl and Robinson 2002). In addition, individuals might mitigate time displaced by Internet use by 'multi-tasking' or doing two or more things at the same time (Sciadas 2006 (forthcoming)).

On the other hand, there are those who find that while there may be slight variations in time allocated to specific activities, there is relatively little significant difference in the overall time allocation of Internet users and non-users (de Haan and Huysmans 2002, Fu, Wang and Qiu 2002).

Considering these different perspectives, some reach the conclusion that the Internet can function as both a 'time displacer' and a 'time enhancer' (Robinson, Kestnbaum, Neustadtl and Alvarez 2002). These authors note, for instance, that while Internet users spend reduced time on certain activities, they also spend more time on others, such as reading, when compared with non-users. Some might argue that the Internet has more in common with time-enhancing technologies such as the telephone than time-displacing technologies such as television (Robinson, Kestnbaum, Neustadtl and Alvarez 2000).

The period at which an individual began using the Internet may also be associated with time use patterns. For example, some researchers have pointed out that early adopters of the Internet were more likely to use print media than non-users, while more recent adopters were no more or no less likely to use print media (Robinson, Kestnbaum, Neustadtl and Alvarez 2002). It must be recognized that early adopters of the Internet often have different characteristics than recent adopters. A large number of early adopters were affluent and highly educated and although they acquired an Internet connection, they retained a strong interest in print media for example, compared to those who were more recent adopters. Differences in the social and economic characteristics of early and recent adopters, as well as those who lack access to the Internet are well-established, for example, through studies of the 'digital divide' (see, for instance, U.S. Dept. of Commerce 2004, Sciadas 2002, 2003 and OECD 2001). Although the times at which users first started using the Internet are not available from the survey source, it is this sort of finding that re-emphasizes the need to include detail about the social characteristics of users when attempting to understand how they allocate their time.

From a social perspective, there is plenty of evidence to suggest that Internet use takes time away from traditional social behaviour, prompting concerns about the lack of face-to-face interaction, increasing isolation and loss of community fabric (Nie and Hillygus 2002, Nie and Erbring 2000, UCLA 2000, Kraut, Lundmark, Patterson, Kiesler, Mukopadhyay and Scherlis 1998). On the other hand, others find that Internet users are no less sociable than non-users (Gershuny 2003, Cole and Robinson 2002b, Kestnbaum, Robinson, Neustadtl and Alvarez 2002, Robinson, Kestnbaum, Neustadtl and Alvarez 2000, 2002), and yet others use data to illustrate ways in which the Internet can be a socially-enriching tool (Boase, Horrigan, Wellman and Rainie, 2006). As discussed elsewhere (Sciadas 2006 (forthcoming), Nie and Hillygus 2002) and as the findings presented here suggest, there are many nuances to consider when attempting to understand how the Internet is affecting the lives of individuals. Understanding the extent of use, the purposes of use, and the differences in how Internet users and non-users allocate their time to other activities all warrant attention.

3. An overview of Internet users and their time use patterns

Past research has noted that when comparing Internet users with non-users, it is important to capture the extent of Internet use since decisions about how to allocate the remainder of one's time are likely to be influenced by the amount of time spent online (Nie and Hillygus 2002). For the purpose of comparison, respondents were grouped according to time spent on the Internet in the following manner: those who did not report using the Internet for any one episode of at least five minutes during the diary day ('non-users'); those who spent between five minutes and one hour on personal use of the Internet (i.e., email, browsing the Net for recreational purposes, chat groups, and other Internet communication) ('moderate users'); and those who spent more than one hour on personal use of the Internet ('heavy users'). This approach offers a preliminary attempt to gauge the extent to which duration of time online affects other activities. Future work might refine such a comparison by adding more detailed categories or perhaps using a continuous measure of time spent online[1].

1. The classification of Internet users was also influenced by a few additional factors. A categorical classification was selected in order to assist with presentation and interpretation of findings. In order to preserve data quality, the 'moderate' and 'heavy' use categories were not broken into additional groups due to issues of sample size. Readers should note that although the 'moderate' use category spans a range of five minutes to one hour, the majority (79%) of moderate users reported spending at least 30 minutes online. The mean Internet time for moderate users was 40 minutes, while heavy users averaged over 150 minutes online (the median value was 120 minutes, but some extreme high values resulted in the inflated figure for the mean). Heavy users accounted for 43% of the Internet users in this study.

Table 1
Summary characteristics of Internet users and non-users during the diary day

Characteristic	Non-users	Moderate users (5 min. to 1 hr.)	Heavy users (more than 1 hr.)
Age		*years*	
Mean age[1]	45.1	39.7	37.4
Sex		*% of respondents*	
Female	51.6	49.6	41.1
Male	48.4	50.4	58.9
Main activity in the 7 days prior to the survey		*% of respondents*	
Working at a paid job or business (incl. vacation)	56.7	57.7	45.3
Going to school	7.9	15.2	23.2
Household work/caring for child	12.7	7.6	7.6
Retired	16.6	12.1	12.5
Looking for paid work	2.0	2.9	6.1
Other (incl. maternal/paternal leave and long-term illness)	4.1	4.5	5.3

Note:
1. Only respondents aged 15 years and over are included in the survey.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

In terms of their demographic characteristics, heavy Internet users differed considerably from moderate Internet users and non-users[2]. Heavy users tended to be younger than both moderate and non-users (Table 1). There were also greater proportions of students and unemployed individuals in the heavy user group. Further, while both non-users and moderate users were represented relatively equally among males and females, a much higher proportion of males could be found in the heavy user group.

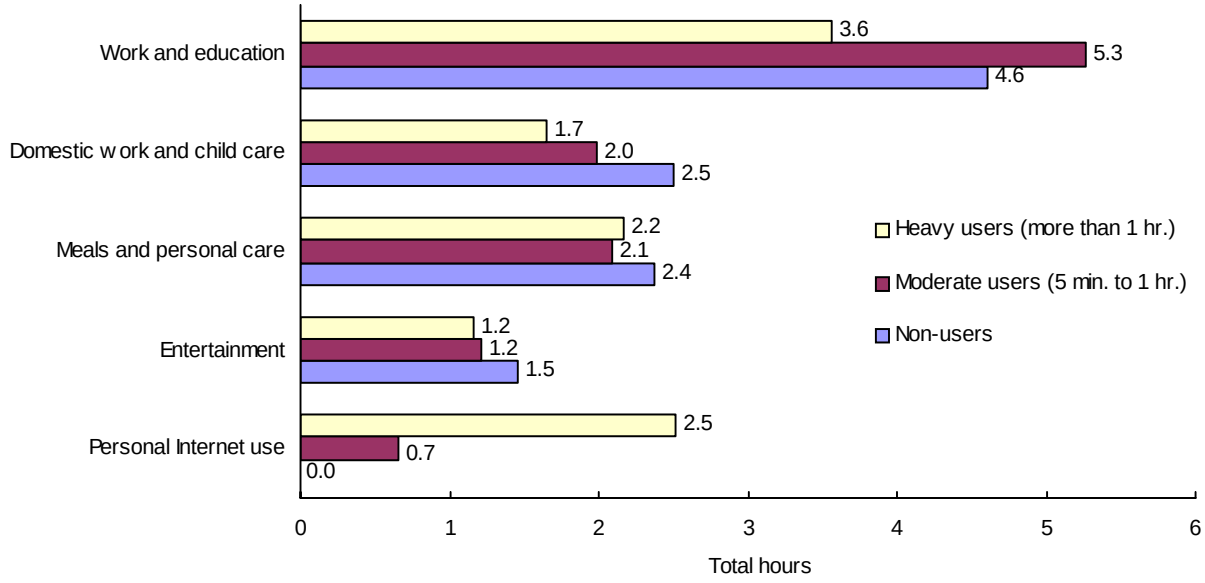
These basic characteristics of the different groups are important since they help to explain differences in the general time use patterns observed for Internet users and non-users. Figure 1 shows that the principal difference between the three groups is that heavy Internet users spent considerably less time working during the diary day than both moderate and non-users[3]. They also spent less time on domestic work than the other groups, and somewhat less time on personal care and entertainment, compared with non-users. In fact, heavy users spent just over 10% of their total time (or on average about two-and-a-half hours) during the day on the Internet for personal use, a figure that was exceeded only by time spent sleeping (about 35% of total time), working or studying (15%), and consuming television and other media (11%). This figure is in addition to any time spent on the Internet for work or education-related purposes. Moderate Internet users spent the most time working and just under 3% of their total time (or about 40 minutes on average) using the Internet for personal use. Those who did not use the Internet during the diary day were older, and therefore a greater proportion of them were retired. Despite this fact, collectively they spent a greater amount of time working, both for paid employment and domestic work, than heavy Internet users. These findings reflect the positive association observed between amount of Internet use and the amount of discretionary or 'free' time held by respondents.

The magnitude of the gap in time spent working between heavy Internet users on the one hand, and moderate and non-users on the other potentially clouds the ability to discern less obvious relationships between Internet use and other uses of time. This is simply due to the fact that time spent at work may have a sizeable effect on other time use decisions. For this reason, the analysis includes an adjustment for time spent at work, so that comparisons can be made between users and non-users while assuming equal work time. Unadjusted results are also presented, to give readers an appreciation of the extent to which work time might influence other decisions (see **Text Box 1** for more details).

2. Readers should be cautioned that in this study, data on Internet users reflect only those individuals using the Internet during the 24-hour period captured by the time diary for an episode of at least five minutes. See the Note to readers for further information.

3. When reading figures, readers should note that only about two-thirds (65.5%) of respondents reported that their main activity in the week leading up to the survey was work or school. This, together with the fact that collection of the diary data included weekends, should be considered when interpreting values reported for time spent on work and educational activities.

Figure 1
Principal differences in time allocation during the diary day by type of Internet user



Source: Statistics Canada, *General Social Survey (GSS), Cycle 19: Time Use*, 2005.

Text Box 1: Analytical approach

Both simple bivariate and multivariate methods are used in the analyses for a number of reasons. Bivariate analyses offer effective means for exploring and identifying major patterns in how people spend their time in a manner that is relatively simple to convey. Past research has noted, however, that any examination of how people allocate their time must not ignore the array of social and economic factors which shape peoples' lifestyles and form the context around which decisions are made (see, for example, Nie and Hillygus 2002, de Haan and Huysmans 2002, Pronovost 2002, Anderson and Tracey 2001, Nie 2001, Franzen 2000). Multivariate methods are therefore essential for examining differences in how people spend their time while also accounting for other factors that may influence overall behaviour and decisions, such as age, sex, labour force status, education, and the presence or absence of children in the household.

The specific methods used include multiple regression and multiple classification analysis (MCA) procedures, which generate estimates of the time that individuals in different groups devote to specific activities, both before and after adjustment for relevant control variables (specified at the bottom of each table). The adjusted and unadjusted figures are presented so that the effects of the adjustments are transparent to readers. Both of these methods can be used to obtain the desired results and the choice to include MCA is more a matter of the researcher's preference regarding input, output and presentation (for more on MCA, see Andrews, Morgan, Sonquist and Klem 1973). Readers should note that the reported differences between the adjusted and unadjusted figures are subject to rounding.

It should also be noted that time use results presented in this study do not provide information about the *causality* of relationships between Internet use and time spent on other activities. Rather, the results reveal the existence of *associations* between time spent on the Internet and other activities, as well as the strength of these associations.

The next sections examine how Internet use fits into other daily activities, including both non-discretionary activities such as work, as well as those respondents choose to perform during their free time.

4. Time spent on work, education and domestic activities

While the previous section outlined broad differences in time use between Internet users and non-users, Table 2 presents a more detailed breakdown of work, educational, domestic and personal care activities, and reveals estimates that include an adjustment to account for some of the social and demographic differences among Internet users and non-users. For many of these activities, respondents have limited choices regarding their participation (for example, work, school and child care), while for others, they may have more discretion regarding the amount of time they spend (for example, some domestic work activities and sleeping).

The data reveal that Internet users spent significantly less time on a number of daily tasks and chores than non-users during the diary day. For example, heavy Internet users spent almost 40 minutes less time on domestic work than non-users. As shown in the adjusted figures, when comparing users with similar characteristics (i.e., age, sex, education, number of children and time at work), the difference dropped slightly. However, heavy Internet users were still found to spend significantly less time (33 minutes) on all domestic activities. Observations were quite similar for moderate users, except that time differences were not as large. In fact, after adjustment, the differences in time spent by moderate Internet users and non-users on cooking and washing up and certain other household activities were no longer significant.

Table 2
Comparison of time spent on work, school, domestic and personal care activities

	Non-users		Moderate users				Heavy users			
Activity	Time	Adj. time[1]	Time	Diff.	Adj. time[1]	Adj. diff.	Time	Diff.	Adj. time[1]	Adj. diff.
	time in minutes									
Time spent at location of work	198.0	202.8	199.6	1.6	172.2	-30.6**	117.6	-80.4**	92.6	-110.2**
Total time for all work activities[2]	246.3	251.9	255.3	9.1	223.0	-28.9**	150.0	-96.2**	122.2	-129.6**
Classes, credit courses on TV, lectures[3]	16.0	18.2	29.3	13.3**	21.5	3.3	33.6	17.6**	16.5	-1.7
Homework[3]	10.4	11.6	19.8	9.4**	15.4	3.8	17.8	7.5**	8.2	-3.4
All educational activities[3]	31.7	35.7	60.9	29.2**	46.2	10.5*	63.8	32.1**	31.6	-4.1
Cooking and washing up	40.6	39.9	36.7	-3.9*	39.8	-0.1	30.4	-10.2**	35.0	-4.9**
Housekeeping	42.5	42.0	31.7	-10.8**	34.7	-7.3**	28.3	-14.2**	30.8	-11.2**
Maintenance and repair	13.0	13.2	7.4	-5.6**	7.6	-5.6**	7.3	-5.7**	4.7	-8.5**
Other household work	25.4	25.2	20.6	-4.9**	22.4	-2.8	16.7	-8.7**	16.8	-8.4**
Child care	25.3	25.2	19.4	-5.8**	19.8	-5.4**	13.2	-12.1**	14.4	-10.8**
All domestic work	121.5	120.3	96.3	-25.2**	104.5	-15.8**	82.8	-38.7**	87.3	-33.0**
Shopping for goods and services	45.5	45.7	43.9	-1.6	44.2	-1.5	42.1	-3.3	38.3	-7.5**
Night sleep/essential sleep	498.7	499.9	490.6	-8.1*	490.4	-9.5**	501.8	3.1	486.8	-13.1**
Meals at home	51.9	51.3	48.6	-3.3*	52.3	1.0	52.8	0.9	55.6	4.3**
Washing/dressing	36.3	36.3	39.0	2.7**	38.5	2.2*	34.2	-2.2*	36.0	-0.3
Relaxing/resting/ thinking	20.3	19.9	11.5	-8.8**	14.2	-5.7**	11.8	-8.5**	12.9	-7.0**
All personal care activities	640.9	641.1	616.0	-24.9**	622.7	-18.4**	631.4	-9.4	620.3	-20.7**

** Difference (Diff.) from non-users is statistically significant at the 99% confidence level ($p < .01$).
* Difference (Diff.) from non-users is statistically significant at the 95% confidence level ($p < .05$).

Notes:
1. Adjusted (Adj.) figures for work-related activities control for age, sex, number of children aged 14 and under in respondent's household, day of week (weekday or weekend) and education (attainment of university/college/trade degree/diploma/certificate). All non-work related activities also control for time spent at location of work.
2. Total time for all work activities includes travel time to and from work, breaks and idle time at work.
3. Education-related activities also control for time of year.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

Internet users spent more time on education-related activities, although after adjusting for other factors (including time of year), differences were not as large. Nonetheless, moderate users were likely to spend more time on school-related work than both heavy Internet users and non-users.

While Internet users spent about the same or more time than non-users attending to basic needs such as meals, washing and dressing, they seemed to spend less time on other aspects of personal care, including sleeping, relaxing, resting and thinking. Lower sleeping times of varying degree among Internet users have been documented elsewhere (Fu, Wang and Qiu 2002, Pronovost 2002, Robinson, Kestnbaum, Neustadtl and Alvarez 2002), but this finding is not consistent among researchers. However, the idea that Internet users might cut back on sleeping and relaxation activities raises questions about their perceptions of time and levels of stress, a topic that will be examined later.

5. Time spent on social, civic, and recreational activities

Not only did Internet users spend less time working and performing domestic tasks around the home, but they also devoted less time to a variety of social activities (Table 3). This is generally true even when factors related to socializing, such as household size and presence of certain family members, are held constant in the analysis (see Table 3 notes). Internet users spent less time socializing with others generally and playing with children. On the other hand, they spent more time talking on the phone, which could also be regarded as a social activity[4]. This is an interesting finding because even though the Internet offers more options for communications, individual Internet users were still more likely than non-users to use a much older technology. The notion of 'media multiplexity' suggests that people who communicate frequently use multiple media to do so, and that individuals who spend considerable amounts of time using one technology are likely to also spend considerable time using another (Boase, Horrigan, Wellman and Rainie 2006, Sciadas 2006 (forthcoming)).

Perhaps what is most revealing from Table 3 is that before and after adjusting for social and demographic factors, Internet users were likely to spend more time alone. For moderate users, this difference is relatively small considering the total length of the day (after adjustment, moderate users spent about 26 minutes more time alone than non-users), but for heavy users, the difference is striking. While holding household size constant, heavy users spent about two hours (119 minutes) more time alone during the diary day than non-users.

Interestingly, non-users shared their time equally with household members and people from outside the home. Moderate users spent less time with household members compared to non-users, but did not differ significantly in terms of the time spent with people outside the home. Heavy users, on the other hand, spent significantly less time with both sets of people.

Time spent with others was not only related to the intensity of Internet use, but also the timing of that use. For example, weekend use of the Internet was associated with even greater declines in time spent with friends and other people outside the household than use of the Internet on weekdays. These findings echo those of other researchers (Nie and Hillygus 2002).

Respondents were also asked about the type and number of people to whom they feel very close, or in other words, their close social network outside of the home[5]. Aside from a few minor differences, the number of close relationships that Internet users held with various types of people could seldom be described as significantly different from non-users (Table 4).

It is of interest that Internet users and non-users reported having social networks of similar size, even though Internet users spent less time in face-to-face contact with others. It is likely that for some users, a portion of their time spent online may have been spent communicating with those in their close social network. It is also the case that the quantity of time spent with others does not always reflect the quality of that time. Certainly the value of Internet communication vis-à-vis face-to-face interaction is the subject of much debate (see for example Boase, Horrigan, Wellman and Rainie 2006, Suler 2004, Minerd 1999, Flaherty, Pearce and Rubin 1998).

4. Readers are reminded that respondents were not asked to report episodes of activities shorter than 5 minutes in duration. Short telephone calls, often quite common, are therefore not included in the figures.

5. Respondents were read the following question: *"People you feel very close to might include those you discuss important matters with, regularly keep in touch with, or are there for you when you need help. Thinking of all the people who fit this description and who do not live with you, how many are...Members of your immediate family?...Other relatives?...People you know from work?...Neighbours?...Other people?"*

Internet users and non-users did not differ with respect to the number of neighbours they held close relationships with, averaging between one and two neighbours. Non-users, however, were slightly more likely to say that they knew "most" or "many" of the people in their neighbourhood (45.8% of non-users), compared with moderate Internet users (42.6%) and heavy Internet users (39.9%)[6]. A small number (31.6%) of non-users described their sense of belonging to their local community as "somewhat" or "very" weak, while this figure rose to 35.2% for moderate Internet users and 38.5% for those who used the Internet for more than one hour during the diary day[7]. Certainly, the Internet opens up a completely different notion of "community" than one defined by more traditional means.

Table 3
Comparison of time spent on social activities

	Non-users		Moderate users				Heavy users			
Activity	Time	Adj. time[1]	Time	Diff.	Adj. time[1]	Adj. diff.	Time	Diff.	Adj. time[1]	Adj. diff.
	time in minutes									
Socializing										
Without meals	25.6	26.3	20.8	-4.8*	19.5	-6.8**	23.3	-2.3	16.6	-9.7**
With meals (excl. restaurant meals)	30.2	30.6	25.1	-5.1*	24.9	-5.7*	22.0	-8.2**	16.6	-14.0**
At bars, clubs (without meals)	4.1	4.3	3.6	-0.5	2.9	-1.4	4.7	0.6	3.0	-1.3
Playing with children	5.8	5.9	4.6	-1.2	4.5	-1.4*	2.7	-3.1**	2.3	-3.6**
Talking, conversation with household member only (face-to-face)[2]	5.7	5.7	6.5	0.8	7.0	1.3	5.0	-0.7	5.1	-0.6
Talking on the phone	4.4	4.4	6.7	2.3**	6.7	2.3**	7.3	2.9**	7.2	2.8**
Social contact										
Alone[2]	376.3	374.2	396.6	20.4*	400.6	26.4**	473.1	96.8**	493.2	119.0**
Spouse/partner[3]	209.8	205.0	166.6	-43.1**	190.9	-14.1**	147.8	-62.0**	176.1	-28.9**
Household children <15 yrs old	86.3	85.6	68.9	-17.3**	73.7	-12.0**	56.0	-30.3**	57.8	-27.9**
Respondent's non-household children <15 yrs old	5.8	5.8	3.7	-2.1	3.9	-1.9	3.2	-2.7	3.1	-2.7
Respondent's non-household children >14 yrs old	7.8	7.5	3.7	-4.1**	5.3	-2.2*	4.0	-3.8**	5.6	-1.9
Parents or parents-in-law not living in household[4]	13.7	14.1	8.6	-5.0**	7.4	-6.8**	12.4	-1.3	8.3	-5.8
Friends not living in household	86.7	90.4	99.6	12.9*	88.7	-1.7	92.3	5.6	59.6	-30.8**
Household members only[2]	279.1	277.4	239.5	-39.7**	257.3	-20.0**	217.0	-62.2**	215.9	-61.4**
Non-household persons only	282.1	284.8	291.7	9.7	272.2	-12.7	229.4	-52.6**	220.7	-64.2**

** Difference (Diff.) from non-users is statistically significant at the 99% confidence level ($p < .01$).
* Difference (Diff.) from non-users is statistically significant at the 95% confidence level ($p < .05$).

Notes:
1. Adjusted (Adj.) figures control for age, sex, number of children aged 14 and under in respondent's household, day of week (weekday or weekend), education, and time spent at location of work.
2. Adjusted figures also control for household size.
3. Adjusted also control for whether respondent has a spouse or partner.
4. Adjusted also control for whether parents, parents-in-law live in household.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

6. Only the difference between heavy users and non-users was statistically significant ($p < .05$).

7. Here also, the difference between heavy users and non-users was statistically significant ($p < .05$), while the difference between moderate users and non-users was significant only at a 94% level of confidence ($p = .06$).

Table 4
Number of close relationships outside the home identified by Internet users and non-users

	Non-users		Moderate users				Heavy users			
Relation	Total	Adj.[1]	Total	Diff.	Adj.[1]	Adj. diff.	Total	Diff.	Adj.[1]	Adj. diff.
	number of people respondent feels "very close to"									
Members of immediate family (incl. parents, siblings, adult children or in-laws)[2]	4.1	4.1	3.6	-0.5**	3.8	-0.2	3.5	-0.6**	3.7	-0.3
Other relatives	2.9	2.9	2.9	0.0	2.8	0.0	2.5	-0.4	2.5	-0.4*
Work colleagues[3]	2.3	2.3	2.6	0.3	2.6	0.3	2.2	-0.1	2.2	-0.1
Neighbours[4]	1.4	1.4	1.5	0.0	1.5	0.1	1.3	-0.2	1.3	-0.1
Other people	4.8	4.9	5.6	0.7**	5.4	0.6*	4.9	0.1	4.7	-0.1
Total[5]	**15.2**	**15.2**	**16.5**	**1.3**	**16.6**	**1.4**	**14.2**	**-1.0**	**14.3**	**-0.9**

** Difference (Diff.) from non-users is statistically significant at the 99% confidence level (p < .01).
* Difference (Diff.) from non-users is statistically significant at the 95% confidence level (p < .05).

Notes:
1. Adjusted (Adj.) figures control for age and sex.
2. Adjusted figures also control for whether parents, parents-in-law live in household.
3. Adjusted figures also control for whether respondent's main activity during last 7 days was work.
4. Adjusted figures also control for whether respondent has lived in neighbourhood for 10 years or more.
5. Adjusted figures also control for whether parents, parents-in-law live in household, whether respondent's main activity in last 7 days was work, and whether respondent has lived in neighbourhood for 10 years or more.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

Regarding recreational and civic activities, such as participating in sports, hobbies, cultural groups and volunteering, moderate Internet users were very similar to non-users (Table 5). On the other hand, after adjustment, heavy Internet users spent less time participating in active sports, engaging in civic and volunteer activities, and attending sports events, movies and other events. In the case of active sports, controlling for age was particularly important due to the association between age and sports participation, and the fact that heavy users were on average nearly 8 years younger than non-users (refer back to Table 1).

Table 5
Comparison of time spent on recreational and civic activities

	Non-users		Moderate users				Heavy users			
Activity	Time	Adj. time[1]	Time	Diff.	Adj. time[1]	Adj. diff.	Time	Diff.	Adj. time[1]	Adj. diff.
	time in minutes									
Participating in active sports[2]	29.9	30.5	29.0	-0.9	28.3	-2.3	26.9	-3.0	20.3	-10.2**
Walking, hiking[2]	8.0	8.0	6.7	-1.3	7.1	-0.9	7.4	-0.6	7.2	-0.8
Hobbies done mainly for pleasure	2.7	2.7	2.2	-0.4	2.5	-0.2	1.8	-0.9	1.7	-1.0
Participating in music, theatre, dance	1.5	1.5	2.7	1.2*	2.4	0.9	2.0	0.5	1.3	-0.3
Attending sports, movies and other events	9.2	9.4	9.7	0.5	9.7	0.3	6.5	-2.7	4.8	-4.5**
Civic and volunteer activities	21.2	21.2	22.8	1.6	23.2	2.1	16.3	-4.9*	15.5	-5.7**

** Difference (Diff.) from non-users is statistically significant at the 99% confidence level (p < .01).
* Difference (Diff.) from non-users is statistically significant at the 95% confidence level (p < .05).

Notes:
1. Adjusted (Adj.) figures control for age, sex, number of children aged 14 and under in respondent's household, day of week (weekday or weekend), education, and time spent at location of work.
2. Adjusted figures also control for time of year.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

6. Time spent using other media

One issue that is consistently raised in discussions of Internet use and time allocation is the impact that users' Web-surfing habits (as well as the amount of time spent online) may have on traditional media. Canadians spend a sizeable chunk of their day in front of the television (approximately 2 hours on average during the diary day[8]), and to what extent the Internet - as both an informational tool and source of entertainment - might cut into this popular pastime is a pertinent question.

This study finds that there is little in the way of significant differences among Internet users and non-users in terms of the time they spend watching television (Table 6). It is true that moderate Internet users were likely to spend a slightly shorter period of time watching T.V. (by just over 13 minutes during the diary day compared to non-users), but once controlling for social and demographic factors, the difference was no longer significant. Most interestingly, there was no significant difference between heavy Internet users and non-users.

Although the data source does not track whether individual respondents cut their television viewing over a period of time, the findings indicate that heavy Internet users are in fact regular television viewers who still find time for this traditional medium in spite of their choice to go online. Although heavy Internet users were more likely to download music on the Internet, they also spent more time actively listening to music in traditional formats such as CDs, tapes, and records compared with both moderate users and non-users[9].

An important issue for the media industry, as well as educators and others, is whether Internet users dedicate less time to reading traditional media. As sometimes found elsewhere (see for example Cole and Robinson 2002a, Pronovost 2002), the reverse was true. In fact, Internet users were likely to spend more time reading books than non-users of the Internet. Nearly half (48.1%) of heavy Internet users during the diary day indicated that they typically read a book at least once a month as a leisure activity, while this was the case for slightly fewer moderate users (44.1%) and non-users (38.6%)[10].

Table 6
Comparison of media use

	Non-users		Moderate users				Heavy users			
Activity	Time	Adj. time[1]	Time	Diff.	Adj. time[1]	Adj. diff.	Time	Diff.	Adj. time[1]	Adj. diff.
	time in minutes									
Total duration for watching TV	125.8	125.2	112.2	-13.5**	120.2	-5.0	124.3	-1.5	120.6	-4.6
Listening to the radio	1.4	1.3	0.7	-0.7**	1.1	-0.3	0.9	-0.5	1.1	-0.2
Listening to CDs, tapes, records	0.9	0.9	0.8	-0.1	0.8	-0.1	2.7	1.8**	2.4	1.5**
Reading books	13.0	12.8	16.3	3.3*	17.2	4.4**	15.8	2.8	17.0	4.2*
Reading magazines	1.6	1.6	1.4	-0.2	1.7	0.1	2.2	0.6	2.5	0.9
Reading newspapers	7.8	7.5	7.8	-0.1	9.4	1.8**	6.7	-1.2	8.2	0.7
All media activity	**150.7**	**149.6**	**139.8**	**-10.9****	**150.8**	**1.2**	**152.9**	**2.2**	**152.1**	**2.5**

** Difference (Diff.) from non-users is statistically significant at the 99% confidence level ($p < .01$).
* Difference (Diff.) from non-users is statistically significant at the 95% confidence level ($p < .05$).

Notes:
1. Adjusted (Adj.) figures control for age, sex, number of children aged 14 and under in respondent's household, day of week (weekday or weekend), education, and time spent at location of work.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

8. The average time that respondents reported watching television during the diary day may be lower than estimates from other sources, such as the Statistics Canada *Television Viewing Databank*. The databank is based on data collected from BBM, a private company which gathers audience data for the Canadian media industry. Differences in the estimates may occur for a number of reasons, including differences in the collection period, differences in collection units, different target populations, different reporting units, significantly lower response rates in BBM data, and differences in activity coding. In the United States, similar differences in estimates of television viewing time have been observed with data collected in the Bureau of Labor Statistics' Time Use Survey and that reported by ratings services such as Nielsen Media Research (Galbi 2001). Readers interested in results from the Statistics Canada *Television Viewing Databank* may refer to *Television Viewing: Data Tables*, Statistics Canada Cat. No. 87F0006XIE, available at: www.statcan.ca.

9. Listening activities (and in particular radio listening) are often secondary activities performed simultaneously with other tasks (Galbi 2001). As the time diary only captured one activity at any given time, figures in Table 6 do not include time spent listening to music and the radio while doing other primary activities (e.g., driving, household chores).

10. Both moderate and heavy Internet users were significantly different from non-users in this regard, at a 95% level of confidence ($p < .05$).

Similarly, Internet use did not appear to deter users from other print media. Users and non-users spent similar amounts of time reading newspapers and magazines. Moderate users were in fact likely to spend slightly more time during the day with newspapers than non-users.

7. How do Internet users and non-users differ in where they spend their time?

The varying ways in which Internet users and non-users allocate their time are likely to translate into differences in spatial patterns. As heavy Internet users worked less, they spent considerably more time at home than both moderate Internet users and non-users (Table 7).

While Internet users tended to spend more time at school than non-users, the difference was explained almost entirely by demographic factors – once respondents of the same age were compared, differences in time spent at school were no longer significant.

Perhaps one of the more telling measures from a social perspective is time spent in another person's home. Upon initial inspection, differences in time spent at other homes were relatively modest when comparing Internet users and non-users, but again when controlling for relevant factors such as age and sex, Internet users spent considerably less time visiting others. Not surprisingly, the intensity of Internet use matters as the gap between heavy users and moderate users is considerable.

Heavy users also did not venture outdoors as much as non-users. This was also the case for moderate users, although the gap between moderate and non-users was smaller.

In order to better understand the relationships between Internet use and other activities, it is therefore instructive to supplement information on time use with an awareness of the spatial implications of behavioural change. The "space-time displacement" perspective is useful for understanding the impacts of new technologies on the urban economy, for example (Kwan 2003). Essentially, the limited temporal and spatial flexibility of certain activities restricts choices about other activities performed during the day. For example, a parent may be pressed to modify their hours of work depending on drop-off times and location of their child's daycare facility.

Although the Internet and other information and communications technologies (ICTs) are often credited with eroding barriers put up by distance, there are still a number of reasons why spatial considerations remain relevant even with respect to technology use. Although availability of Internet access is expanding, there are still areas where it is not available. For some applications, such as email, users may still experience delays in communication. Other technologies, such as instant messaging and cell phones, may remain temporally or spatially fixed in terms of the time at which participants are available to communicate with each other and the location from or within which services are available (Kwan 2001, Harvey and MacNab 2000). While technological advances in general push toward

Table 7
Comparison of time spent at various locations

	Non-users		Moderate users				Heavy users			
Location	Time	Adj. time[1]	Time	Diff.	Adj. time[1]	Adj. diff.	Time	Diff.	Adj. time[1]	Adj. diff.
	time in minutes									
Home	985.9	984.7	977.8	-8.0	1002.1	17.5**	1089.2	103.3**	1072.1	87.5**
Work[2]	198.0	202.8	199.6	1.6	172.2	-30.6**	117.6	-80.4**	92.6	-110.2**
Someone else's home	50.5	52.2	44.3	-6.2	40.6	-11.6**	36.6	-13.9**	20.1	-32.1**
School[3]	19.7	22.4	37.9	18.2**	28.2	5.8	43.3	23.7**	22.0	-0.4
Outdoors away from home[3]	19.5	19.7	13.8	-5.7**	14.4	-5.3**	11.9	-7.5**	8.3	-11.3**
Restaurant or bar	16.5	16.8	14.6	-1.9	13.7	-3.0*	14.5	-1.9	12.0	-4.8**
Place of Worship	3.1	3.1	1.8	-1.4**	2.2	-0.9	2.8	-0.4	2.8	-0.3
Library	0.4	0.4	1.2	0.8	1.1	0.7	0.7	0.3	0.5	0.1
Travel time	73.2	73.8	79.1	5.9*	75.6	1.8	63.9	-9.4**	60.3	-13.6**

** Difference (Diff.) from non-users is statistically significant at the 99% confidence level ($p < .01$).
* Difference (Diff.) from non-users is statistically significant at the 95% confidence level ($p < .05$).

Notes:
1. Adjusted (Adj.) figures control for age, sex, number of children aged 14 and under in respondent's household, day of week (weekday or weekend), education, and time spent at location of work.
2. Not adjusted for 'time at work' as it is the subject of measure.
3. Adjusted figures also control for time of year.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

relaxation of spatial constraints, there are arguments that new technologies can in fact lead to increased travel. This is perhaps due to their potential for increasing communication and awareness of the activities of other people (Mokhtarian and Meenakshisundaram 1999). At the very least, such points bring into question notions of the "end of distance" (Sciadas 2006 (forthcoming)).

Results from this survey indicate that heavy Internet users travelled less during the diary day, although the difference — nearly 14 minutes after adjustment, compared to non-users — was relatively modest considering that travel times generally exceeded one hour during the day. Moderate Internet users were likely to spend similar amounts of time travelling as non-users.

While beyond the scope of the present study, telework (or telecommuting) is a phenomenon that is perhaps reflective of the potential of ICTs (most notably the computer, the Internet, and cellular phone) to reallocate activity in both time and space. Studies of telework and its impacts on time management and other decisions represent a body of work that is important to understanding the roles ICTs play in shaping peoples' lives both at home and in the workplace (see, for example, Duxbury and Higgins 2003).

8. Perceptions of time and stress

Previous sections discussed differences in how Internet users and non-users allocated their time during the diary day. However, a related question is the extent to which users perceive time and stress in their life in general, and whether their perceptions differ from non-users.

Table 8 presents several indicators concerning stress levels and certain aspects of time allocation. Although perceptions could not be characterized as vastly different, a slightly higher proportion of non-users' answers revealed stressful patterns when compared with Internet users.

Non-users were more likely to feel that they didn't have time for fun, and that they never had extra time on their hands. Heavy users stood out because they were less likely to be stressed, feel rushed or consider themselves a workaholic.

Although fewer Internet users identified with the indicators of stress, it is worth noting that a slightly higher proportion of Internet users asserted that they were willing to cut back on sleep when they felt they needed more time. Referring back to earlier findings (Table 2), both moderate and heavy users (after adjustment for social and demographic factors) typically spent less time sleeping during the diary day, albeit sleep times declined only slightly.

Table 8
General perceptions of time and stress among Internet users and non-users

	Non-users	Moderate users	Heavy users
Perceptions reported by a significantly different proportion of Internet users compared with non-users		*% of respondents*	
Feel rushed every day	35.6	32.6	29.9**
Most days are quite a bit or extremely stressful	20.7	19.3	17.1*
Have time on my hands that I don't know what to do with:			
every day or a few times a week	20.7	23.2	34.5**
never	30.9	22.7**	17.4**
Considers self a workaholic	26.0	24.2	20.6**
Cut back on sleep when I don't have enough time	47.0	52.8**	54.3**
Feel constantly under stress trying to accomplish more than I can handle	35.1	32.8	30.7*
Feel that I just don't have time for fun anymore	32.9	28.9*	25.2**
Perceptions where difference between Internet users and non-users was not statistically significant		*% of respondents*	
Feel days are just too short to do all the things I want	64.3	65.5	61.2
Regularly have trouble going to sleep or staying asleep	29.9	29.0	32.5
Worry that I don't spend enough time with family or friends	40.8	39.9	37.1
Would like to spend more time alone	25.3	24.7	22.9

** Difference from non-users is statistically significant at the 99% confidence level ($p < .01$).
* Difference from non-users is statistically significant at the 95% confidence level ($p < .05$).

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

Again, it is important to consider the extent to which any differences in perceptions of time and stress may have more to do with differences in demographic and socioeconomic characteristics of Internet users and non-users and less to do with Internet use itself. To do this, a multivariate method somewhat similar to the approach used earlier in this study is employed. Logistic regression analysis is used to model the chances that Internet users would indicate that they found most days "quite a bit" or "extremely" stressful compared to non-users, while attempting to account for other factors which likely affect stress levels, such as age, work situation, marital status, income, presence of children and the like (see **Text Box 2** for more information).

Readers will recall from Table 8 that slightly fewer heavy users described their days as stressful compared with non-users. Once accounting for a number of social and demographic characteristics (see the notes below Table 9 for the full list of control variables, and Appendix A for full results of the model), the model revealed that moderate Internet use was associated with reduced chances of being stressed (Table 9). However, it did not find a significant difference in the chances that heavy Internet users would be stressed, compared with non-users. Thus, the earlier differences between heavy users and non-users were largely explained by other social and demographic characteristics included in the model.

Text Box 2: Logistic regression analysis

Logistic regression is used in this section due to the nature of the outcome being modelled. Respondents were grouped into two categories: those stating that most days were "quite a bit" or "extremely" stressful, and those who stated otherwise. In earlier sections, the dependent variable of interest (time in minutes) was measured on a continuous scale, which required different methods of analysis (multiple regression and multiple classification analysis).

The logistic regression models the odds that individuals with different characteristics would report the outcome, in this case, finding most days "quite a bit" or "extremely" stressful, compared to a designated reference group. The influence of each characteristic is modelled while controlling for the influence of other variables in the model. The output of the regression procedure is a series of odds ratios. For each characteristic, values greater than '1' represent increased chances of finding most days stressful, while ratios less than '1' reflect decreased chances of finding most days stressful compared to the designated reference (or comparison group). In this case, non-users are designated the reference group against which comparisons will be made.

For more on logistic regression, odds ratios and their interpretation, see Menard (2001).

Table 9
Adjusted odds ratios showing the chances that Internet users would report finding most days "quite a bit" or "extremely" stressful

Type of Internet user	Adjusted odds ratios
Internet non-user	1.00
Moderate Internet user	0.84 *
Heavy Internet user	0.88

* Difference from non-users is statistically significant at the 95% confidence level ($p < .05$).

Notes: Reference group is Internet non-user. Odds ratios greater than 1.0 represent increased chances of finding most days stressful relative to non-users; Odds ratios less than 1.0 represent reduced chances relative to non-users. Odds ratios are adjusted for age, sex, education, labour force status, household income, marital status and presence of children in the household. See **Appendix A** for results from the full regression model.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use*, 2005.

Similarly, although moderate Internet use was associated with lower stress levels, the strength of this relationship was dwarfed by other factors much more directly linked with stress (refer again to Appendix A). Most notably, age was an important factor, as middle-aged individuals had the greatest chances of finding days stressful while accounting for other social and demographic factors. Labour force status was also particularly influential, with those who were employed or attending school in the week prior to the survey much more likely to be stressed than retired individuals, household workers, or those seeking employment. In addition, women were more likely to report stress than men, and having children living in the household was also associated with higher stress levels. Interestingly, those with moderate income levels were less likely to report being stressed than individuals coming from low-income households, but those in the highest income group did not differ significantly from those in low-income households in this regard. Put in perspective, each of these factors held a stronger association with the chances that respondents would find most days stressful than their level of Internet use.

A separate model (not shown) examined the chances that Internet users would report "feeling rushed every day". Similar to the findings above, moderate Internet use was associated with reduced chances of feeling rushed once other social factors commonly related to the chances that an individual would feel rushed were introduced[11]. Again, the relationship between this measure of stress and Internet use was relatively modest when compared with social and demographic factors more closely connected with the stress levels of respondents.

9. Internet use and perceived health and happiness

Closely related to measures of stress of course, are measures of general health. When asked about their perceived health[12], little difference existed among heavy users, moderate users and non-users of the Internet during the diary day. The only difference of any significance was that moderate Internet users were less likely to report fair or poor health (10.7% of moderate users) compared with non-Internet users (14.5%). Of course, measures of health can be heavily influenced by other factors such as the age of respondents and a logistic regression was used to investigate this further. While identifying many factors associated with one's chances of perceiving their health to be fair or poor, no significant relationship between health and level of Internet use could be observed while controlling for these other variables[13].

The *GSS Time Use* survey also addressed respondents' self-perceptions of happiness[14]. More moderate Internet users (42.3%) and non-users (43.7%) described themselves as being "very" happy compared to heavy users (35.9%), but if these figures were totalled to include those respondents who described themselves as either "very" or "somewhat" happy, there was little difference between the groups. Only 4.6% of non-users, 5.2% of moderate Internet users and 5.4% of heavy Internet users portrayed themselves as "somewhat" or "very" unhappy, making it difficult to discern differences among the groups.

A multivariate analysis confirmed that once other factors[15] related to unhappiness were considered (including perceived health, which was found to be most influential in relation to unhappiness), there was not sufficient evidence to support a relationship between level of Internet use and unhappiness.

11. Relative to non-users, moderate users were less likely to report feeling rushed (reflected in the odds ratio .85*), while controlling for other factors in the model. The ratio for heavy Internet users (.83) was also lower than non-users but fell short of being statistically significant (the odds ratio for heavy users could only be described as significantly different from non-users with a 94% level of confidence (p=.06).

12. Respondents were asked, *"In general, would you say your health is: Excellent? Very good? Good? Fair? or Poor?"*

13. In the model, level of Internet use, sex, and presence of children in the household were not associated with any change in the likelihood that respondents would describe their health as "fair" or "poor". Variables associated with increased chances of reporting fair or poor health included: old age, lack of regular participation in sports in the past year, work status (being unemployed or a household worker), and not having a married or common law partner. Likewise, those with moderate or high household incomes were significantly less likely to report their health to be fair or poor compared to those respondents who lived in households with incomes of less than $30,000. Those who had completed post-secondary education were also less likely to report fair or poor health compared with those whose highest level of education was a high school diploma, while controlling for other factors in the model.

14. Respondents were asked, *"Presently, would you describe yourself as: Very happy? Somewhat happy? Somewhat unhappy? or Very Unhappy?"*

15. Factors that increased the odds of being unhappy included fair or poor perceived health, being middle-aged, unemployed, lacking a married or common-law partner and low-income. Internet use, sex, educational attainment, presence of children in the household and time of year of interview were also included in the model but were not significantly associated with the odds of being unhappy, while controlling for other variables.

Thus, when considering these findings and those of the previous section, the various models seem to suggest that moderate Internet users were slightly less likely to feel stressed or rushed than non-users, after controlling for other factors related to stress. No significant difference in the chances of reporting fair or poor health existed among Internet users and non-users when controlling for other variables closely related to individual health.

10. How do Canadians view their use of time?

When given the choice about how they would spend more time if opportunity allowed, Internet users differed in some ways from non-users (Table 10)[16]. Moderate and heavy Internet users were less likely than non-users to say they wanted to spend more time outdoors, but were more likely to want to spend time on their crafts and hobbies. One feature of the Internet is that it enables users to search and retrieve information on specific hobbies, crafts, or other activities that might not be easily accessed elsewhere in their community. It is also sometimes possible to communicate with people with similar interests online, meaning that the Internet may, in some cases, nurture the existence of diverse "communities of interest" that are not defined by physical location (Sciadas 2006 (forthcoming)). Heavy users were also more likely than non-users to want to spend more time on their studies, but this was linked to the fact that a greater proportion of these users were students.

Although Internet users, particularly the heavy users, spent a substantial amount of time alone during the diary day, they did not differ significantly from non-users in their desire to spend more time with family and friends. In fact, this was the most popular choice for all three groups, as over one-quarter of individuals in each group singled out more time with family and friends as their number one priority.

Similarly, even though heavy users spent less time participating in sports than non-users, they were no more likely to want to spend more time on this activity, if they were given the choice, compared with non-users. Although slightly more heavy users appeared interested in spending more time reading and writing (a finding which would be consistent with results from the media section), the difference compared with non-users was not statistically significant. In short, aside from the few differences mentioned above, Internet users and non-users tended to share similar views about how they would like to spend additional time should they be given the choice.

Respondents to the survey were also asked to identify which activity they found most enjoyable during the diary day (if any). Not surprisingly, heavy Internet users stood out from both the non-users and moderate users for their preference for surfing the Web, using email and online chat groups. Web browsing was in fact the activity mentioned most often by heavy users (9.2%). Heavy users were also less likely than non-users to say that they found working, relaxing and sleeping to be the most enjoyable activities of the day. The only difference between moderate Internet users and non-users was that the moderate users were less likely to say that watching television was their most enjoyable activity (7.6%). Nonetheless, watching television remained the activity most often mentioned by moderate users. Interestingly, the proportions of non-users and heavy users who most enjoyed television were similar. Overall then, aside from their Internet use, and lack of enjoyment of working, relaxing and sleeping, Internet users did not differ substantially from non-users in terms of the activities they most enjoyed.

One distinguishing characteristic of heavy users however was the fact that they were more likely to have performed their most enjoyable activity alone. Nearly half (42.2%) of these heavy users did their most enjoyable activity in solitude while this was the case for fewer moderate users (33.2%) and non-users (30.2%) Clearly, the fact that activities undertaken by heavy users included Internet use accounted in large part for this difference, as spending time on the computer is almost always a solitary activity. It must be stressed however that while some individuals spending time on the Internet are alone in a physical sense, they may be interacting with other individuals online in various ways. Email was the most popular activity among Internet users in the survey, and online discussion groups, instant messaging and webcams, for example, offer other means of interaction. Certain behaviours might emphasize that it is important not to generalize internet use as necessarily 'anti-social' behaviour but rather *differently* social behaviour (Sciadas 2006 (forthcoming)).

16. Respondents were asked, *"On which main activity would you choose to spend more time if you could?"*

Aside from the activity they most enjoyed, respondents were also asked to rate a number of other daily activities and chores, ranging from whether they liked the activity a great deal to whether they disliked the activity a great deal[17]. Differences that emerged after adjustment for social and demographic factors included the fact that both moderate and heavy users found cleaning, doing repairs and maintenance, and having supper at home less enjoyable than non-Internet users. Heavy users also expressed less enjoyment for cooking. The one activity that they were likely to rank as more enjoyable than non-users was participating in clubs or social organizations, perhaps partly a reflection of their elevated interest in hobbies. Moderate Internet users also tended to enjoy attending movies, plays, sports and social events more than non-users, but expressed greater dislike for watching t.v., working, commuting, and driving children to various activities.

It is perhaps revealing that while both types of Internet users spent less time socializing or in contact with others, they expressed a greater level of enjoyment for these activities than non-users. Such a finding cautions against the interpretation that Internet users during the diary day were inherently anti-social in nature. It also raises the point that sometimes people particularly enjoy things that they don't normally spend much time doing.

Table 10
Main activity respondent would like to spend more time doing

	Non-users	Moderate users	Heavy users
Choices reported by a significantly different proportion of Internet users compared with non-users		*% of respondents*	
Crafts or hobbies	10.8	13.4 *	14.0 *
Outdoor activities	10.4	7.7 **	6.9 **
Studies	1.8	2.9 E	4.6 E,**
Choices where difference between Internet users and non-users was not statistically significant		*% of respondents*	
Time with family and friends	28.0	25.2	26.5
Practising sports	15.0	14.3	13.7
Relaxation or personal time	14.5	15.2	13.9
Reading/writing	6.8	7.8	8.3
Travel	2.9	4.0	3.1 E
Household work	2.5	2.3 E	1.6 E
Work	2.0	2.6 E	3.2 E

** Difference from non-users is statistically significant at the 99% confidence level ($p < .01$).
* Difference from non-users is statistically significant at the 95% confidence level ($p < .05$).
E Lower reliability estimate due to sample size.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

17. Respondents were asked to respond using a 5-point scale, with '1' meaning that they "dislike the activity a great deal" and '5' meaning that they "enjoy the activity a great deal". Respondents were not asked to rate activities which did not apply to them.

11. Summary of findings

Some of the findings in this study reveal considerable differences in how Internet users and non-users spent and perceived their time during the diary day. Most significantly, heavy Internet users spent substantially less time in social contact with others. This finding stands out due to its potential social impact on users, as well as its magnitude (even after adjustment, heavy Internet users spent nearly two hours more time alone during the diary day than non-users). Further, heavy users spent over one-and-one-half hours more time alone than even moderate users. In this respect, moderate Internet users were more akin to non-users than they were to the Net's heavy users during the diary day. In spite of their reduced contact however, Internet users expressed slightly greater enjoyment for attending social events and participating in clubs or social organizations than non-users.

Not only did Internet users spend less time in face-to-face contact with others, but their lifestyles were also very different. Internet users spent considerably less time on paid work and domestic activities, and also expressed a lower level of enjoyment for domestic work. Once again, the extent of Internet use mattered as even moderate Internet users spent nearly twice as much time working during the diary day as heavy users. Although the moderate/heavy user classification is a simple one, such findings underscore the importance of including time spent on the Internet in studies of time use rather than treating Internet users as a single group (Nie and Hillygus 2002).

Other lifestyle differences included the fact that Internet users devoted less time to sleeping, relaxing, resting and thinking compared with non-users. Given the possible associations between sleep, rest and stress levels, a number of indicators reflecting Internet users' perceptions of their own time management were examined.

Interestingly, a greater proportion of heavy Internet users indicated that they were willing to cut back on sleep when they felt they needed more time, but by and large, it was the moderate users and non-users who in fact tended to have less free time at their disposal. Once controlling for work status and other social and demographic factors, heavy Internet users did not differ significantly from non-users in two indicators of stress used in this study. On the other hand, moderate users were slightly less likely to report that they felt rushed or that they found most days stressful.

A final key finding is that although the Internet potentially displaces time spent on traditional sources of information and entertainment, Internet users were avid consumers of other media. In fact, heavy Internet users spent essentially the same time watching television as non-users and both heavy and moderate use of the Internet were associated with increased time spent reading books. The survey did not assess whether individual users had cut their television viewing over a period of time, but certainly the fact that heavy Internet users were still likely to spend just over two hours during the day watching television questions the extent to which Web surfers might view the Internet as a 'replacement' for television, or rather as simply another source of diversion in the form of information and entertainment in general.

Overall, this study has identified key differences in social contact, time spent on work and domestic activities, and attitudes and perceptions of time and stress among Internet users and non-users. An important next step is to gather detailed information to determine what these differences mean in terms of health, relationships, and quality of life for the user. For example, while the data reveal that some Internet users spent sizeable periods of time on email or chatting with other users, knowledge of the nature and quality of information exchanged, and possible impacts of various types of online interaction on the well-being of the user would be even more revealing. Research elsewhere has made a number of contributions toward understanding social aspects of online interaction and behaviour (see for instance, Boase, Horrigan, Wellman and Rainie 2006, Boase and Wellman 2005, DiMaggio, Hargittai, Neumann and Robinson 2001). In some cases, the Internet may enhance social capital, enabling users to keep in touch with family, friends and other contacts separated by distance, and broaden social networks which are sometimes useful for seeking help, advice, or assisting in important decisions (Boase, Horrigan, Wellman and Rainie 2006). These types of considerations should not be dismissed. Indeed, when examining specific trends it is important to maintain the awareness that Internet use can act as *both* a socially-enhancing and socially-inhibiting activity (Nie and Hillygus 2002). The diverse nature of Internet activity calls for more detail on the impacts of specific types of use, and stresses the need to distinguish users by their online activities rather than treating all users as an aggregated whole (van Zoonen, Walczuch, Aalberts and Fjelsten 2003, Miller and Slater 2000). While findings of this study demonstrate a number of distinct differences in the time allocation of Internet users and non-users, they also caution that relationships between Internet activity, attitudes, and time use should not be oversimplified.

References

Anderson, B. and K. Tracey (2001) "Digital living: The impact (or otherwise) of the Internet on everyday life," *American Behavioral Scientist*. 45(3).

Andrews, Frank M., James N. Morgan, John A. Sonquist and Laura Klem (1973) *Multiple Classification Analysis: A Report on a Computer Program for Multiple Regression Using Categorical Predictors.* 2nd edition. Ann Arbor, Michigan: Institute for Social Research, University of Michigan.

Boase, Jeffrey, John B. Horrigan, Barry Wellman and Lee Rainie (2006) *The Strength of Internet Ties: The Internet and Email Aid Users in Maintaining Their Social Networks and Provide Pathways to Help When People Face Big Decisions,* Pew Internet and American Life Project, Washington D.C., January. **http://www.pewinternet.org/**

Boase, Jeffrey and Barry Wellman (2005) "Personal relationships: On and Off the Internet," in Dan Perlman and Anita L. Vangelisti (eds.) *Handbook of Personal Relations,* Oxford: Blackwell.

Cole, Jeffrey and John P. Robinson. (2002a) "Internet use, mass media and other activity in the UCLA data," *IT and Society.* 1(2).

Cole, Jeffrey and John P. Robinson. (2002b) "internet use and sociability in the UCLA data: A simplified MCA analysis," *IT and Society.* 1(1).

de Haan, J. and F. Huysmans. (2002) "Differences in time use between Internet users and nonusers in the Netherlands," *IT and Society.* 1(2).

DiMaggio, Paul, Eszter Hargittai, W. Russell Neumann and John P. Robinson (2001) "Social implications of the Internet," *Annual Review of Sociology,* 27.

Dryburgh, Heather (2001) *Changing our Ways: Why and how Canadians use the Internet*, Statistics Canada Cat. No. 56F0006XIE, March 26. **http://www.statcan.ca**

Duxbury, Linda and Chris Higgins (2003) *Where to Work in Canada? An Examination of Regional Differences in Work Life Practices,* Report Commissioned by the Work-Life Summit 2003, September.

Flaherty, Lisa M., Kevin J. Pearce and Rebecca B. Rubin (1998) "Internet and face-to-face communication: Not functional alternatives," *Communication Quarterly,* 46(3), Summer.

Franzen, A. (2000) "Does the Internet make us lonely?" *European Sociological Review,* 16(4).

Fu, S., R. Wang and Y. Qiu. (2002) "Daily activity and Internet use in dual-earner families: A weekly time-diary approach," *IT and Society.* 1(2).

Galbi, Douglas A. (2001) *Communications Policy, Media Development, and Convergence,* Competitive Pricing Division, Common Carrier Bureau, Federal Communications Commission, January 18. Version 1.06. **http://www.galbithink.org**

Gershuny, Jonathan (2003) "Web use and net nerds: A neofunctionalist analysis of the impact of information technology in the home," *Social Forces,* 82(1), September.

Harvey, A.S. and P.A. MacNab. (2000) "Who's up? Global interpersonal temporal accessibility," in D.G. Janelle and D.C. Hodge (eds.), *Information, Place and Cyberspace: Issues in Accessibility.* Berlin: Springer-Verlag, pp147-170.

Haythornthwaite, Caroline (2001) "The Internet in everyday life," *American Behavioral Scientist,* 45(3), pp 363-382.

Kestnbaum, M., J.P. Robinson, A. Neustadtl and A.S. Alvarez. (2002) "IT and social time displacement," *IT and Society,* 1(1) pp.21-37.

Kraut, Robert, Sara Kiesler, Bonka Boneva and Irina Shklovski (forthcoming) "Examining the impact of Internet use on TV viewing: Details make a difference," in Robert Kraut et al (eds.) *Domesticating Information Technology,* Oxford University Press.

Kraut, R., V. Lundmark, M. Patterson, S. Kiesler, T. Mukopadhyay and W. Scherlis (1998) "Internet paradox: A social technology that reduces social involvement and psychological well-being?", *American Psychologist*, 53(9).

Kwan, M.P. (2003) *New Information Technologies, Human Behavior in Space-Time and the Urban Economy.* Paper presented at the STELLA conference of Focus Group 2: ICT, Innovation and the Transport System, Washington, DC, January 15-17, 2002.

Kwan, M.P. (2001) "Cyberspatial cognition and individual access to information: The behavioral foundation of cybergeography," *Environment and Planning B*, 28, pp21-37.

Menard, Scott (2001) "Applied logistic regression analysis," 2nd ed. *Quantitative Applications in the Social Sciences Series*, 106, Sage Publications.

Miller, D. and D. Slater (2000) *The Internet: An Ethnographic Approach.* Oxford: Berg.

Minerd, Jeff (1999) "The decline of conversation: With everybody wired, we are starved for face-to-face conversation," *The Futurist,* 33(2), February.

Mokhtarian, P.L. and Meenakshisundaram, R. (1999) "Beyond tele-substitution: disaggregate longitudinal structural equations modeling of communication impacts", *Transportation Research C*, Vol. 7, 33-52.

Neustadtl, Alan and John P. Robinson. (2002) "Media use differences between Internet users and nonusers in the General Social Survey," *IT and Society.* 1(2).

Nie, Norman H. and D. Sunshine Hillygus. (2002) "The impact of Internet use on sociability: Time-diary findings," *IT and Society.* 1(1).

Nie, N. (2001) "Sociability, interpersonal relations, and the Internet: Reconciling conflicting findings," *American Behavioral Scientist,* 45(3).

Nie, N.H. and L. Erbring. (2000) *Internet and Society: A Preliminary Report.* Stanford, CA: Stanford Institute for the Quantitative Study of Society.

Organisation for Economic Cooperation and Development (OECD) (2001) *Understanding the Digital Divide,* Paris.

Pronovost, Gilles (2002) "The Internet and time displacement: A Canadian perspective," *IT and Society,* 1(2).

Robinson, J.P., M. Kestnbaum, A. Neustadtl and A. Alvarez. (2002) "Information technology and functional time displacement," *IT and Society*. 1(2).

Robinson, John P., Meyer Kestnbaum, Alan Neustadtl and Anthony Alvarez. (2000) "Mass media use and social life among Internet users," *Social Science Computer Review*. 18(4).

Sciadas, George (2006 forthcoming) "Our lives in digital times", *Connectedness Series*, Statistics Canada Cat. No. 56F0004MIE, No. 14. **http://www.statcan.ca**

Sciadas, George (ed.) (2003) *Monitoring the Digital Divide... and Beyond,* National Research Council of Canada, Orbicom. **http://www.orbicom.uqam.ca**

Sciadas, George (2002) "Unveiling the digital divide", *Connectedness Series*, Statistics Canada Cat. No. 56F0004MIE, No. 7. **http://www.statcan.ca**

Suler, John (2004) "The final showdown between in-person and cyberspace relationships," (version 2.0) in *The Psychology of Cyberspace,* **http://www.rider.edu~suler/psycyber/psycyber.html** (accessed April 5, 2006).

UCLA (2000) *The UCLA Internet Report: Surveying the Digital Future.* UCLA Center for Communication Policy.

U.S. Department of Commerce (2004) *A Nation Online: Entering the Broadband Age,* September.

van Zoonen, Liesbet, Rita Walczuch, Chris Aalberts and Anne Fjelsten (2003) *Social Effects of the Internet: Participatory Capital and Community Commitment in the Netherlands,* first draft, February.

Williams, Cara (2001) "Connected to the Internet: Still connected to life?" *Canadian Social Trends,* Statistics Canada Cat. No. 11-008, Winter. **http://www.statcan.ca**

Appendix A

Appendix A
Characteristics associated with finding most days "quite a bit" or "extremely" stressful

Respondent characteristic	Adjusted odds ratios
Age	
Age 15 to 24	*1.00*
Age 25 to 34	1.63 **
Age 35 to 44	1.95 **
Age 45 to 54	1.84 **
Age 55 to 64	1.43 **
Age 65 or older	0.86
Sex	
Male	*1.00*
Female	1.38 **
Education	
High school graduate	*1.00*
Some high school (or less)	1.20
Some post-secondary	1.45 **
Post-secondary degree, diploma or certificate	1.35 **
Labour force status	
Working	*1.00*
Work seeker	0.57 **
Student	0.98
Household worker	0.42 **
Retired	0.26 **
Other	0.89
Household income	
Less than $30,000	*1.00*
$30,000 to less than $60,000	0.68 **
$60,000 to less than $100,000	0.62 **
$100,000 or higher	0.87
Marital status	
Married or living common-law	*1.00*
Not married or living common-law	1.01
Presence of children	
No children aged 14 and under living in household	*1.00*
Children aged 14 and under living in household	1.27 **
Internet use	
Internet non-user	*1.00*
Moderate Internet user	0.84 *
Heavy Internet user	0.88

** Difference from reference group is statistically significant at the 99% confidence level ($p < .01$).
* Difference from reference group is statistically significant at the 95% confidence level ($p < .05$).

Notes: Reference groups are in *italics.* Odds ratios greater than 1.0 represent increased chances of finding most days stressful relative to the reference group; Odds ratios less than 1.0 represent reduced chances relative to the reference group.

Source: Statistics Canada, *General Social Survey, Cycle 19: Time Use,* 2005.

Connectedness Series