ALONE IN A CROWDED ROOM: AN EXPLORATION OF FAMILY TIME EXPENDITURE AND INVESTMENT RELATED TO COMPUTER USE

by

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(Under the direction of David Wright)

ABSTRACT

The present study investigates how patterns of family time change as a function of computer ownership according to Hobfoll's (1988) conservation of resources theory with specific attention to sex differences in the types and nature of displaced family time. Grounded in Kraut and his colleagues' (1998) findings that higher levels of loneliness, depression, and social isolation are linked to higher levels of computer and Internet use, the present study explores how family resource expenditure and investment related to computer use alter the patterns of interactions between persons living in the same household. The present study uses time diary data from the Americans' Use of Time study (AUT; Robinson, 1985), gathered prior to prevalent computer and Internet use, and from the Family Interaction, Social Capital, and Trends in Time Use study (FISCT; Robinson, Bianchi, & Presser, 1998-1999), gathered during the explosion of computer adoption, to compare how American adults spend their time (i.e. energy resources). MANOVAs determine main and interaction effects of the categorical variables (dataset, nature, with whom, sex, and computer ownership) between the AUT and the FISCT samples and between computer owners and non-owners within the FISCT sample on the total number of minutes spent per day in various activities None of the results of the analyses for

the hypothesized relationships were significant. Chapter 5 concludes the present study with a discussion of the results, possible explanations for the discrepancies between hypothesized results and actual results, limitations of the study and directions for future research.

INDEX WORDS: Family time, Computer use, Internet use, Family interaction, Time use, Time diary

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DEDICATION

To Michael, for your patience and faith

And Dan and Diane Jones, for being my greatest teachers.

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TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

The computer and Internet have become an indispensable part of my daily routine. I stay connected to a larger professional community by conducting online searches for literature, collaborating with colleagues, scheduling meetings, and transferring files from home to office. Such information technologies are also useful for my clinical practice because I can access information about particular populations or diagnoses. I use email and the Internet to maintain personal relationships with friends and family, regardless if they are people I interact with daily or distant family members. I frequently use email to schedule lunches with friends and have used audio Internet relay applications to have real time conversations with friends who live several states away.

Despite being a frequent consumer of all things related to information technology, my training and experience as a therapist belie my bias for face-to-face interactions over those mediated by computers and the Internet. The coherence between spoken and unspoken messages that pass between individuals is invaluable in maintaining connection and developing intimacy. Many value and meaning-laden messages are distorted when exchanged via computer, thus the ability to determine trustworthiness, veracity, and intent is often lacking or misunderstood. Therefore, my appreciating the usefulness of technologies is often in conflict with my prejudice toward in-person interactions.

Take a moment to think over the technologies you used today and the many forms and functions each of these digital assistants performs. As you imagine these items, pay particular attention to ways you used information technologies in your home. Did you check your email

before leaving the house? Did you download your schedule from personal data assistant (PDA) to laptop? In much the same way, families have wholeheartedly adopted the home computer and Internet into their lives. Family patterns of technology use have become so integral to the family's daily schedule that they are nearly invisible.

The 'invisibility' of computers in our everyday lives can be better understood by examining the route through which they came to the family. The computer and the Internet were initially intended to make business more efficient, but when computer interfaces became user-friendly, software companies were quick to develop educational software. The educational software was marketed to parents by appealing to the culture of enrichment in the United States (Schneider & Schneider, 1984). Parents' interest was ensured and the number of families who own home computers grew significantly in the late 1990's, rising from 16% in 1997 to 63% in 2001 ("Who's in Line to Log on," 1997; Yin, 2001). Since then, white middle-class families have adapted the computer to their own needs and primarily use the computer for communication via the Internet; writing and sending e-mail and surfing the Web for information account for 50% of the time spent using the computer ("PC Makers: Please read this story," 1999).

Unfortunately there are a number of problems associated with the presence of the computer in the family space. These problems can be grouped in two distinct areas: (a) individual outcomes related to computer use and (b) family outcomes related to computer use. First, the high levels of Internet use are associated with negative outcomes for individuals. Despite using the computer and Internet primarily for communication, individuals with high levels of computer and Internet use display increased levels of depression, social isolation, and loneliness (Kraut, et al., 1998). Second, couples and families have demonstrated a shift in focus from face-to-face relationships at home to interests pursued online (Kraut et al., 1996, Sleek,

1998; Stoll, 1995; Turkle, 1996). In part, this shift may occur because time spent interacting with others online or using the computer displaces time spent interacting with those living in the same household.

In an effort to combat this second problem, negative outcomes for couples and families, some parents have attempted to create more time for family members through teleworking or using information technologies to maintain a home office. Ironically in their efforts to have greater flexibility to maintain family relationships, telecommuters report weak or lacking boundaries between professional and family lives (English-Lueck, 1998), therefore generating greater role strain (Gore, Leuwerke, & Krumboltz, 2002; Hill & Hawkins, 1996; Oravec, 2000). The result is that even more family time is displaced by work demands that occur in the home space as a growing number of parents attempt to navigate complex career and family demands.

Technologies in the home have made communication with others faster, more efficient, and more easily accessible. However, possible ramifications for individuals' well-being, displaced time, and weak or non-existent boundaries between home and work potentially combine to weaken the connections between family members. The exponential growth of access to the Internet through computers in the home gives rise to questions regarding how their presence influences family time use.

This study uses Hobfoll's (1988) conservation of resources model to frame family time as an energy resource to be invested in various types of activities and with different configurations of participants. Energy resources are one of four classes of resources postulated by COR model and are valued because of their ability to aid in obtaining other valuable resources, such as love, money, or status. Humans use their interactions with one another as a means of gathering and conserving resources. Conservation of resources model posits that humans are more likely to

invest their resources in activities or endeavors that will be advantageous in gaining other valuable resources. Likewise, humans will conserve the resources that are intrinsically valuable. The purpose of the present study is to explore how the energy resource expenditure patterns of family shared time change as a function of computer ownership and to explore possible sex differences in the types and nature of displaced activities. In particular, the present study aims to answer the question, does the energy resource (i.e. time) expenditure of family members change after the addition of a home computer? And if so, do men and women's patterns of conservation of resources differ?

The following four chapters comprise the literature review, methodology, results and discussion of the study and illustrate how the present study endeavors to answer the above questions. The second chapter reviews the relevant literature about who uses computers, how they are used by families, including their communication uses, the computer's influence on individual variables that affect family relationships, and the activities displaced by computer use. Also included in chapter two is a critique of the challenges to research in this field and an integration of these disparate bodies of literature. Also, in chapter two, I review how conservation of resources model is established under the umbrella of resource theory, a social exchange perspective, and illustrate how its assumptions and concepts are important to the present study. This chapter concludes by presenting the research questions used to organize the present study.

The third chapter describes the methodology section for the study. This section includes a description of the data used for the study and an overview of the participants. Also discussed in chapter three are the data collection methods for the Americans' Use of Time and Family Interaction, Social Capital, and Trends in Time Use studies and the reliability and validity of the

data. The chapter concludes with an explanation of the analyses used to answer the research questions and the hypothesized results.

Chapter 4 contains a detailed report of the participants according to the groups of interest, AUT participants, FISCT participants, and FISCT computer owners and non-owners. Next the results of the analyses are presented according to the hypothesized results in Chapter 3. The fifth and final chapter includes a discussion of the results and explanations of the unexpected results consistent with conservation of resources model. This chapter also includes a brief overview of other factors that were not included in the original hypotheses, but which were relevant areas of significant difference. The limitations of the study and directions for future research conclude chapter 5.

CHAPTER 2

LITERATURE REVIEW

Who uses computers?

Families have experienced a myriad of technological advancements in the past one hundred years. American children grow up in households where three TV's, three radios, two VCR's, two CD players, one video game player and one computer are commonplace ("E-wire: U.S Kids are Media Junkies," 2000). Technology is pervasive and spread throughout the household; (a) 67% of American children have a television in their room and (b) 58% of families have the television on during mealtimes ("E-wire: U.S Kids are media Junkies," 2000). Families are inundated with technology in their homes.

The number of white, middle class families who own home computers has grown significantly in the last few years, rising from 16% in 1997 to 63% in 2001 ("Who's in Line to Log on," 1997; Yin, 2001). Now distant family members have a more affordable, accessible and timely means of interacting through the use of Internet services, such as e-mail and Instant Messaging.

Computers clearly have become a part of family life for many families. Even families who do not comprise the bulk of computer consumers are adopting the technology. Thirty-seven percent of lower income families and 18% of Americans over 50 planned to begin using the Internet in 1997 (“Who’s in line to log on,” 1997). The presence of young children in the home is the strongest predictor that a household will be interested in going online (“Who’s in line to log on,” 1997). Kraut and his associates (1996) found that the child who used the Internet most frequently predicted sibling and parent use of the computer. They postulated that the

enthusiasm of the child who used the Internet very frequently encouraged other family members to get involved in computer use. This information points to the overwhelming popularity of information technologies and demonstrates the importance of investigating family interactions with respect to computer use.

The percentages cited above represent national averages and are primarily based on data gathered from white, upper-middle class men (Kraut et al., 1996; Venkatesh & Vitalari, 1992), the original target audience for the home computer. Recent literature investigating women and the computer/Internet are discussed in a later section. The numbers for African American and Latino households present a different picture; approximately 23% of African Americans and Latin American households had Internet access in 2000 (Cattagni & Farris, 2000) and 22% of households with incomes less than $15,000 annually owned home computers as compared to over 80% households with incomes greater than $75,000 (Cattagni & Farris, 2000). These figures provide some evidence that information technologies are not universally available to all groups. Some Americans have made a conscious choice not to adopt the home computer. Middle and higher income Americans over 55 comprise only 5% of Internet users, which provides evidence for the distinct categories of have-nots and want-nots (Russell, 1998).

Individual differences that predict use

In a longitudinal study of family computer use, researchers provided the equipment and the online account thereby removing financial barriers to home computers and the Internet and found that when the limitations that might prevent access to information technologies are reduced, lower income and less educated people are more likely to become involved (Kraut et al., 1996). Their results indicated that race and gender are strong predictors of Internet use; white males and teens were more likely to use the Internet more than minorities, female, and

adults. But generation was found to be the strongest predictor, with teen males using the Internet most often, followed closely by teen females. These results suggest strong cultural and social forces influence the degree to which different types of families and different individuals within the family embrace computing at home.

Another individual difference that predicts computer use is that historically men and women have had differential access to computers. At 48%, the overall percentages of women who use the Internet are almost equal to that of male consumers (Russell, 1998), however males have traditionally experienced a greater sense of efficacy in: (a) computer use in general; (b) searching the Internet; and (c) using the Internet for more functions (GVU; Graphics, Visualization, and Usability Center, 1999; Jackson et al., 2001; Weiser, 2000). As previously noted, the computer and Internet were originally designed for business applications, yet these original machines looked very different from the computers now sitting in home offices. The predecessors of the PC were large and required some degree of programming knowledge to operate, therefore they were used by a smaller group of individuals in the business world. At that time, women had yet to be included in these elite groups (Burke, 2001).

When computers started moving into the home, women weren't interested because they weren't familiar with the technology, didn't have time to learn the complex programming, and the applications available at that time weren't relevant to many home tasks (Cassidy, 2001). In response, advertisers used women's close connection with family life to draw them into the world of the computer and Internet and to boost lagging sales. The adult, male demographic had become saturated and computer advertising was targeted to women to generate another target demographic (Cassidy, 2001). This advertising campaign was successful since evidence suggests that the initial gender difference that traditionally dominated the computer field is

declining (GVU, 1999; Martinez, 1998; Weiser, 2000); a recent report by NetSmart America (1999) stated that 58% of *new* Internet users are women, displaying a marked increase from 44% the previous year.

The gender differences may be narrowing, yet men and women are drawn to use the Internet in distinctly different ways. Disparate tasks lead to potential differences in the ways male and female Internet use might affect family interactions. Men use the Internet for a much longer list of tasks than do women although women tend to be more task oriented (Jackson, Ervin, Gardner, & Schmitt, 2001; Weiser, 2000), using the Internet to send an email, make travel arrangements, or send an online greeting card. Men primarily use the Internet for entertainment and leisure, spending more time browsing to see what might be interesting without a specific goal or task in mind. They use the Internet to search for hard to find items and products, pursue sexual relationships, view pornography, and search for romance (Weiser, 2000). On the other hand, women tend to use their computers primarily for communication tasks. Women primarily use the Internet for interpersonal communication such as email and chatting online (Weiser, 2000).

These differences are not merely about gender. Jackson and his colleagues (2001) hypothesized that when cognitive and affective differences in men and women are controlled, gender differences in computer and Internet use disappear. The results of their research suggest that gender differences in Internet use are mediated by differences in computer self-efficacy, loneliness, and depression. For example, men tend to report more loneliness (Jackson, et al, 2001). Therefore it would follow that men would use the Internet to pursue romantic relationships and sexual partners (Weiser, 2000) more so than women who experience lower levels of loneliness. These results may provide a different understanding of gender differences

in use; men and women use the Internet to accomplish the same end, albeit through different means. In other words, men and women use the Internet in an attempt to connect with others but do so in a way that reflects the different challenges each sex faces.

The potential for the Internet to produce connections with others appears to have been a theme in the literature for some time. Prior to the widespread adoption of the Internet, Schneider and Schneider (1984) hypothesized that persons who are low on extraversion use the Internet as a practicing ground in order to build social skills that can then be generalized to a face-to-face situation. This early research asserts that individuals who are socially inhibited and unskilled seek out entertainment on the Internet as a means of communicating with others in a secure environment without social pressures (Schneider & Schneider, 1984). However, Hamburger and Ben-Artzi (2000) counter these early assumptions with their findings that, in men, high extraversion scores are positively related to leisure services to include the use of sex entertainment on the Internet, and no relationship exists between extraversion scores and the use of leisure services on the Internet for women. So perhaps, an interaction effect between gender and personality exists that has yet to be explored.

It is clear that some families have wholeheartedly adopted the computer and Internet access into their homes and lives in the last few years. However, much of the research conducted to date has focused on individual variables, such as depression and scholastic achievement, rather than family variables to include the amount and quality of time spent in face-to-face interactions with family members (Bonamy, Charlier, Saunders, 2001; Boyle, 2001; Kraut et al., 1999; Williams, 2001). Further, the positive and negative effects of the use of information technology within the home have remained largely unexplored. Family interaction

is becoming more of a focus as family scientists realize the impact of home computers and the Internet in the home.

Intended vs. actual uses

Many parents initially purchase a home computer and Internet access to provide their children with the information necessary to do well in school. A number of studies have found that families believe the home computer is useful for schoolwork, supporting employment, and performing household chores (Kraut et al., 1996; Venkatesh & Vitalari, 1987). Indeed, the strongest predictor of a family purchasing a computer is the presence of children in the home ("Who's in line to log on," 1997) supporting the idea that computers are intended to help children meet scholastic goals as well as to socialize them in our information-dependent world. The idea that children will play educational games to strengthen basic skills being learned in the classroom and both children and adults will have access to infinite amount of continuously updated information provides a strong motivator for computer adoption in our achievement-oriented culture.

Despite the compelling evidence that the home computer and Internet are useful, if not essential, for both academic and employment pursuits, family's *actual* uses of the computer do not match their *intended* uses. Venkatesh and Vitalari (1987) found that families state educational and business uses as their reasons for purchasing home computers although their actual uses differ. In order of frequency, families with children used their computers for entertainment, games and word processing applications and couples without children used their computers primarily for word processing, business, education and entertainment/games. More recent studies, after the advent of Internet applications and user-friendly interfaces, support the notion that intended uses and actual uses do not always match. Fifty percent of the time spent

using the computer is spent writing and sending e-mail and surfing the Web for leisure related information ("PC Makers: Please read this story," 1999).

Communication uses of the Internet

Computer-mediated communication via email, Instant Messages, or real-time audio relay is one of the most common uses of Internet applications. People modified a business tool in order to maintain already existing relationships or establish new ones, providing evidence that humans value connection with one another. Kraut (1996) summarizes the importance of connection and the role of communication in the proliferation of the computer and Internet in their seminal research on the relationship between social interaction and Internet use:

> "It is not surprising that when the phone companies of the day tried to market the telephone to the home, they pushed a theme of household efficiency, in communication between a working husband and an at-home wife, between the household and the grocery store for home shopping, or between members of a household and their friends for scheduling social visits. They did not foresee that teenagers, farm wives, the disabled, people out of the work force, and millions of others would talk on the phone for its own sake, not to accomplish any specific task, but because talking to other people is fun" (Kraut, 1996, p. 2).

Much like the originators of the telephone, consumers were initially interested in the computer and Internet for commercial purposes. Kraut and his colleagues (1996) concluded that computer proliferation was consistent with previous technological advancements that had been embraced by the family home. Participants did not think the Internet would be useful, yet chatting online and emailing quickly became the dominant use of the Internet and proficiency in these applications determined participants' confidence in attempting to use other services online (Kraut et al., 1996).

Humans have clearly adapted what was intended as a data processing machine into a way to connect with one another. Kraut and his colleagues (1996) have argued that this connection with others is what keeps people returning to the Internet. The authors note that email is self-

reinforcing because checking email is resistant to extinction (Kraut et al, 1996). We don't always have an email waiting when we log on to check our messages, therefore intermittent reinforcements increase the likelihood of logging on to check email again. Getting email is rewarding (i.e. I am loved, important, etc.) so email brings people back to the Internet more consistently due to the illusion of connection with others. Emails are ongoing dialogs, integral to social relationships therefore more stable than school or work tasks, games, or curiosity about information. "Since people usually wish to sustain relationships, they usually want to continue dialogs" (Kraut et al., 1996, p. 8). Browsing the web, a solitary activity that does not hold the possibility for connection with others, and email use are not necessarily predictive of each other (Kraut et al., 1996) reinforcing the idea that the possibility for communication is a strong motivator for individuals to use Internet applications.

Links to loneliness, depression, stress, and social isolation

Even though they are mainly used for communication, the computer and Internet have been linked to loneliness, depression, and stress as well as shrinking social support and lower levels of happiness for individuals (Kraut et al., 1996, Sleek, 1998; Stoll, 1995; Turkle, 1996). Some authors argue that the Internet causes social isolation and distance from authentic interpersonal relationships (Stoll, 1995; Turkle, 1996), whereas others present an opposing view that the Internet frees people from time, geography, and other barriers to establishing connections with others (Gore, Leuwerke, & Krumboltz, 2002; Katz & Aspden, 1997; Rheingold, 1993).

Despite the theories that Internet connection frees individuals from barriers of time and geography, empirical evidence suggests that Internet use may create disconnections between individuals. Specifically, people who use the Internet more frequently reported larger increases

in loneliness over a one to two year period (Kraut et al, 1998). Initial loneliness did not predict frequency of Internet use, however gender, socioeconomic status, and ethnicity predict the amount of increase in loneliness. Men reported more increased loneliness than women, more affluent households reported more increased loneliness than less affluent households and minority households reported more increased loneliness than Caucasian households. The results suggest that frequent Internet use is closely associated with rising levels of loneliness when demographic differences are controlled (Kraut et al., 1998).

Examining the link between depression and Internet use reveals similar findings. Since initial levels of participant depression did not predict subsequent Internet use, participants who logged on more frequently were not more likely to be depressed. Again, demographic variables influenced the degree of increased depression. Minority households reported more increases in depression than Caucasian households and individuals with higher initial stress levels reported more increases in depression. However, even when these variables were controlled, greater use of the Internet was associated with increased depression (Kraut et al., 1998). Kraut and his colleagues (1998) did not report the range of Internet use, however the reported average number of hours per week were 2.43 with a standard deviation of 4.94. In addition, they did not report a cutoff at which point participants experienced more depression or loneliness.

Defined as daily "hassles" (p. 1027), stress was the last psychological well-being variable investigated by Kraut and his colleagues (1998). The participant families with greater Internet use reported a marginal increase in cumulative stress during the course of the study. In an attempt to investigate which aspects of Internet use influenced the experience of stress, the authors analyzed the individual stressors (hassles) used to comprise the aggregate scores.

According to their analyses, no single stressor increased from its baseline, therefore suggesting the rise in overall stress did not occur through a common route (Kraut et al., 1998).

Kraut and his colleagues' (1996) longitudinal research on Internet use was the first to examine individual psychological outcomes related to web use at home. Their findings were used to generate theories as to why individual psychological well-being decreases with Internet use, both of which are discussed in detail in later sections. The first model suggests that family time, where positive family interactions usually occur, is displaced by Internet use. The displacement of family time results in increases in loneliness, depression, and stress (Subrahmanyam, Greenfield, Kraut, & Gross, 2001). Their second model states that people are substituting poorer quality online relationships for higher quality real life relationships (Subrahmanyam, Greenfield, Kraut, & Gross, 2001). The weak bonds that comprise virtual relationships do not buffer against daily hassles and result in increased loneliness, depression, and stress.

Critiques of Kraut's findings.

Kraut and his associates have received some criticism of their investigation of the links between Internet use and psychological well-being. One critique of their methodology notes the possibility that participant selection contributed to their results (Shapiro, 1999). Participant selection in Kraut and his associates' (1998) study may have resulted in a sample of people likely to reduce their social contacts (Shapiro, 1999). One of Kraut's groups consisted of families with high school students. In their results, Kraut and his colleagues note that during their two year study some students graduated and moved to college. The parents were likely to reduce social contacts with their children at college and decrease social contacts with others outside the family as well. The teens themselves are likely to experience some sort of depression or homesickness in their transition to college life therefore reducing social contacts with friends and family from

home while using the Internet more often to email them. Thus, Kraut and his associates' (1996) findings that older teens are more likely to use the Internet more often and have higher levels of depression and loneliness would be expected given the sampling (Shapiro, 1999).

Kraut and his associates' second group demonstrate the research artifact called regression towards the mean. The basis for the selection of the participants in the second group was the membership of an adult family member on the Board of Directors of local community organizations. These participants possessed a high degree of social involvement as evidenced by their level of participation in civic organizations. Whenever participants are selected based on an extreme level of a variable, the variable is likely to move toward more average values over time (Hillard, 2003). According to Shapiro (1999), Kraut's recruiting methods may have contributed to his results because he selected participants who exhibited extreme levels of social involvement and therefore the data were susceptible to the statistical phenomena, regression to the mean.

Rierdan (1999) critiqued Kraut and his colleagues' (1996) selection of an instrument used to measure depression, the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is highly correlated with anxiety and demoralization; therefore it is an indication of distress rather than depression (Rierdan, 1999). This criticism seems unfounded, however because the statement that frequent users of the Internet are more distressed also indicates decreased psychological well-being.

Kraut and his colleagues (1998) have also been accused of neglecting the fact that individuals intend to be relational online and that they feel more free to express themselves without censure online (Silverman, 1999). Again, this criticism appears to fall short of the mark in light of the evidence that online relationships are composed of weaker bonds than face-to-face

relationships (Gore, Leuwerke, & Krumboltz, 2002; Keisler & Kraut, 1999; Silverman, 1999; Sleek, 1998).

Possible explanations for the links between computer use and depression.

In light of the original work by Kraut and his colleagues (1998), researchers began examining possible reasons some individuals use the Internet more frequently (Shapira et al., 2000) and whether personality variables are associated with Internet use (Hamburger-Artzi, 2000). Shapira and his associates (2000) recruited twenty participants via newspaper advertisements for individuals who felt they met the criteria for problematic Internet use or clinical referrals for this complaint. In their study of problematic Internet use, 100% of subjects met Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria for Impulse Control Disorder Not Otherwise Specified (ICD NOS) indicating that Internet use is more impulsive than compulsive (Shapira et al., 2000). Furthermore, 100% of subjects had a lifetime history of a clinical disorder diagnosis and 70% had a lifetime diagnosis of bipolar disorder (Shapira et al., 2000) indicating the association between a history of psychiatric diagnoses and problematic Internet use. Symptoms associated with problematic Internet use include significant social impairment, marked personal distress over behaviors, vocational impairment, financial problems, and legal issues (Shapira et al., 2000). These findings are consistent with the research of Kraut and his associates (1998) discussed previously, despite the fact that Kraut's participants, who were frequent Internet users, did not meet the criteria for problematic Internet use.

The personalities of individuals who use the Internet in a more moderate manner predict different patterns of use depending on the sex of the respondent. A more recent study found that extraverted men use online leisure services more often and neurotic men use online information

services less often (Hamburger & Ben-Artzi, 2000). Earlier studies demonstrated the positive relationship between extraversion and sexual sensation seeking (Rosenthal, Muram, Tolley, & Peeler, 1992) and improved memory for sexual content (Ball & Zukerman, 1992). Hamburger and Ben-Artzi's (2000) study included random surfing and sex sites in the leisure factor. Because sex sites are usually aimed at men, in their study extraversion and online leisure services are related.

For women, extraversion is negatively related and neuroticism is positively related to online social services (Hamburger & Ben-Artzi, 2000). Introverted women use the Internet to search for phone numbers and addresses to reduce social loneliness and both introverted and neurotic women access the abundantly available Internet chat rooms where they feel secure enough to chat with others in the effort of reducing emotional loneliness (Hamburger & Ben-Artzi, 2000). Women's higher self-consciousness enables them to recognize their need for help more readily than men leading them to seek social support more frequently (Leana, 1991; Ptacek, Smith, & Dodge, 1994).

Hamburger and Ben-Artzi's (2000) findings about gender and personality differences in the use of Internet services support Kraut and his associates' (1998) results that men experience more loneliness with increased Internet use. The evidence suggests that men and women use the Internet differently, but with the same goal. Both genders apply Internet technologies to decrease loneliness and facilitate connection with others. Previously discussed gender differences in Internet use demonstrate that men tend to report more loneliness (Jackson, et al, 2001), men use the Internet to pursue romantic relationships and sexual partners (Weiser, 2000), and women use the Internet for communication via email. These findings are consistent with Hamburger and

Ben-Artzi's (2000) and Kraut and his associates' (1996) research linking personality variables, psychological well-being variables, Internet use, and the need to connect with others.

Family time use

Any new technological advancement requires a period of adjustment, time to learn the new technology, and time to incorporate that technology into everyday life. Yet, time is considered a limited commodity because it exists in a finite quantity. Each person has 24 hours per day and makes decisions about how to apportion the time allotted them. Even though each person is given the same quantity of time, the freedom to choose the activities that comprise each day varies according to several factors, including parental status, employment, age, socioeconomic status, marital status, and personality preferences. The time displacement model suggests that when a new activity is added to the day or week, time is allocated differently among current activities, or one or more activities are replaced altogether.

Neuman (1991) argued that the displacement or default models were too simple because they didn't account for multitasking, performing more than one activity at a time, or relationships among multiple variables. The current 'time bind' or cultural speed up (Hochschild, 1996; Hochschild & Machung, 1989) has many Americans multitasking, in order to maximize the time available. Multitasking is fairly common in both work and home settings and often combines a passive and an active activity. For example, watching TV and playing a game, talking on the telephone and doing the dishes, listening to music and studying, or signing paperwork while listening to voicemail messages. Print, television, computers, videogames, and other media can be and often are used in conjunction with one another; therefore one form of media might stimulate interest in other activities. Yet, despite the common occurrence of multitasking, self-report data used to provide estimates of the amount of time spent in various activities often does

not account for contemporaneous activities and gives truncated estimates of time expenditures per day.

Even if we consider multitasking, the time needed to become familiar with a new technology or to keep up with its rapid development necessitates reallocating time such that the new activity can be added. In these ways the Internet interferes with family life, taking up time that is otherwise used for other activities (Christopher, Fabes, & Wilson, 1989; Venkatesh & Vitalari, 1987). It is somewhat surprising that few studies have been conducted on which activities are displaced by the addition of computer use. The following review of the literature on the definitions of family time, American's time use specific to television viewing, the relationship between the amount of time children spend in various activities and their well-being, academic achievement, and problem solving, and gender differences in quantity and quality of time sets the stage for investigating how time use by American families changes with the addition of a home computer.

Family time defined.

Of interest in this study are the potential changes in family time that may occur when a home computer enters the family system. However, a consistent, objective definition of family time does not exist. Some researchers have operationalized family time as any activity in which a child spends time with his/her parent or sibling (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996). Other definitions emphasize proximity or the simultaneous nature of activities when operationalizing family time. A proximity or simultaneity definition doesn't even require that family members be awake during family time as Hofferth & Sandberg (2001) and Sullivan (1996) consider sleeping to be family time. It is true that family members are in close proximity to each other and usually sleeping at the same time, however interactions between members are

absent, unlike during household conversations, mealtimes, and even household chores, which are also considered family time by these authors.

An examination of how families themselves define family time found that participant's definitions differed from researchers attempts to operationalize. The parents in Daly's (2001) study noted three properties of family time; it is (a) created as a source of memories; (b) positive and involves togetherness; and (c) highly valued when spontaneous. Empirical support for Daly's (2001) three properties of family time is found in an earlier exploration of shared time in two-parent, two-child families where parents behave as though there is something inherently different about shared activity vs. solitary activity (Bryant & Zick, 1996a).

Television viewing.

Parents and educators expressed fears about children's well-being and development when the television was incorporated into American homes (Borzekowski & Robinson, 1999; Buerkel-Rothfuss, Greenberg & Neuendorf, 1978; Butsch & Glennon, 1980; Hopkins & Mullis, 1985). Due to similar concerns when the computer began its integration into American homes, much of the initial computer adoption literature draws from earlier television studies. Both television viewing and computer use contribute to American's total 'screen time' (Subrahmanyam et al., 2000), therefore the amount of time spent and the activities displaced by television viewing are relevant to questions about current computer use.

The early research on television watching found that time spent watching television displaces time spent in other more active pursuits (Condry & Keith, 1983) to include outdoor activities and organized sports (Murray & Kippax, 1978; Mutz et al, 1993; Williams & Handford, 1986). These early results appear to be consistent with more recent awareness of the increasing numbers of overweight and obese children resulting from sedentary pastimes. There

is a mounting body of evidence that suggests time spent in front of screens is associated with increased risks of obesity (Bassett & Perl, 2004; Dietz & Gortmaker, 1985; Gortmaker et al, 1996; Vandewater, Shim, Caplovitz, 2004; Van Stavern & Dale, 2004) and problems with the eyes, the back, and wrists (Harris & Straker, 2000; Mendels, 1999; Palmer, 1993). However, it may be that children who watch little television have talent or skill in sports or social activities, have opportunities for playing outside, being with peers, or participating in other similar activities.

In response to parents' early concerns, initial research on television viewing focused on the relationship between television viewing and children's academics. There is some evidence that television viewing displaces educational activities, but it depends on what types of programs the child is watching (Huston et al., 1999). For example, general viewing or entertainment TV has an inverse relationship to educational activities, meaning that time spent watching general or entertainment programming, such as Saturday morning cartoons, is predictive of children spending less time in educational activities like reading or studying (Huston et al., 1999). However, time spent watching informational television does not show a relationship to reading or educational activities. These results have been replicated in longitudinal analyses demonstrating that television viewing can displace reading, but results have been somewhat inconsistent (Koolstra & van der Voort, 1996).

In addition to physical health, academic attainment, and developmental issues, television viewing and total 'screen time' has been shown to affect family interactions. For example, families interact differently and talk less while watching TV and fathers withdraw from family interactions more when watching TV (Brody & Stoneman, 1983; Brody, Stoneman, & Saunders, 1980; Stoneman & Brody, 1983). The total amount of screen time American's engage in has

increased since 1983 with the addition of the home computer. In 1999, children experienced 4.22 hours of 'screen time' per day through the use of television, videogames, and computers (Stanger & Gridina, 1999). Given the proliferation of the Internet, the adoption of computers into homes since 1999, and more affordable video games, it may be that American families currently spend even more time in front of screen than they did five years ago.

Another way that 'screen time' influences family interactions is through socializing in general. Analyses of television viewing report an inverse relationship to socializing with others and video game playing (Huston et al., 1999). Playing video games, hanging out, and socializing with others are activities that occur in family and peer settings. Huston and her associates (1999) findings indicate that the more children watch television, the less time they spend in joint and parallel activities like socializing and playing video games.

Sex differences in time use.

In order to begin the discussion of sex differences in computer and Internet use, the term itself should be clarified. For the purposes of the present study and the discussion of the literature from which the study is based, sex refers to biologically male or female persons. The term sex is often used interchangeably with gender in the family sciences field. However, gender is a social construction based on the set of behaviors or attitudes described as feminine or masculine. Gender exists on a continuum, whereas sex denotes a dichotomous variable, male or female.

The differences in the use of time according to sex begin as early as toddlerhood. Boys and girls tend to spend time in sex-stereotyped activities from the age of two with the differences increasing as the child ages. Girls spend more time in household work, personal care, shopping and errands, and eating whereas boys spend more time in unstructured leisure, active sports, and

outdoor activity (Huston et al., 1999; Mauldin & Meeks, 1990; Timmer, et al., 1985). Girls spend more time on reading, homework, lessons, and 'responsible work' (Bloch, 1989; Huston et al., 1999) and boys spend more time in video games (Huston et al., 1999). Since game playing was one of the top uses of the computer prior to the advent of the Internet, early research noting sex differences in computer use (Ferrari et al., 1985; Mitchell, 1985) may reflect this time use preference.

Childhood sex differences in time use continue into adulthood and shape men and women's patterns of activities. Hochschild's (Hochshild, 1996; Hochschild & Machung, 1989) work on the Second Shift began a discussion of how men and women's contributions at home might differentially limit the time available to them. Consistent with the concept of the Second Shift, men's patterns of time use and activities demonstrate that they have more free time available to them. In a study using the same data set as the present study, Mattingly and Bianchi (2003) found that American men have a half hour more free time per day than women. This equals 164 more hours of free time or more than four weeks vacation time per year. In addition, men experience more pure free time (primary and secondary activities reported are free-time activities) and adult free time (pure free time spent outside the presence of children) than do women (Mattingly & Bianchi, 2003). Since women tend to juggle more tasks at a time (Hessing, 1994) and most time studies do not measure multi-tasking, time studies that take this into consideration may present an even more inequitable distribution of free time.

Creation of family leisure opportunities may contribute to the differences in overall free time between men and women. Organizing leisure opportunities for individual family members or the family as a group may cost organizers some of that time (Deem, 1987; Di Leonardo, 1992; Wimbush & Talbot, 1988). For example, planning vacations, family outings, or parties requires

work on the part of the organizer before, during and after the event, but the goal is leisure time for one or more members of the family. Women tend to be the organizers in the family (Di Leonardo, 1992); therefore they must use free time in order to procure leisure for themselves and their family. As a result, married women have one hour less free time daily than single women.

Another factor that contributes to restrictions in women's access to leisure time is the inequitable distribution of household labor. Household labor as a solitary activity illustrates the significant difference in time use patterns between women and men; women with children spend 4.13 hours and dads spend 1.37 hours per day alone in housework (Mattingly & Bianchi, 2003). Over a one-year span this equals 1007 more hours that women spend in housework. Men experience twenty-five weeks, or over six months vacation per year, worth of free time while women are performing household tasks. Given these results, it is not surprising that women feel more rushed and have shorter, more interrupted bouts of free time than do men (Mattingly & Bianchi, 2003)

Note that the definition of household labor does not include time spent in child care. Again, the patterns of time spent in child care activities contribute to women's having less overall free time. Each child equals a half hour less free time daily for women and mothers spend more free time alone with the children. As a result, women are 50% more likely to share family care time with a younger child and 40% more likely to share family care time with an older child than are fathers (mothers: 1.75 hours younger and 1/5 hours older, fathers: 75 hours if they spend any).

Despite the differences in the amount of free time, household labor, and child care time, women and men spend similar amounts of shared mealtime and leisure time with their children (1 hr 16 minutes). Eighty-five percent of participants in Mattingly & Bianchi's (2003) study

shared time eating with their children with each parent spending about 42 minutes per day in mealtimes with children. The patterns for shared time with children are similar to that of eating, but are of longer duration (74 minutes).

Displaced activities lead to disconnections between family members.

The above demonstrates some of the ways American families spend their time and some of the factors that might explain differential access to discretionary or free time. The literature provides strong evidence for time displacement and a change in family interaction around television viewing. The parallels between television viewing and computer use have led some authors to examine the influence of both on family interaction.

One of the questions evident in the literature is the whether or not computer use has replaced television viewing by adults and children alike. Studies of the activities displaced by computer use show similar findings to that of television viewing, yet research on the amount of time computer and Internet users spend watching television yields mixed results. Some studies have found that computer users watch less television than they did prior to computer adoption (Bird & Goss, 1990; Stanger, 1998; Suzuki, Hashimoto, & Ishil, 1997; Venkatesh & Vitalari, 1987). On the other hand, results of the Neilsen Media Research (1998) indicated that TV watching changed little. It is more likely that many families combine the two activities (Subrahmanyam, Greenfield, Kraut, & Gross, 2001). As recently as 1999, the television still held the most interest for children. They spent more time watching television (2.46 hr/day) than using the computer (.97 hr/day) or playing video games (.65 hr/day; Stanger & Gridina, 1999). One explanation for these mixed results may be that watching television is often a joint or parallel activity where family members either watch together or do activities together with the television in the background. The computer's solitary nature, with one keyboard and one mouse

does not lend itself to joint use, however one family member may be using the computer while other members are in the same room watching television.

Other research indicates that family members tend to participate in fewer shared activities or they trade joint or parallel activities for solitary computer use (Bird & Goss, 1990; Christopher, Fabes, Wilson, 1989; Hill, Hawkins, & Miller, 1996). Time spent alone increases as much as 33% whereas time spent sleeping and in family interactions decrease (Bird & Goss, 1990; Turow, 2001; Turow & Nir, 2000; Watt & White, 1999; Venkatesh & Vitalari, 1987). The fact that 50% of family members agreed with the statement "families who spend a lot of time online talk to each other less than they otherwise would," (Turow & Nir, 2000, p. 12) supports the conclusion that Internet use displaces family time allowing for disconnections between family members.

Sex also plays a part in whether or not the computer displaces family interactions. Fathers tend to decrease the amount of time spent in household chores and decrease the amount of time with their spouses, but increase the amount of time spent with their children, specifically spending more time with their children while using the computer (Bird & Goss, 1990). The perception of this change in time spent with children is either positive or negative depending on one's perspective and which activities computer use displaces. If the time spent with children is in place of activities that do not usually include them, then this will most likely be a positive change in family time use as well as in family interaction. However, if the time spent with children on the computer is in place of playing active games with the children (ex. playing catch, taking a walk), spending time with one's spouse or attending to household responsibilities, this will be perceived as a negative shift in family time use from family members' perspectives as well as from a family scientist perspective.

The empirical evidence strongly supports the supposition that time is borrowed from other activities to allow time to learn computing skills, surf online, and communicate with faceless others. These displaced or replaced activities contain elements of connection and communication with others, either family or community, therefore the Internet displaces vital human interactions. The following reviews the literature about the effects of this time displacement on family relationships.

Families who do things together tend to have positive family outcomes (Hawkes, 1991; Holman & Epperson, 1989; Othner & Mancini, 1991; Zabriskie, 2001) as measured by family satisfaction, interaction, stability, cohesion, and adaptability (Othner & Mancini, 1991; Zabriskie, 2001). If families spend time interacting with one another through shared time, they are more likely to view their family relationships positively, have more stable relationships, and feel like a more cohesive unit. The family leisure research that studies marital relationships found that spouses who spend leisure time together and have joint recreational activities are more satisfied. The question remains, do these couples like their marriage because they spend time together or do they spend time together because they like their marriage?

The influence of computer-mediated connectivity varies depending on the individual or family structure. Some families use technologies to connect with each other, while others are drawn apart through the decrease in time spent together. For example, VCR's, karaoke, and telecommunications pulls already close Vietnamese families together and Hispanic families utilize information technology to encourage interactions between tightly knit families and communities (English-Lueck, 1998). Other types of families are fragmented into smaller interest groups (English-Lueck, 1998) who spend less time together, therefore decreasing their

perceptions of satisfaction and cohesion (Hawkes, 1991; Holman & Epperson, 1989; Othner & Mancini, 1991; Zabriskie, 2001).

Although 60% of computer time is spent alone (Subrahmanyam, Greenfield, Kraut, & Gross, 2001), applications that connect people hold users' interest more than any other application; "email is the primary Internet application that keeps both teens and adults coming back to the computer" (Subrahmanyam, Greenfield, Kraut, & Gross, 2001, p. 9). Gaming is one of the ways people connect with each other online. Frequent online game players meet friends outside their school networks (Colwell, Grady, & Rhaiti, 1995), however game playing does not impact players real-life social networks nor the characteristics of the social interactions among players.

Information technology displacement also reaches beyond the home. Kraut and his colleagues (1998) note that in the past 35 years there has been a decrease in civic and social involvement as evidenced by a decreased percentage of voters, decreased church involvement, and less contact with neighbors as well as overall decreases in individual's psychological and physical health. The authors relate these shifts to the incorporation of televisions, the predecessor to the Internet, into homes and a shift in family boundaries. Their results lead to the conclusion that Internet use decreases social involvement, family communication and social support networks.

Weak boundaries displace family time

With 19.6 million Americans working from their homes, questions emerge about the blurring of boundaries between work and home (Dannhauser, 1999). Employees are choosing to work from home in order to save time, be more available for their children, and increase their flexibility and mobility in the hopes of having more frequent, higher quality family interactions.

The ability to balance home and work lives through technology has an overall positive image because families believe they will have more time for a personal/home life by adjusting the timing and location of work.

Despite the overall positive view of teleworking (Hill, Hawkins, & Miller, 1996), conclusive evidence supporting increased family interaction or greater quality of family communication for teleworkers and telecommuters does not exist. In fact, the research on satisfaction with flexibility or balance between home and work lives suggests negative or neutral outcomes. Employees who telework are dissatisfied with their work arrangements (Hill & Hawkins, 1996) and the majority of teleworkers report a neutral influence of teleworking on household chores, child care and family relationships. Teleworkers report having a "difficult" or "very difficult" time balancing home and work lives, yet parents with preschool aged children reported a positive influence on personal/home life (Hill, Hawkins, & Miller, 1996). They worked more hours and work more outside normal business hours (ITAC; International Telework Association Council, 2000) on average than their counterparts in traditional office settings and teleworkers whose home office had a door are less likely to report sufficient time for family life, suggesting that the boundaries between work and home become indistinct (Gore, Leuwerke, & Krumboltz, 2002; Hill, Hawkins, & Miller, 1996). Work tasks and activities that take place in the home displace family time leaving teleworkers feeling deprived.

Hill, Hawkins and Miller (1996) gathered data from the teleworkers perspective and did not include reports from other family members such has spouse, significant other, or children. Gathering data from multiple sources may paint a different picture. The qualitative written comments, however, spanned the continuum in terms of the effect of teleworking on family life. For example, comments such as "I am able to see my kids off to school" were balanced with

those such as “my home life is suffering” (Hill, Hawkins, & Miller, 1996). These contradictory written comments also suggest that certain situations and/or personality types may be more suited for teleworking. For example, persons who have difficulty maintaining boundaries in general may not benefit from teleworking as the work would always be ‘there.’ Hill and Hawkins (1996) also suggest that a curvilinear relationship exists between flexibility and the ability to balance work and family life. Flexibility can be a positive influence on family life, up to a certain point; too much flexibility can lead to a blurring of boundaries and the displacement of family time may negate work flexibility.

When individuals telework, home time is colonized by work activities that require time and action such as writing, reading, and reflecting at home because the work environment is interruptible (English-Lueck, 1998). The penetration of work into home time creates an access dilemma; “I want instant access to you, but want to minimize your access to me” (English-Lueck, 1998, p. 4). This leads to the use of home as a work environment where family members manage interruptions. Boundaries are set between work time and home time by defining times when children can not interrupt parents (ex. mommy’s work-time), taking post-bedtime shifts, and manipulating information technologies to meet parents time needs (English-Lueck, 1998). Teleworkers use their personal space for business or office related matters (ITAC, 2000), extending the office to their personal residence, and expect their family members to adjust to the new arrangement.

Families may be unclear about changes in the home because of the conflicting roles (Oravec, 2000) and possible role strain for parents (Gore, Leuwerke, & Krumboltz, 2002). The computer facilitates permeable boundaries between the home and a number of other environments, including work, and serves to deprivatize the home (Oravec, 2000). Setting

boundaries between all of these environments is difficult because of: (a) the unlimited nature of the Internet; (b) the infinite number of commercial sites targeting any demographic, psychographic, and lifestyle; and (c) the complexity of the technology (Turow, 2001).

Challenges in researching human-technology interactions

Researching how family members living in the same home interact with one another in the presence of by technology is a difficult enterprise. This area of research is plagued by challenges such as the lack of theory, methodological problems, and history affects that limit the ability to study the phenomena in question and restrict researcher's ability to draw conclusions. This section provides a review of the challenges that limit research on the interactions between humans and technology with the goal of resolving some of these challenges in the following methods section.

Lack of cohesive theory.

One challenge to conducting research on human interactions and technology is the lack of theory directly addressing these relationships. Theoretical frameworks organize information and guide potential research questions and hypotheses. They also aid in selecting pertinent variables based on assumptions about the relationships between the variables. Research on human interactions mediated by technology lacks theoretical underpinnings, therefore a wide range of professions and disciplines attempt organize the information with existing theories. Unfortunately, this results in inconsistent operationalization of key concepts and multiple outcome variables.

The lack of theory in this area means that there are no hypothesized relationships between variables. Human-technology interaction research draws from a variety of other theoretical orientations in order to attempt to understand the findings. Some of the theories used in the

empirical research conducted on human interaction around technology have been: (a) flow (Chen, Wigand, & Nilan, 2000); (b) leisure time use (Zabriskie, 2001); and (c) social learning theory (Tamar, 2001). Pirolli and Card (1999) developed a new theory in response to the speed of information technology development. Their theory, called information foraging, addresses how strategies for information gathering adapt to changes in the environment and is more concerned with changes in time use specifically for information seeking rather than family time use. Most of the literature in this area, however, is either atheoretical or does not state a specific theory from which the research was conducted. Based on the assumptions inherent in their design, many studies investigating family interaction use a systems approach (Dannhauser, 1999; Gore, Leuwerke, & Krumboltz, 2002; Hill, Hawkins, & Miller, 1996; Oravec, 2000) and appear to be focused on how the different systems of workplace, school, and broader social contacts available through information technologies interact with the family or individual system. Using multiple theories from several disciplines results in a lack of a common language, making it difficult compare bodies of literature and generalize findings. The lack of a common language also translates to challenges with the methods used to research how technology influences family interactions.

Issues in methodology.

Several methodological issues stem from an inconsistent or nonexistent theoretical basis for the research on home computers and family interaction. One problem is the difficulty conceptualizing relationships between variables when theoretical assumptions are not available.

Another methodological problem is operationalizing the variables needed to answer questions concerning family interaction and computer use. In many cases, key variables such as computer use are ill defined. Computer use based on retrospective self-reports does not pay

specific attention to whether the computer use occurs at home or in the workplace. Regardless of where it occurs, computer use can mean thousands of different applications and the lack of specificity puts all of them in the same category. Combining all of the functions of the computer into one category of 'computer use' implies that each has an equal effect on interaction. However, writing a paper for a homework assignment and playing an interactive role-playing game serve different functions for the user and may displace different activities. Even when researchers divide computer use into Internet vs. non-Internet functions, the ambiguous operationalization of computer use fails to articulate whether the activity connects users to one another, provides information, or is work-related. When computer use is not specifically defined, it is difficult to draw implications or make meaning of research findings. For example, Kraut and his colleagues (1998) found that depression increases with high levels of Internet use, however what types of Internet activities comprise the high levels of use are not known. Nor is it clear whether certain types of Internet applications lend themselves to higher levels of use.

The vague operationalization of types of Internet use in the literature also calls into question whether the online activities are joint, solitary, or parallel. In Kraut's (1998) study linking depression and isolation, levels of Internet use are measured but the researchers did not assess with whom the Internet use occurred. While their results provide a beginning understanding of the relationship between high levels of Internet use and loneliness, the study would provide more relevant information for individuals and families if the study assessed whether solitary, joint, or parallel use of the Internet result in the same increases in depression and loneliness.

A related problem in operationalizing variables in this field of study is the difficulty in measuring concepts such as family interaction and shared time. The Olson Circumplex Model

has used the Family Adaptability and Cohesion Evaluation Scales (FACES; Olson et al., 1979) to assess family interaction. The model proposes an orthogonal relationship between adaptability, cohesion, and communication. However, criticism of the FACES instruments questions whether or not the relationship between these concepts is indeed orthogonal (Perosa & Perosa, 2001) and cites problems with the validity of the model (Anderson & Gavazzi, 1990; Perosa & Perosa, 1990; Thomas & Ozechowski, 2000), suggesting problems with measuring family interaction defined in this manner. Even if robust measurements of family interaction existed, few studies investigate the linkages between family interaction and levels of computer or Internet use.

Measuring family shared time in general presents a similar challenge. The operationalization of leisure time in the literature is inconsistent and based in author biases about what constitutes leisure. Sullivan (1996) did not consider household duties in the calculation of 'work' therefore cited women's leisure time as equal to men's. These results are inconsistent with other literature that cites women in dual earner families as completing up to 80% of the household labor (Hochschild, 1989; Shelton & John, 1996). However, leisure could be equated with discretionary time. This is problematic because individuals can fill discretionary time with either leisure activities done for enjoyment, no activities at all, or infrequent or unexpected activities.

Investigating the influence of Internet use on individual variables removes the difficulty of measuring family interaction. Unfortunately, the extant literature reports causal relationships using correlational data. Kraut's (1998) findings that frequent Internet users experienced increases in depression and loneliness are based on correlational data, yet the study and its critics cite a causal relationship between the variables.

Kraut and his associates' (1998) study illustrate the challenge in determining causal relationships and direction when conducting research on this topic. Because participants self-select into groups based on home computer ownership and levels of use, designing an experimental or causal study is challenging. Home computer ownership is so widespread that researchers are not likely to find families that do not have them. Households most likely to be without computers are more likely to be minority, extremely low income, older, or those that do not wish to have information technologies present in the home. These types of families represent specific portions of the population in general and research conducted with only these groups may be suspect.

History Effects.

History effects are a methodological issue and threat to internal validity, but I have separated them into another category of research challenges because of the unique rate of development of information technologies. Change occurs at a slow pace in most other areas of family science. Research conducted two years ago, but reported in a journal last year is still considered recent research. Computer technology differs from other types of research due to the rapid developments in speed, usability, size, types and numbers of functions performed.

Many of the works cited in the literature review date back to previous operating systems with slower download speeds or less user-friendly interfaces that relied on the user's knowledge of computer programming. Research on these previous versions of computer interfaces and time use or family interaction has limited usefulness for drawing conclusions about contemporary information technologies and time use or family interaction. Venkatesh and Vitalari (1986) studied a more programming oriented version of computer software and 95% of the respondents were male. This volunteer bias demonstrates that women had less interest in and possibly less

access to technology in the mid 1980's. Venkatesh and Vitalari's (1986) results may be less applicable now that women have equal access to information technologies (Russell, 1998) and contemporary computer interfaces use point-and-click navigation. Therefore, researchers must be careful when drawing conclusions about 'contemporary' technologies using research based on outdated or older versions of information technologies.

Older versions of computer technology add another confound to studying time use and increase the disparity between computer owners. Previous systems often take longer to perform the same functions than do the most recent models. When the amount of time spent engaged in a specific activity is the question at hand, the processing speed becomes an important variable. For example, if the majority of the participants in a given study have computers with a 400Mhz processor, when the models currently on sale have a speed of 4Ghz Pentium processor (100x faster than the 400Mhz), then it will take longer for the participants in the study to download a webpage than it would participants who have just purchased a new computer. Even though the processing speed is an important variable, there is great variability in when families upgrade their information technologies. Technophiles upgrade their operating system with each new version and their hardware every year to eighteen months. However, another type of family might value other activities or objects more highly and upgrade only when their current hardware becomes unusable. Given this variability, it can be difficult to discern an average amount of time spent using home computers, therefore further complicating research in this area.

Summary of the literature and implications for displaced family interaction

Despite using the Internet and the home computer for communication, high levels of use have been associated with increases in loneliness, depression, stress and social isolation (Kraut et al., 1996; Sleek, 1998). The time spent online decreases time spent interacting face-to-face,

participating in connection rituals, or engaging in core leisure patterns with family members at home (Stoll, 1995; Turkle, 1996). Time spent online is used for communication, yet individuals are more distressed and family members are spending less time communicating with one another (Kraut et al., 1998).

Even when families use information technologies at home for their intended business purposes, they are likely to have negative outcomes. Parents who telecommute to give them greater flexibility to maintain family relationships report weak boundaries between family and professional lives as well as greater role strain (Gore, Leuwerke, & Krumboltz, 2002; Hill & Hawkins, 1996; Oravec, 2000). The indistinct boundaries between home and work mirror the indistinct boundaries between culture and family that occurs through the Internet (Gobeil-Dwyer, 1999).

Negative individual outcomes, displaced family time, weak boundaries between home and work, and greater role strain combine to create disconnections between family members. The focus of the family toward the broader social network embodied by the Internet draws attention away from more basic interactions between family members necessary for healthy functioning. An intentional family definition and attention to connection rituals during core leisure activities helps families maintain appropriate boundaries between subsystems and increase positive family outcomes such as satisfaction, and cohesion (Gobeil-Dwyer, 1999; Zabriskie, 2000).

This section integrates several bodies of literature to organize information about families and technology. Yet, the language in each body of literature is based in the theoretical assumptions that ground the particular paradigm of that discipline. The following section outlines the theoretical perspective used to frame the present study and describes its usefulness.

Theoretical underpinnings

In a previous section I provided a general discussion of the theoretical issues surrounding the current body of literature pertaining to the present study. I noted that the theoretical frameworks to organize information, guide potential research questions or hypotheses, and aid in variable selection were lacking in the exploration of interpersonal relationships and technology. This study aims to remedy the lack of theory in previous research through grounding the research questions, hypotheses, and variable selection in conservation of resources model (Hobfoll, 1988), a model derived from Foa & Foa's (1973) resource theory. The following section briefly describes resource theory and conservation of resources model and concludes with a discussion of how the assumptions of conservation of resources model inform the present study.

Resource theory.

Resource theory as postulated by Foa & Foa (1973) belongs in the social exchange group of theories because it assumes that humans seek to maximize rewards [resources] and minimize costs [threats to resource reduction] through interpersonal exchanges. Rewards, as defined by Thibaut & Kelley (1959), are "pleasures, satisfactions, and gratifications the person enjoys" are transferred through social (or interpersonal) exchanges, the medium through which we obtain or lose resources, largely because the ability to obtain profits is contingent upon the ability to provide others with rewards (Foa & Foa, 1973; Sabatelli & Shehan, 1993). Social exchanges are regulated by the norms of reciprocity and fairness. In other words, if we have nothing to offer in return, our ability, and ultimate goal, to obtain rewards is limited. It is not possible to know actual rewards or costs, therefore humans use the information available to them to choose the behavior that will result in the least costly alternative based on their expectations of rewards and costs (Sabatelli & Shehan, 1993). The evaluation of potential rewards and costs, and the value

placed on these, varies from person to person creating an infinite number of possible interpersonal exchanges.

The resource perspective uses four key concepts in the articulation of the theory (Sabatelli & Shehan, 1993). The first concept that influences interpersonal exchange is the set of individual characteristics the actor brings to the relationship. An actor's rewards, costs, resources, and motivations influence the evaluation of the value of potential rewards and costs and the ability to obtain them. The motivational state of the actor is dependent upon a range within which the actor is unlikely to act; below this optimum range, the actor is motivated to engage in resource obtaining behaviors and below the range, the actor has power to spend his/her resources in order to gain others (Foa & Foa, 1973; Rettig & Leichtentritt, 1999). The second concept involves norms and rules. As noted above, the norms of fairness, equity, and reciprocity regulate interpersonal exchanges. The third concept is the emergent characteristics of the relationship. These characteristics influence whether the actors engage in the exchange or withdraw from it. The fourth and final concept addresses relationship dynamics that may be part of the environment. For example, decision-making, power, and control are not distributed equitably; therefore some actors may have more or less access to rewards than others. Another component of the social institutional environment in which exchanges take place is the amount of exposure to the actor. Particularistic resources require some degree of privacy of space and repeated encounters over long periods of time (Rettig & Leichtentritt, 1999).

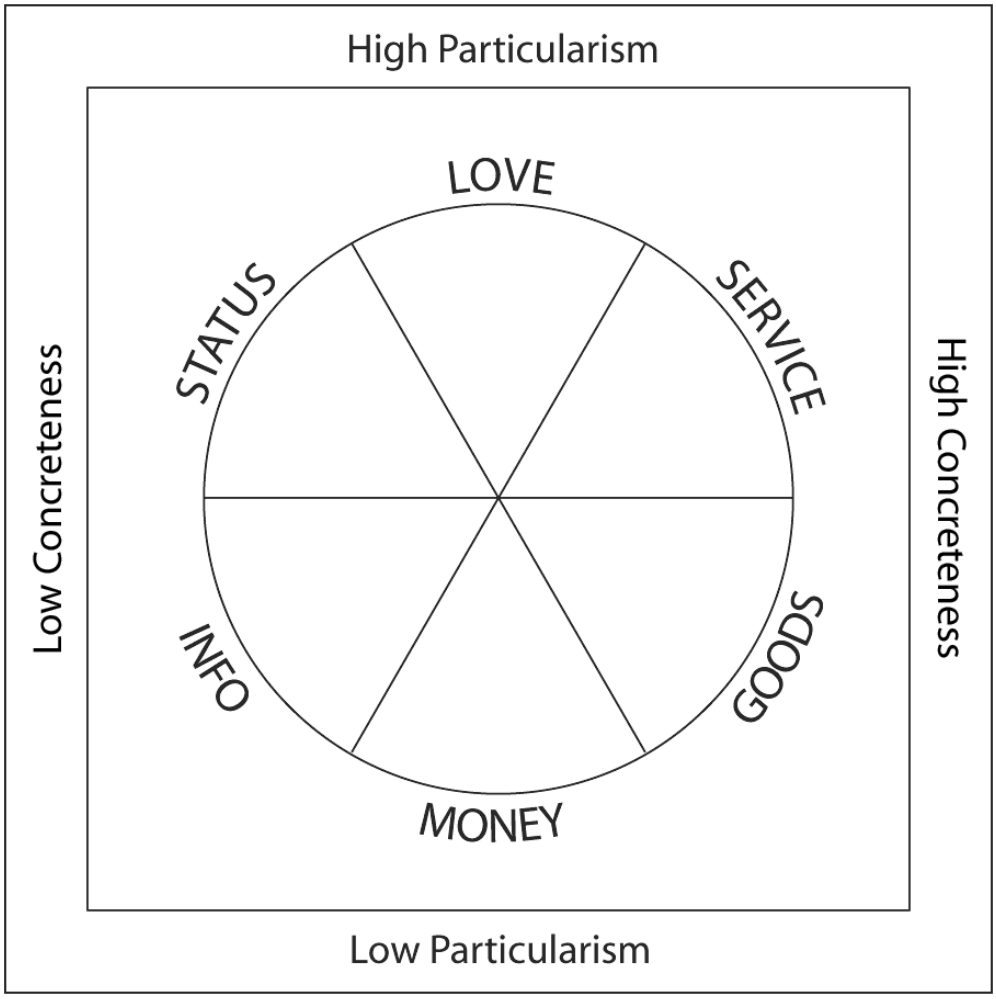
Resources are "any commodity, material or symbolic, that can be transmitted through interpersonal behavior" (Foa & Foa, 1973, p. 36; 1980) or "any property of an individual which he makes available to a person in his environment as a means for their positive or negative need satisfaction" (Levinger, 1959, p. 84). Foa & Foa (1973) used social exchange assumptions and

concepts to develop six different classes of resources: Love, Money, Status, Information, Goods, and Services. These six resources are organized according to two axes, concreteness vs. symbolism and particularism vs. universalism (See Figure 2.1). The concreteness vs. symbolism axis denotes how visible the resource is in a given exchange. For example, money is tangible, therefore high on concreteness, whereas status is more symbolic in an exchange. The particularism vs. universalism axis conveys the degree to which the value of the resource is dependent upon the source. For example, love received from a casual acquaintance is less valuable than love from a family member or significant other. In contrast, money has a finite value and spends equally well regardless of the source. The property of the resource, or the proximity of the resource to others in the model, is influential in the level of satisfaction in a given exchange: the more proximal the resources, then the more similar, and likely to be exchanged simultaneously, therefore more satisfaction (Rettig & Leichtentritt, 1999).

According to resource theory, there are four components to interactions: (a) the actor; (b) the object; (c) the mode of behavior; and (d) the resource (Foa & Foa, 1973, Foa & Foa, 1980; Rettig & Leichtentritt, 1999). The first three components combine to form paradigms of interaction as seen in Table 2.1. When the six resource classes are taken into consideration, 6X6 types of paradigms are formed resulting in 36 possible paradigms for each of the five types in Table 2.1. The two most common types of exchanges are A gives to B, who reciprocates by providing A with the same or other resource and A takes from B, who retaliates by taking away the same or some other resource. However, the resource of reaction (B's response to A) must be an appropriate response given in the institutional situation. Foa & Foa (1973) use the example of a friend playing a musical instrument. If the institutional situation were a gathering of friends, then the appropriate reaction would be to pay a compliment (actor gives service, reaction is

Figure 2.1.

Resource theory model.



(Foa & Foa, 1973)

Table 2.1.

Paradigms of interaction.

Type of Paradigm	Proaction	Reaction
Giving	A gives to B	B gives to A
Taking (Aggression)	A takes from B	B takes from A
Restitution	A takes from B	A gives to B
Turning the other cheek	A takes from B	B gives to A
Ingratitude	A gives to B	B takes from A

love). However, if the same friend were to play in a concert, one would be expected to pay an admission price as well as applaud (actor gives service, reaction is money, love, and status).

Rettig and Leichtentritt (1999) note nine advantages to using resource theory for measuring family life quality. These advantages are as follows: Resource theory: (a) links the concepts of personal needs met through interpersonal exchanges of resources that lead to satisfactions; (b) assumes that humans have both economic and social psychological needs that cannot be met in isolation, but require others; (c) assumes that family is the social institution with widest range of resource exchanges and there is greatest potential for needs satisfaction; (d) recognizes that economic and psychological resources are interdependent and equally necessary in evaluating quality of life and quality of family life or marriage (Rettig & Bulbolz, 1983b); (e) provides a means for studying interactions of individuals and their proximal environments with an ecological view of social-psychological and economic well-being (Rettig & Bulbolz, 1983b); (f) provides a classification of events and conditions which make life pleasant and worthwhile, offers parsimony, yet specific enough to pinpoint essential differences between people (Foa &

Foa, 1973); (g) can be applied to different domains of life and to different institutional environments for interpersonal resource exchanges, including work, school, home, or marketplace; (h) clarifies the interpersonal dynamics and reasons for diminished interpersonal satisfactions when material goods and money are substituted for needed highly valued particularistic resources of love and status; and (i) can allow for development of measures that examine conditions of family life and experiences in family life (Rettig & Leichtentritt, 1999).

The present study uses the mode of behavior (giving or taking) and resources, specifically energies, noted above as well as a number of the advantages posited by Rettig & Leichtentritt (1999). The advantages cited above reflect the interdependent nature of humans as a whole and with family members specifically (numbers 2 & 4). The relationship between this interdependence, needs satisfaction, and overall satisfaction in families and couples is grounded in the assumption that are evident in the present study through the assumption that less love resource expenditure in family exchanges leads to a decrease in overall satisfaction and possible love, status, information, and services resource reduction for family members. This is specifically articulated in number eight above related to money and goods, but can be applied to computer use defined as information, goods, or money dependent upon how the computer is used.

Another way resource theory is used by the present study is through addressing the appropriateness of reaction. It is not possible for only one person to take time away from a relationship. Both A and B must 'spend' time in other pursuits rather than together, thereby possibly decreasing love or information resource exchanges. According to Foa & Foa (1973) this constitutes Aggression because both A and B are taking away resources from the other. Even if A chases B, A is engaging in the relationship while B is actively *not* engaging in the

relationship. However, Conservation of Resources model, described later, details two methods actors may use to protect themselves against this loss of resources.

The basic precept of resource theory is that the potential or actual loss of valued resources is threatening (Foa & Foa, 1973; Foa & Foa, 1980; Sabatelli & Shehan, 1993). Hobfoll (1988) combined resource theory with Maslow's (1968) proposal that people seek physical, then social, then psychological resources in a hierarchical manner to begin an exploration into studying human stress. The result was a specific type of resource theory called conservation of resources.

Conservation of Resources model.

The fundamental tenet of the conservation of resources model (COR) is that people strive to retain, protect, and build resources. As such, it would follow that this model is used to understand psychological stress which is defined as a reaction to the environment in which there is a (a) threat of a net loss of resources; (b) the net loss of resources; or (c) a lack of resource gain following the investment of resources (Hobfoll, 1988; 1989). The model predicts that when confronted by stress, individuals seek to minimize the net loss of resources. When not currently threatened by resource loss, humans seek to increase their resource bank account to offset potential future losses. Social institutional environments, personal characteristics, and motivations may make it difficult for some individuals to gain resources. These people are more likely to be vulnerable to resource loss (Rappaport, 1981) and lean toward prevention of losses (Hobfoll, 1989). In this vein, COR model uses the basic ideas of Foa & Foa's (1973) resource theory to derive a model of human interactions that describes behavior rather than individual development.

One of the main distinctions between resource theory and COR is that Hobfoll's (1988) COR model only uses only four classes of resources. The first class is *objects* that are valued because of some aspect of their physical nature or their acquiring secondary status value based on rarity and expense. This class can be equated to Foa & Foa's (1973) classes of goods with some elements of status. The second COR class, *conditions*, is easily equated to Foa & Foa's (1973) status because resources in this class are valued to the extent that they are sought after. For example, tenure, seniority, and marriage belong in the conditions class of resource because they hold concrete and symbolic importance related to the social institutional environments in which they occur. The third and fourth COR classes do not have direct analogous relationship to Foa & Foa' s (1973) resource classes. For example, *personal characteristics* are the third class of resources in the COR model and are useful in aiding stress resistance (Cohen & Edwards, 1989; Hobfoll, 1985). These would be considered protective factors against stress, or resource loss, unique to the individual. The fourth and final class of resources is called *energies* and includes time, money, effort and knowledge. Resources in this class are valued not for their intrinsic value but rather their aid in obtaining other resources. The importance of this class of resources to the present study will be explained in the following section.

Consistent with Foa & Foa's (1973) resource theory, COR model postulates that loss can be experienced even when there may be some increase in a valued resource. Conservation of resources theory predicts that when an investment of resources does not provide a good return, loss is experienced. The cost of expended internal and external resources must be added to negative outcome or subtracted from positive outcome (Schonpflug, 1985). A suitable payoff (resource increase) that occurs after a loss is still experienced as stressful. A series of multiple

losses combine to form chains of stressors from which some individuals have difficulty recovering.

As noted earlier, social institutional environments, personal characteristics, and motivations may make it difficult for some individuals to gain resources and may be compounded by their inequitable distribution. Individuals or families who experience chains of losses fit in this category and often experience resource loss more often and on a greater scale. When people with limited resources attempt to preserve what resources they have, they often produce self-defeating consequences. However, positive events in which resources are increased with little or no loss have a stress limiting effect.

Hobfoll (1989) proposes two ways for people to conserve resources. The first is for the individual to re-frame the threat of resource loss as a challenge (Kobasa, 1979; Kobasa, Maddi, & Cournington, 1981). Re-framing the threat or actual loss of a resource requires that the individual focus on what might be gained by a given exchange rather than the resources lost. For example, a father who wants to put away money for his children's college attends to an online business, his second job, in the evening rather than playing board games or watching a video with his family. This father is conserving his resources by reframing the loss of energy resources (time with family) as a means to increase his object or condition resources (potential increase in wealth or status).

The second method present by the COR model is that individuals protect their resources by re-valuing the lost or threatened resource (Hobfoll, 1989). In this case, a person who pursues an online relationship because it is less emotionally threatening than a 'real-time' relationship is conserving personal characteristic resources. She or he may devalue 'real-time' relationships because they are too costly in terms of energy resources (time and effort). This method of

conserving resources is not as straightforward as it may seem because social institutional environments influence our norms and values; culture play a large role in deciding what we value and access to resources is not equal. Marriage and children are still currently valued by the culture; therefore one would have difficulty re-valuing these types of resources in the face of threats.

Limitations of Resource Theory

Resource theory and COR model provide a useful framework for the present study, although there are some limitations to these models. The originators of the theory (Foa & Foa, 1973) note the temptation to confuse resources with behavior. Resource theory and COR classify the meanings of behaviors, not the actions themselves, therefore the resource class to which a behavior is assigned is largely dependent upon the meaning, or perception, of the action by the actor and receiver in a given interaction. As noted previously, a resource may belong in more than one resource class depending upon previous interactions or the context and social institution of the current interaction. The classification is largely determined by the meanings assigned to the interactions by the actors.

Another limitation to resource theory and COR is the classification system itself. It is impossible to tell a priori which of the many ways the rewards and punishments in an interpersonal interaction is classified. The conceptualization of resource classes such as Information needs further refinement. For example, information has intrinsic value, but can also be valued because it provides access to other valued resources. The potential for mis-classification of this resource class can create deviation in predicted patterns of interactions.

Related to the limitations of the classification system are the different rules of exchanges for the different resource classes. Each resource class is governed by a different set of rules

depending where it falls on the two dimensions, particularism and concreteness. Resources such as money, which is high in concreteness, create a deficit in the giver while creating an increase for the recipient; information, which is low in concreteness, does not create a deficit in the giver, but also an increase for the recipient; and love can increase exponentially for both the giver and the recipient. Therefore, the different rules of exchange can lead to different levels of investment and motivations for the actors in an interaction.

The final limitation to this theory is that it is explanatory rather than predictive. Due to the limitations discussed above, the classification of actions and the classification system itself, it is not possible to predict the outcome of interactions using resource or COR model. For the purposes of the present study, COR explains the potential changes in patterns of interactions, but the model cannot predict what these changes may be.

Importance to the present study.

The present study seeks to examine how Americans spend and conserve their energy resources (e.g. time). Based on the assumptions of both resource and COR model, time is spent in activities that hold value or that are valuable in gaining other types of resources. Therefore, the activities in which Americans engage provide evidence of the values they purport to hold, not the least of which is the family. Conversely, time that is taken away from a particular activity denotes a devaluation of that specific activity, either due to changes in cultural values or motivation to gain other, more valuable, types of resources. Less time spent with immediate household members indicates that either less value is placed on the family or that time with family is traded for a more valued resource that may be protective in some way against losses that might threaten family. For example, time spent in market work is traded for money and

money enables the family to protect itself against losses of object resources such as food, shelter, and clothing.

It was previously noted that the loss of items or object resources is the most stressful and severe, yet the most commonly cited wish is for more time (Milkie et al, 2004). The devaluation of energy resources, to include family time, is a statement about the values of our culture as a whole. In addition, in his theory of social change, Frederick LePlay states that social practices and the production and consumption of resources in the family environment reflect the welfare of society, and the welfare of society influences family well-being. LePlay's theory postulates that how well a family is meeting the material and non-material needs of its members is a barometer of how well society is functioning (Rettig & Bulbolz, 1983a). In COR model terms, how well a family meets the needs of its family members for energies, objects, and conditions is a measure of societal well-being. The idea that the quality of family life is an important indicator of overall life quality has received some empirical support (Andrews & Withey, 1976; Campbell, 1981; Jeffres & Dobos, 1995); therefore, the examination of resource expenditure provides an overview of societal and family well-being based on the ways in which they spend their energy resources.

Previous research has used surveys to measure the quality of life with global indicators with some items asking about satisfaction with primary relationships of partners and children (Andrews & Withey, 1976; Ball & Robbins, 1986; Schumm et al., 1986; Voydanoff, Donnenelly, & Fine, 1988) and family environment such as neighborhood, friends, employment and internal family concerns (Olson & Barnes, 1987). However, the present study aims to use COR model to measure resource expenditure in the form of time to explore the changing values of families. The specific research questions for the present study are described in the following section.

Research questions

The present study aims to determine how the resource expenditures of family members have changed since the adoption of the home computer, in particular the energy resource expenditures of family members living in the same home. In other words, how much time do family members spend in activities with one another? There are several parts to this question: (a) what types of activities did family members engage in prior to the adoption of the home computer; (b) how much time did they spend in these activities; (c) what types of activities do families engage in after the adoption of the home computer; and (d) how do these patterns compare to computer owners and non-owners.

A related question concerns how computer use is related to interaction between family members. This question involves the nature of the patterns of activities; are the activities in which family members engaged before and after the adoption of the home computer solitary, joint, or parallel? Solitary activities are those in which the respondent is alone and engaged in an activity alone, thereby decreasing the amount of interpersonal exchanges taking place. Joint activities require that more than one person is present and engaged in the activity simultaneously and are likely to increase the amount of interpersonal exchanges. Parallel activities are those in which the respondent is engaged in the activity alone, but another person is present and engaged in another activity (Kitterød, 2001). An example of a parallel activity is when one person watches television while another reads a book in the same room. The possibility for interpersonal exchanges exists, yet each actor is engaged in separate activities. Of particular interest in this study is whether computer owners spend less time engaged in family interaction or family shared time (i.e. have fewer interpersonal exchanges) due to the addition of computer use. Unfortunately, the data collection and recording methods do not allow for determination of

parallel activities and the present study will only address joint or solitary activities. Do computer owners use their computers in solitary or joint patterns? Also, if computer owners engage in joint patterns, where and with whom does computer use take place?

Once time use patterns in 1985 and 1998-1999, the nature of the activities, and with whom the activities take place is understood, questions about different patterns of displaced activities are relevant. It is well established in the literature that women and men use their time differently and that they place different value on different types of resources (Babbie, 1992; Rettig & Leichtentritt, 1999; Wills, Weiss, & Paterson, 1974), therefore it becomes important to ask questions about how resource expenditure patterns change with the addition of the computer. Do the patterns and nature of displaced activities vary by sex? And if men and women engage in joint activities, does the person(s) with whom they spend time differ?

The research questions for the present study are listed below:

1) Are the patterns of energy expenditure by family members in 1985 different than patterns of families in 1998 – 1999?
    1a) If so, how do the patterns of post-adoption families compare to pre-adoption families and how do computer owner compare to computer non-owners?
2) Do computer owners spend more or less time in joint activities than computer non-owners?
    2a) Do computer owners use their computer alone or with someone?
    2b) If with someone, with whom?
3) Do women and men differ in their patterns of energy resource displacement?
4) Do women and men differ in the nature of their energy expenditures?

CHAPTER 3

METHODOLOGY

The intended design of the present study is to explore how American family's energy resource expenditure patterns of shared time change as a function of computer ownership and to explore possible sex differences in the types and nature of displaced activities. The results of the present study will add to previous time use and family outcome studies to provide evidence about how information technologies influence family interaction in the home.

Participants

The 1985 AUT mail back data collection method yielded a 51% return rate from the households originally contacted. Ninety percent of those households who returned data contained diaries for all household members aged 12 and over. However, of the 3349 diaries returned by respondents aged 12 and over from the 997 households, only the 2921 diaries from the respondents aged 18 and over were entered into the database.

The 1985 AUT telephone interview data yielded 1210 completed telephone diaries. The telephone interview collection method resulted in the highest response rate of the three methods, with 67% of those contacted by telephone completing a prior day telephone diary. Much of these data are missing the corresponding demographic data because some telephone interviewees did not return the demographics questionnaires mailed to them.

Table 3.1 illustrates the distribution of the telephone numbers in the FISCT sampling that became eligible households for the time diary collection. Table 3.1 also displays the distribution

Table 3.1

Distribution of FISCT sample

Phone Numbers			Percentage
Non-households		1019	31.1%
Never Answered		188	5.7%
Eligible Households		2073	63.2%
	Total	3280	100%
Eligible Households			
Interviews		1151	55.5%
Refusals		541	26.1%
Non-contacts		283	13.7%
Misc. Problems		97	4.7%
	Total	2073	100%

Note: Non-households are businesses or non-working telephone numbers

Table 3.2

Computer Ownership Demographics in FISCT Data

	n
Owns home computer	268
Uses Internet or World Wide Web	414
Subscribes to online service	274
Uses Email	454

of contacts made with eligible households. Of the 2073 households deemed eligible for the study, 1151 interviews were conducted, for a response rate of 56%.

The focus of this study concerns Americans' use of home computers, therefore it is important to know how many participants own home computers. Table 3.2 illustrates the number of participants in the FISCT data that own computers, use the Internet, subscribe to an online service at home, and use email. A large number of participants did not complete this portion of the survey because questions about computer ownership and subscription to an online service were embedded in a skip in the questionnaire (359 for owns home computer and 586 for subscribes to an online service). If respondents reported that they did not use email or the Internet at home, then interviewer was directed to skip ahead to the demographic questions.

The values in Table 3.2 indicate more participants use the Internet and email than own home computers. The assumption is that these participants use the Internet and email as a part of their work-time rather than home-time. One factor that may contribute to the small discrepancy between the numbers of participants who own a home computer and those that subscribe to an online service could be that the participant uses another persons' computer. Table 3.2 displays the small percentage of participants that own home computers in comparison to the entire sample (23.3%). However, when compared to the numbers of Americans who owned home computers in 1997 (16%; Who's in Line to Log on," 1997), the value is representative of the demographics at the time the data was collected.

Procedure

The data for the present study will be derived from the Americans' Use of Time study (AUT; Robinson, 1985) and the Family Interaction, Social Capital, and Trends in Time Use study (FISCT: Robinson, Bianchi, & Presser, 1998 – 1999). The two studies were designed to

collect parallel information, but were collected with different samples. Therefore the present study compares two cross-sectional samples and is not a longitudinal design. It is also important to note that the Americans' Use of Time study collected data in 1965 and 1975 in addition to the 1985 data that will be used for the present study. The 1965 and 1975 data were excluded from the present study due to the lack of variables related to computer use. The National Science Foundation (Grant #9710662) and the National Institutes of Aging (Grant #Y1-AG-8364-01) funded portions of the FISCT data collected in 1998 and 1999. Both datasets were located through the Inter-University Consortium for Political and Social Research (ICPSR, 2004).

Americans' Use of Time.

The American's Use of Time study used a stage-cluster sampling method to generate 500 first stage clusters, prepared by the Sampling Department of the Institute for Social Research at the University of Michigan. In stage cluster sampling either all elements from each selected cluster can be included in the sample, or a sub-selection can be made from within the selected clusters. The former case is called one-stage cluster sampling while the latter is known as two-stage cluster sampling. The Americans' Use of Time study used a two-stage cluster sampling method. The study description notes that the sample was designed to represent all telephone households in the contiguous United States, however it does not report the two elements from which the two stages of clusters were derived (Robinson, 1985). One hundred seventy three clusters of the initial 500 were chosen in the second stage with an average telephone sample cluster size of 14.

The American's Use of Time data contains single day time diaries gathered through three different data collection methods: (a) mail back diary data; (b) telephone diary data; and (c) personal diary data. Participants reported how much time they spend in both work and non-work

activities, to include work breaks, transportation, household labor, personal care, education, child care, and special interest group meetings. In their diaries, participants recorded each activity they engaged in over the previous 24 hour day (beginning at midnight the day before and ending at midnight the night before the interview), when each activity began and ended, where it occurred, and who was present. Demographic variables such as household type, sex, marital status, age, education level, occupation, work hours, number of children in home under ages 5 and 18 years old, and household income are also included in the dataset.

The time diary method of data collection has demonstrated a reasonable degree of reliability through correlations between the 1965 and 1975 Americans Use of Time data with both a single site (0.95) and these data with a Canadian sample (0.95; Robinson & Bostrom, 1994). Reasonably high correlations between 'day before' and 'day after' time diaries for a single site time study (0.85; Robinson & Bostrom, 1994) demonstrate split-half reliability for time diary data. Internal and external validity for time diary data have been evaluated in several ways. First, researchers evaluated construct validity through correlations of time estimates based on subjects' self-reports of activities when paged by researchers to these same subjects' time diaries (0.81;Robinson & Bostrom, 1994). Second, respondents were asked to report what they were doing in a given hour the previous day, with no hint from the researcher about what they had recorded in their diary. The correlations between the diaries and the responses were within reasonable limits for construct validity (0.81; Robinson & Bostrom, 1994). Third, researchers found a 0.80 correlation between spouses' responses to the 'with whom' question using the 1975 AUT diary data (Robinson & Bostrom, 1994) demonstrating a reasonable degree of internal validity.

Mail back diary data collection. The participants identified in the first stage cluster were first contacted by telephone using the Waksberg-Mitofsky two-stage random digit dial design by researchers from the Survey Research Center at the University of Maryland between January 1, 1985 and December 30, 1985. One respondent aged 18 or over was selected at random from the household and give a brief (2-5) minute orientation interview. If the respondent agreed to participate in the study, each member of the household aged 12 and over was mailed a diary form to be completed on a specified day the following week. Researchers placed two follow-up calls made at day 4 and day 6 post-telephone contacts to ensure that participants had received the packets and felt comfortable with how to complete the diaries. When the researchers received the diaries back via mail, they entered only the data recorded by those aged 18 and over because they were primarily interested in how adults use their time.

Telephone interview data collection. The telephone interview data method consisted of a random sample of adults contacted in the first phase of the random digit dial sample described above. From January 1, 1985 to June 30, 1985 a random third of the adults aged 18 and over who responded to the first telephone contact were selected to complete a prior day's diary via telephone. During the data collection from July 1, 1985 to December 30, 1985 all respondents contacted completed a prior day diary via telephone.

Interview data collection. A separate national sample of 808 time diaries was collected by personal in-home interviews. These participants were drawn from a subset of 20 primary sampling units (PSUs) chosen at random from a national sample of the
Institute for Survey Research at Temple University in Philadelphia. The sample was further stratified and subjected to controlled selection to ensure that the subset of 20 PSUs retained representation by rural-urban-suburban character within each of the four regions of the United

States. One adult aged 18 and over was selected to complete a retrospective interview for the previous day. At the conclusion of the interview, the experimenter left diaries for each of the other adult members of the household to complete the following day.

FISCT data.

In order to allow for cross time comparisons, the data for the FISCT study was collected in 1998 and 1999 and designed to be consistent with the AUT data gathered in 1985. As noted previously, these data include time diaries from a second set of participants and are not longitudinal. These data were collected data between March 1998 and December 1999 using a simple random sampling method. The authors state that they used a simple random sampling method (SRS) means that all the elements in a population have an equal probability of being included in the sample. One way to draw a simple random sample is to assign each population element a (pseudo) random number, sort the data set according to the random numbers, and finally select the required sample size from any sequential part of the population, normally beginning from the first element and continuing until the desired sample size is reached. When the FISCT study authors used a 'next birthday' selection method for person aged 18 and over, the person who answered the telephone was asked which of the persons aged 18 and over in the household was expected to have the next birthday, the random nature of the data collection was lost. The FISCT data was only collected via telephone respondents and did not employ multiple collection methods, as did the AUT data.

The FISCT data collection used the same time diary procedures for the previous day with Computer Assisted Telephone Interviewing (CATI) using a random sample of possible telephone numbers from a One Plus List-Assisted Random Digit Dial (RDD) frame. The research team called each number at least 20 times over different times of day and days of week or until the

telephone was answered. Both the Americans' Use of Time and the FISCT studies collected data on primary and secondary activities, with whom and where the activity occurred. The FISCT data collection added variables on feelings of time pressure, use of Internet, email and home computers.

Variables

The data for the present study will be drawn from the two previous data collections described above, the Americans' Use of Time (Robinson, 1985) and the Family Interaction, Social Capital, and Trends in Time Use (Robinson, Bianchi, & Presser, 1998-1999). The AUT and FISCT datasets are variables because they represent information about how adults used their time before and after prevalent computer adoption.

The questions of interest in the present study are primarily concerned with time use. The data for the activity codes are continuous positive integers that represent continuous data, the number of minutes per diary day the respondent spent in a given activity. The activity codes for the AUT and the FISCT data are very similar, however there were modifications and additions in the FISCT codes. Appendix A lists the activity codes for the AUT study and the FISCT study. Of note, the FISCT codes include computer use activity codes located in the Education/Training category. Also, the FISCT researchers distinguish between parlor games (i.e. board games, cards; activity code 87) and games played on the computer (activity code 57). In addition to coding primary and secondary activities during the interview, interviewers recorded with whom the activity was occurring according to Table 3.3 and the location of the activity in Table 3.4.

The nature of the activity will be addressed through constructing a new variable in both of the datasets. The new variables (SOLITARY and JOINT) will categorize respondents' activities into solitary or joint activities based on the Activity Code, With Whom, and Location

Table 3.3

With Whom codes

Code	With whom
0	Other (includes neighbors, babysitters, priests, doctors, dentists, teachers, etc)
1	Alone
2	Spouse only (includes cohabitating partner)
3	Child(ren) only
4	Spouse (includes cohabitating partner) & children
5	Co-workers
6	Friends
7	Relatives
8	Strangers/Crowd

Note: Respondents were not asked 'with whom' when they reported sleeping or bathing

codes shown in Appendix A and Tables 3.3 and 3.4, respectively. The With Whom codes will also be used in conjunction with the Activity codes to determine how much and in which activities non-paid work time is spent. These variables as well as the sex of the respondent will be used in answering the specific questions about sex differences in patterns of displaced activities and patterns of computer use with respect to how often, nature of use, and with whom it usually occurs.

Analyses

The primary investigators of both the AUT and FISCT data collections designed the studies to be parallel to one another to facilitate comparisons of activities between time periods.

Table 3.4

Location codes

Code	Location
0	Other
1	Home
2	Other's home
3	Outdoor away from home
4	Office Building/Factory
5	Grocery store
6	Other store/mall
7	School
8	Restaurant

However, the addition of computer activities to the list of activity codes and other small changes in coding of the FISCT sample required that some codes be reassigned in order to merge the files. Several other small changes were made to facilitate analyses using two data sources. A description of these changes can be found in Appendix B.

Using Multivariate Analysis of Variance (MANOVA) one can determine main and interaction effects of categorical independent variables (dataset, computer ownership, education level, sex of the respondent, nature [solitary/joint], with whom) on the continuous dependent variables, amount of time spent in the activity groups of interest (e.g. active leisure, sleep, interaction, television, and total screen time). The following section describes the hypotheses derived from the research questions in Chapter 2.

Hypotheses

Hypothesis 1.0. The first research question concerns the overall change in energy resource expenditure patterns of family members before and after prevalent home computer adoption with the goal of understanding the types of activities that are displaced by computer use.

Hypothesis 1.1. The first set of comparisons is between active leisure across time and computer ownership. It is hypothesized that energy resources expended on active leisure, as measured by time spent in active sports and outdoor leisure, are less in the overall FISCT sample compared to the AUT sample because of the time spent in computer use. In addition, it is hypothesized that the energy resources spent in active leisure are less for the computer owners compared to the computer non-owners within the FISCT sample.

Hypothesis 1.2. It has established in existing literature that the time spent sleeping decreases with computer ownership (Bird & Goss, 1990; Turow, 2001; Turow & Nir, 2000; Watt & White, 1999). This can be tested here by comparing the amount of energy invested in sleeping for respondents in the AUT study and with those in the FISCT study, as well as comparing computer owners and respondents that do not own computer in 1998-1999 FISCT sample. It is, therefore, hypothesized that the FISCT participants will invest less time sleeping than the AUT respondents (1985) and that the FISCT computer owners will spend less time sleeping than the FISCT respondents who do not own computers.

Hypothesis 1.3. The other category of activities of interest in the present study is how much time computer owners spend interacting with both family and local community members. Activities such as eating at home with family members, visiting, attending political/civic meetings or events, having conversations, and engaging in parlor games were included in both

the AUT and the FISCT datasets. Because these activities are representative of ways family members spend time together, it is hypothesized that the FISCT participants will invest fewer energy resources as measured by less time spent in all of these activities than the AUT respondents and that the FISCT computer owners will spent less time in these activities than the FISCT computer non-owners.

Hypothesis 1.4. Another activity that could be added to the category of family activities is watching movies at home. However, the AUT data coded watching movies at home and watching videos as part of Activity code 92 Records/Tapes whereas the FISCT data coded watching movies at home as Activity code 72 Movies/Videos. Because of the discrepancy in coding watching movies or videos at home and the aggregation of the time spent with other activities this activity cannot be compared across times or by computer ownership. However, Activity code 91, Television watching, was consistently coded between the two datasets so comparisons can be between cohorts and according to computer ownership. It is hypothesized that the FISCT participants spend the same amount of time watching television as the AUT sample. Also, computer owners within the FISCT sample will invest approximately the same amount of energy resources as measured by time spent watching television as those who do not own computers based on contradictory finding in previous studies (Koolstra & van der Voort, 1996).

Hypothesis 1.5. The final comparison about patterns of activities is the amount of screen time, or the total amount of time spent in front of screens. The discrepancy in coding movie watching noted above does not affect this comparison because movies at home and movies at a theater are aggregated within one variable as they are in the AUT data. It is hypothesized that the FISCT participants will invest more energy resources in total screen time than the AUT

participants and that the FISCT computer owners will invest more energy resources in total screen time than the FISCT computer non-owners.

Hypothesis 2.0. The next set of research questions focuses on the nature of solitary and joint activities. A series of studies published from longitudinal data links computer use with social isolation and loneliness (Kraut, 1996; Kraut et al., 1996, Kraut et al., 1998, Kraut et al., 1999). Based on this information, it is hypothesized that the computer owners in the FISCT data will expend more energy resources in solitary activities than the FISCT respondents who do not own computers.

Hypothesis 2.1. The computer is not built for simultaneous use. There is only one keyboard, one mouse, and one screen. Kraut and his colleagues conclusions based on the HomeNet study (1996; 1998; 1999) seem to suggest that the computer is a solitary activity. Therefore, it is hypothesized that when computer use is the primary activity, computer owners spend approximately 75% of their computer use time alone.

Hypothesis 2.2. When computer use is a joint activity, it is hypothesized that participants invest this time with children on the computer. Again, this hypothesis is derived from the evidence that many families purchase home computers for their children to use for academic pursuits (Kraut et al., 1996; Venkatesh & Vitalari, 1987; "Who's in line to log on," 1997).

Hypothesis 3.0. It is well established in the literature that women spend significantly more time in household labor and child care than do men (Mattingly & Bianchi, 2003; Hochschild & Machung, 1989; Hochshild, 1996). It is hypothesized that the male and female participants will have different patterns of activities. The following paragraphs reflect hypothesized differences in the specific ways male and female computer owners conserve energy resources.

Hypothesis 3.1 – 3.5. Other sex differences that have been noted are the amount of time spent in personal care, obtaining goods and paid work. Women spend more time on personal hygiene and obtaining goods whereas men spend more time in paid work (Bloch, 1989; Huston et al., 1999; Huston et al., 1999; Mattingly & Bianchi, 2003; Mauldin & Meeks, 1990; Timmer, et al., 1985). Since these sex differences have been well investigated, the present study aims to explore specific questions about sex differences in the type and nature of activities displaced by computer use. It is hypothesized that male computer owners will be more likely to conserve energy resources through displacing active leisure (Hypothesis 3.1), sleeping (Hypothesis 3.2), and household labor (Hypothesis 3.3) than will their male non-owner counterparts; therefore male computer owners will spend less time in these activities than will non-owners. For female computer owners, it is hypothesized, that they will be more likely to conserve energy resources through spending less time than female non-owners on personal care (Hypothesis 3.4), and television viewing (Hypothesis 3.5).

Hypothesis 4.0. Many of women's activities are done in conjunction with caring for children, therefore they tend to spend less time alone in general. Some studies have documented that fathers tend to increase their time with children when they own computers because they play games together (Bird & Goss, 1990), however this does not eliminate the disparity in amount of time spent with children. It is hypothesized that, within the FISCT dataset, men will spend more time in solitary activities than will women.

CHAPTER 4

RESULTS

All analyses were conducted with the Statistical Package for the Social Sciences (SPSS Version 11.5). The first analyses conducted provide various statistics to describe the overall patterns of time use in both the AUT and FISCT data. The means and standard deviations for the activity groups of interest according to time period and computer ownership by sex of the respondent and level of education are listed in Appendix C.

To provide an overall picture of the participants, Table 4.1 illustrates the demographics of the sample based on sex, marital status, race, age, parental status, and education for both datasets. The AUT data set does not contain information on the participants' race; therefore comparisons based on this demographic variable cannot be conducted across datasets. In addition, the majority of the FISCT sample identifies as 'white,' therefore any comparisons between datasets based on race would lack of sufficient power to draw any meaningful conclusions.

Although the FISCT data collection was intended to be consistent with that of the AUT study, the researchers used a different set of categories for household income. Table 4.2 represents the frequencies of these categories in each sample. The different categories make comparison across samples more complex, particularly when a correction for inflation is taken into account. After the correction, however, the distribution of the two samples appears to be more even across income levels, although the FISCT data still seems slightly skewed.

Table 4.1

AUT and FISCT Demographics

	1985	1998
Sex		
Male	2186	494
Female	2753	657
Marital Status		
Married	2844	620
Separated/Divorced	413	171
Widowed	328	103
Living together	No data	13
Never Married	894	240
Race		
White	No data	914
Black	No data	124
Asian	No data	17
Another	No data	67
Age of participants		
18 – 22	403	32
23 – 29	694	66
30 – 39	1057	93
40 – 49	679	136
50 – 59	593	253

Table 4.1

AUT and FISCT Demographics

	1985	1998
Age (cont.)		
60 +	883	489
Parental Status		
Children under 18 in household	1612	496
Children under 6 in household	496	240
Education		
Did not complete High School	789	86
Completed High School	1891	364
Some college	759	301
Completed college	665	216
Post graduate	286	169

Note: 1985: N = 4939; 1998-1999: N = 1151

Based on the information in Table 4.2, the FISCT sample appears to represent a more affluent portion of Americans than the AUT sample.

The descriptive statistics used to compare the AUT and FISCT participants as well as computer owners and non-owners. Because sex differences in time displacement is also of interest in the present study, comparisons of ownership status by sex were also conducted. These comparisons are described below.

Table 4.2

Household Income Demographics

Data Set	Annual Household Income	1998-1999 Value*	n	Percentage of $N\text{-}n_{refused}$
1985	Less than $15000	Less than $23,340	841	20.71%
	$15,000 – $24,999	$23,340 - $38,900	1007	24.80%
	$25,000 – $34,999	$38,900 – $54,460	984	24.23%
	$35,000 +	$54,460+	1229	30.26%
	Refused		878	
1998-1999				
	Less than $20,000		126	12.20%
	$20,001 to $50,000		415	40.17%
	$50,001 to $75,000		223	21.59%
	$75,001 to $100,000		102	9.87%
	Over $100,000		94	8.13%
	Refused		118	

Note: * Friedman (2005)

In both time periods, women were more likely to have responded to the telephone sampling methods than men. See Table 4.3 for a comparison of the AUT, FISCT, FISCT owners, and FISCT non-owners. AUT participants represent a younger portion of the population than do the FISCT participants with an average age of 43. These participants were most likely to

Table 4.3

Comparison of Participants

	AUT	FISCT	Owners	Non-owners
Age	43	55	51	55
Education	HS diploma	Some college	Some college	HS diploma
Household Income	15-25K (23-39K corrected)	30-50K	50-75K	20-30K

have a high school diploma and make $15000 - $25000 per year ($23,340 - $38,900 with inflation correction). In contrast, the FISCT participants were somewhat older with an average age of 55. They also tended to have a higher educational attainment, with at least some college education, and be making $30000-$50000 per year. Thus, the FISCT participants represent a slightly older, more affluent population. The difference in income may be partially related to more education, but this also may be a historical difference.

The present study is concerned with time displacement of computer owners and sex differences in time displacement, therefore similar profiles for the male and female computer owners and non-owners were constructed. As a whole, computer owners in the FISCT sample tend to have slightly higher educational attainment, having at least some college compared to non-owners being more likely to have a high school education. Another major difference between owners and non-owners within the FISCT sample is the annual household income. Computer owners have a higher income, $50000 - $75000 per year, than non-owners, $20000 - $30000. Interestingly, there are no differences between the male and female computer non-

owners, but the profiles by sex for owners vary according to income. Men and women in the ownership group are similar in terms of their education (some college), however men have a higher household income than do women, $50000 - $75000 and $30000 - $50000, respectively.

Because the data from the AUT and the FISCT participants were collected using a 24 hour day diary method, the time spent in the various activities only reflects one day of seven within a given week. To account for the possibility that the participants' activities on a weekday might differ from their weekend activities, the investigators in both the AUT and the FISCT studies constructed a day weight variable (DAYWT) for each study. This weight corrects for the day of the week on which the diary was collected, allowing for the construction of a synthetic week (Robinson, 1985; Robinson, Bianchi, & Presser, 1998 – 1999). Application of the DAYWT variable ensures that weekday and weekend activities are represented in the appropriate proportion. Prior to beginning the analyses, the weight data option was selected in SPSS and the cases were weighted by the DAYWT variable included in the original time periods. The day weight variable values range from .183 to 5.177 (range 4.993).

Hypothesis 1.0.

Between 1985 and 1998-1999.

To test the hypothesis regarding a change in pattern of activities between the 1985 AUT participants and the 1998-1999 FISCT participants, an omnibus MANOVA was conducted for the time spent in activity groups of interest (dependent variables) with time period and education as independent variables. The level of education achieved by the respondent was included as an independent variable because people with higher educational attainment may have access to information about the relationship between overall physical or mental health and exercise and the potential influence this knowledge might have on the energy investment in active leisure.

Another reason for the inclusion of the respondents' level of education is that it may be related to occupations that determine work vs. non-work time and contribute to differential energy resource availability.

The overall MANOVA including time period and respondents' level of education tested the null hypothesis of equal means in the activity groups of interest among the two time samples, AUT (1985) and FISCT (1998 – 1999). These overall tests were significant with a Bonferroni adjusted alpha of .0125 to account for multiple post hoc univariate tests (four activity groups of interest). A review of the results of the analyses indicated a significant difference in the time period*education interaction term, Wilks' ☹= .991, (F (20, 18119) = 2.542, $p < .001$, partial η^2 = .002. However, none of the univariate analyses for the activity groups of interest were significant with an adjusted alpha.

The main effect for time period confirmed significant differences between the AUT and FISCT samples on the activity groupings, Wilks' ☹= .983, F (4, 5486)= 23.311 ($p < .001$), although the multivariate η^2 shows a very small effect size of .017. The main effect for differences among levels of education on the activity groupings are also significant, Wilks' ☹= .961 F (20, 18119) = 10.962, ($p < .001$). Although the results for education were statistically significant, they explained a very small portion of the variance between the activity groups with a multivariate η^2 of .01.

Differences between computer owners and non-owners.

Similar analyses were used to investigate the hypothesis that computer owners and non-owners differ in the amount of time spent in the activity groups. This set of analyses added the variable computer use to the list of dependent variables. It was not included in the previous MANOVA because computer use was not coded in the AUT data. An omnibus MANOVA was

conducted for the activity groups of interest by ownership and education to test the hypothesis that overall energy expenditure patterns are different between owners and non-owners.

The main effect for ownership confirmed significant differences between computer owners and non-owners on the activity groupings noted in the above section, Wilks' ☹= .965, F (9, 783)= 3.176 (p = .001), η^2 = .035. Neither the main effect for education nor any of the interaction terms were significant.

Hypotheses 1.1 – 1.5

Table 4.4 contains a review of the hypothesized results for the specific activity groups. The five sub-hypotheses were evaluated with univariate comparisons of the specific activity groups of interest by time period and education. According to the results of these analyses, there were no significant differences between the AUT participants and the FISCT participants for four of the five groups; active leisure, sleep, television viewing, and total screen time. Nor were there any significant differences between the FISCT computer owners and FISCT computer non-

Table 4.4

Review of Hypotheses 1.1 – 1.5

Hypothesis	AUT	FISCT	Computer Owner	Computer Non-owner
1.1: Active Leisure	More	Less	Less	More
1.2: Sleep	More	Less	Less	More
1.3: Interaction	More	Less	Less	More
1.4: Television	Same	Same	Same	Same
1.5: Total Screen Time	Less	More	More	Less

owners for these three activity groups of interest; therefore there is no evidence to support hypotheses 1.1, 1.2, and 1.5.

The group of interest for which there was a significant difference between time periods was the activity group for interaction related activities (Hypothesis 1.2), F (1, 5490) = 27.157, p < .001, $\approx^2$ = .005. Since this activity group was composed of disparate activities, a follow up MANOVA was conducted for the individual activity codes within the INTERACT variable. The alpha was adjusted to .0045 to account for time spent in the eleven activity codes that comprise this activity group. The follow up MANOVA was also significant, F (11, 5478), p < .001, $\approx^2$ = .029. According to the univariate analyses, there were significant differences between the FISCT and the AUT participants, regardless of sex or level of education, in indoor (F (1, 5488) = 12.555, p < .001, $\approx^2$ = .002) and outdoor playing with children (F (1, 5488) = 12. 403), p < .001, $\approx^2$ = .002), with the FISCT participants having a higher average amount of time spent in these areas, contrary to the hypothesis.

Hypothesis 2.0

The next set of analyses addresses the hypothesis that computer owners in the FISCT data will expend more energy resources in solitary activities than the FISCT respondents who do not own computers. Before conducting the one-way MANOVA, cases in which the primary activity was sleep or any activity that took place at a work location were omitted. Since sleep as an activity is addressed above in the section on patterns of activities and interaction among family members does not occur during sleep, the value in the SOLITARY variable excluded sleep. This also provided for a more accurate depiction of joint time because the focus of this study is on family time and is not concerned with work interactions. Joint time spent with persons other than

Table 4.5

MANOVA Results for Solitary and Joint Time by Ownership and Sex

	Wilks' ☹	Hypothesis df	Error df	F	p	Partial η^2
Ownership	.999	2	16677	11.697	<.001	.001
Sex	.999	2	16677	8.900	<.001	.001
Ownership*Sex	.999	2	16677	4.229	.015	.001

a spouse or children also were not included in the JOINT variable because the focus of the present study is on family time between members of a household. With these changes, the one-way MANOVA evaluated the relationship between computer ownership and differences in the amount of time spent alone (solitary) or with other family members (joint). The MANOVA with a Bonferroni adjusted alpha of .025 was significant for both main effects and the interaction term (See Table 4.5), but with negligible effect sizes. However, contrary to the hypothesis, computer owners spend more time in joint activities than do non-owners.

Hypothesis 2.1

Tot test the hypothesis that computer owners spend approximately 75% of their computer use time alone, cases were selected for a primary activity that was computer related (activities 56-58). A one-sample chi-square test was then conducted to assess whether computer time is solitary or joint. The first chi square tested for equal proportions of solitary and joint time using the nature of the activity variable (NATURE where 0=solitary, 1=joint). The chi square was significant (X^2 (1, N=137)= 68.679, p< .001) indicating that the proportions of solitary computer use were not equal to the hypothesized proportion of 75%. There is evidence to support the

hypothesis that computer use is primarily a solitary activity because the observed proportion of solitary computer time was higher than joint computer time.

Hypothesis 2.2

To test for hypothesized proportions of solitary and joint computer time outside of a paid work capacity, entries of computer use with a co-worker were excluded from these data. The follow up chi-square to test for the hypothesized proportions were not significant, X^2 (6, N=150)= 9.557, p= .145. The lack of significance for the chi-square suggests that the hypothesized proportions were equal to the observed proportions. The observed proportions are found in Table 4.6. There is support for the hypothesis that the majority of computer use is solitary, although the data do not provide information about possible parallel processes where solitary computer use may be occurring in the same room as another activity with one or more persons.

Table 4.6

Hypothesized and Observed Proportions of the Nature of Computer Use

Nature of Use	Hypothesized Proportion	Hypothesized n	Observed Proportion	Observed n
Alone	.75	112	.78	117
Spouse Only	.05	8	.053	10
Children Only	.10	15	.033	5
Spouse and Children	.03	6	.033	5
Friends	.03	4	.04	6
Relatives	.03	4	.04	6
Strangers	.01	1	.007	1

Hypothesis 3.0

Between 1985 and 1998 – 1999

Sex of the respondent was included as an independent variable due to the wealth of information, some of which is noted in previous sections, about the different patterns of women and men in terms of child care, household labor, and free vs. non-free time (Deem, 1987; Di Leonardo, 1992; Mattingly & Bianchi, 2003; Wimbush & Talbot, 1988). This hypothesis used the five activity groups noted in Hypothesis 1 as well as the specific activity groups of interest for the sexes; active leisure, household labor, personal care, and child care activities (added due to results for interaction noted for Hypothesis 1.3). Therefore, the alpha was adjusted to .0056 to account for nine dependent variables.

It was hypothesized that the overall male and female patterns would be different and the amount of time spent in the activity grouping would differ between men and women. In addition to the significant main effects for time period and education level noted above, the three interaction effects were also significant. Table 4.7 lists the results of these analyses. Despite the significant differences in the multivariate analyses for the three-way interaction term time period*sex*education, there were no significant differences in the univariate analyses for any of the groups of interest. This may reflect the negligible effect sizes for the interaction terms.

The main effect for sex was also significant, Wilks' ☹ ■ 🖐👁⌛📄📠 F (8, 5459) = 26.608, $p < .001$. There was a small effect size for the differences between male and female respondents on the activity groupings, although this is larger than the effect size for the AUT and FISCT samples, $\approx^2 = .038$. These main effects are partially due to the differences in child care. Consistent with previous findings (Deem, 1987; Di Leonardo, 1992; Mattingly & Bianchi, 2003;

Table 4.7

MANOVA Interactions for Activity Groups by Time Period, Sex, and Education

Interaction term	Wilks' ☹	Hypothesis df	Error df	*F*	*p*	Partial ≋^{2}
Time period*sex	.994	8	5459	3.943	<.001	.006
Sex*Education	.981	40	23798	2.642	<.001	.004
Time period * Sex*Education	.981	40	23798	2.628	<.001	.004

Wimbush & Talbot, 1988), the differences between men and women in the amount of time spent in child care activities was significant, F (1, 5466)=49.278, $p < .001$, ≋^{2} = .009. In the present study, men spent less than half (approximately 45%) of the amount of time in child care activities as women.

Between computer owners and non-owners

The same analyses as those conducted with the time periods above were performed using computer ownership as an independent variable instead of time period. Although none of the interaction terms for this MANOVA were significant, the main effects for ownership were significant, Wilks' ☹= .965, F (9,783) = 3.176, p = .001, ≋^{2} = .035. According to the univariate analyses, the differences between computer owners and non-owners exist in the area of child care activities. Computer owners spend more time in child care activities than the non-owners.

The main effect for sex was also significant with a Wilks' ☹ 🖬 🖎🖲🖱🖃 F (9,783) = 3.795, p<.001. The differences between male and female respondents on the activity groupings demonstrated a small effect size, although larger than the effect size for ownership,

$\approx^2$ = .042. Despite a significant main effect for sex in the multivariate analyses, no significant differences among men and women on any of the activity groups were evident in the univariate comparisons. Of note in this lack of significance is that there were no significant differences between men and women in the amount of time they spent in computer related activities, work related activities, household labor, or child care activities.

Hypothesis 3.1

Active leisure is a grouping of interest for which a difference between male computer owners and non-owners was hypothesized. The hypothesis was that male computer owners would be more likely to displace active leisure than would their computer non-owner counterparts. The univariate analyses testing this hypothesis were not significant. Therefore there is no evidence to support this hypothesis; male computer owners were equally as active as computer non-owners.

Hypothesis 3.2

The second activity group of interest for which differences were hypothesized was in the area of sleeping. The results of the analyses were not significant, meaning that there are no differences in the amount of time spent sleeping between men and women or between owners and non-owners. Specifically, it was hypothesized that men who owned computers would spend less time sleeping than do male non-owners. However, this hypothesis was not supported by the results.

Hypothesis 3.3

The last hypothesized difference for men was the amount of time spent in household labor; men who own home computers spend less time in household labor than men who do not own computers. Although significant differences between men and women across time periods

were found for household labor, significant differences were not found for ownership or sex within the FISCT sample. According to these results, male computer owners spend approximately the same amount of time performing household labor as do male non-owners and there is no evidence to support this hypothesis. Contrary to previous research, there was not a main effect for sex within the FISCT time period, indicating that men and women spend approximately the same amount of time engaging in household labor.

Hypothesis 3.4

The first hypothesis for women is that female computer owners spend less time in personal care than do female non-owners. Although no significant effects were found between computer ownership for women, the difference between the means for total time spent in personal care by women and men across time periods was significant, F (1, 5466)=11.103, p =.001 $\approx^2$ = .002. Women in both the AUT and FISCT time periods spent more time in personal care than men in both time periods. Therefore, there is no evidence to support the hypothesis that women displace personal care when they add computer use.

Hypothesis 3.5

Another activity group of interest for which differences between women owners and non-owners were hypothesized was in television viewing. The results of the analyses were not significant, meaning that there are no differences in the amount of time spent watching television between men and women or between owners and non-owners. Specifically, it was hypothesized that women who owned computers would spend less time watching television than do their female non-owner counterparts. However, this hypothesis was not supported by the results.

Hypothesis 4.0

The preceding analyses indicate that there are significant sex differences in child care and household labor, with women spending more time in these areas than men. Since child care must take place jointly and household labor is often an activity done in conjunction with childcare, it was hypothesized that women would spend less time alone than did men. A two-way contingency table analysis was conducted to evaluate this. The two variables included in the analysis were sex of the respondent and with whom the activity was spent. Data entries for with whom (WHO1) were selected for alone, spouse alone, children alone, and spouse and children. The other possible with whom codes were excluded because the present study is only interested in how time is spent with family members. Entries were also selected for activities that occurred in any location except work. The final selection was for sleep. Time spent sleeping was always coded as time spent alone, therefore entries were selected for any activity except sleeping or napping. Cases were weighted by the number of observed activities in each cell of the 2X8 table. The relationship between sex of the respondent and with whom the activity was significant, Pearson X^2 (3, N = 56467891) = 1302519.6, $p < .001$, Cramér's $V = .152$, indicating that men and women differ in with whom they spend their time. Table 4.8 shows the percentage of time spent in joint and solitary activities according to sex of the respondent.

Follow up pairwise comparisons were conducted to evaluate the difference among these proportions. Table 4.9 shows the results of these analyses. Men and women's reports of spending time with their spouse only were similar at approximately 3.5% of their time. Men and women's reports of family time, or time spent with spouse and children were also very similar at approximately 1%. The differences in the proportions of with whom time is spent were consistent with the hypothesis that men spend a larger proportion of their time alone than do

women. Women make up this difference in their greater likelihood of spending time with the children only than were the male participants. Interestingly, the amount of time spent with family members was less than 15% for both men and women.

Table 4.8

Percentage of Men and Women's Time According to the Nature of the Activity

Nature	Percentage of Men's Time	Percentage of Women's Time
Alone	94.1	86.5
Spouse Only	3.7	3.4
Children Only	1.3	9.1
Spouse and Children	.9	1.0

Table 4.9

Results for Pairwise Comparisons Using Holm's Sequential Bonferroni Method

Comparison	Pearson X^2	p value	Cramér's V
Alone vs. Spouse Only	18.298	< .001	.001
Alone vs. Children Only	1300429.2	< .001	.155
Alone vs. Spouse and Children	1965.34	< .001	.006
Spouse Only vs. Children Only	774140.26	< .001	371
Spouse Only vs. Spouse and Children	1420.325	< .001	.024
Children Only vs. Spouse and Children	358915.58	< .001	.294

In order to allow for the possibility that some participants might work from home, the same contingency table analysis as conducted for entries with any paid-work related activities as the primary activity. Again, sex of the respondent and with whom the activity was spent were related, Pearson X^2 (3, N = 59893638) = 1147223.8, $p < .001$, Cramér's $V = .138$. Since this relationship was also significant and the proportions of with whom men and women's time was spent were similar to the initial analyses, I did not conduct follow up tests to determine where the differences lie.

CHAPTER 5

DISCUSSION

The purpose of the present study was to explore how the energy resource expenditure patterns of family time change as a function of computer ownership and to explore possible sex differences in the types and nature of displaced activities. Is there a difference between the pattern of activities in 1985 and those in 1999? Is there a difference between the patterns of activities of computer owners and non-owners in 1999 - 1999? The results of the present study indicate that there are indeed differences in the patterns of activities between the time periods and computer owners and non-owners. The differences are not, however, in the areas or the directions that were anticipated.

The second purpose of this study was to investigate the difference in the nature of activities between computer owners and non-owners as well as the nature of computer time itself. Again, there were significant differences in the nature of the activities between owners and non-owners, but not in the anticipated direction. As hypothesized, computer time was found to be a solitary activity, however owners spent more time in joint activities than did non-owners.

The third component of the present study explored potential sex differences in the patterns and nature of activities. Most of these results were consistent with prior research about men and women's time, however the expected areas of difference were not significant. The following sections discuss each set of results and begins to explore possible reasons why some of the results were not as expected.

The fourth and final component of the present study was to investigate the influence of technology at home on family patterns from a theoretical perspective, a gap in the extant literature. The conservation of resources (COR) model, a form of resource and exchange theories, framed the research questions and the hypotheses in the previous chapters by using the existing literature to hypothesize which activities would be displaced to conserve energy resources from an individual and family perspective. The COR model is used in this chapter to aide explanations for hypotheses that were not supported as well as those that were supported.

Hypothesis 1.0: Patterns of activities by time period and ownership

The results confirm that the pattern of activities of Americans in 1999 is different than in 1985, as hypothesized. The difference in the pattern of activities was significant despite a lack of significant differences in four of the five specific activity groups of interest between the AUT and FISCT participants and between the FISCT computer owners and the computer non-owners. The results for the sub-hypotheses will be discussed in the following section. One explanation for the significant difference in energy expenditure may be that time displacement occurred in areas that were not of interest to the present study.

There are a number of reasons why patterns of activities between the AUT and the FISCT time periods and the pattern of activities within the FISCT sample by ownership are different. The significant overall difference between the groups may be attributed to the number of activities and possible coding issues. In the present study, energy resources expended were measured in terms of 99 different activity codes. An overall change in patterns may exist between the time periods and between owners and non-owners, but the differences in time spent in the individual activities (99 activity codes) may only change slightly, therefore lack statistical significance but create an overall difference between the two time periods.

Another possibility for significant findings in the overall patterns, but not in the specific areas of interest, is the violation of an assumption for the MANOVA; that population variances among the dependent variables across all levels of the factor are equal. The Levene's Test of Equal Variances was confirmed, meaning that the variances for the dependent variables were different. This test is easily misinterpreted when there is a small sample size. However, given that the sample size for the present study was of sufficient size, one can assume Levene's test to be an accurate reflection of unequal variances across dependent variables. A Dunnett's C correction for unequal variances was used in the analyses, however the overall MANOVA may be distorted by the violation in its assumption (Green, Salkind, & Akey, 2000).

Hypotheses 1.1 – 1.5: Differences in specific activity groupings by time period and ownership

The first of the sub-hypotheses for which there was not a significant difference between time period or between owners and non-owners is active leisure. Although there were no significant differences between time periods, the difference in the average amount of time spent in active leisure according to level of education was significant. As hypothesized in Chapter 3, a higher educational attainment may be related to more active leisure due to awareness of information between active leisure, physical health and mental health.

The results for differences by time period in the amount of time spent sleeping were also not significant. These results are contrary to previous literature that cites decreases in sleep with Internet use (Bird & Goss, 1990; Turow, 2001; Turow & Nir, 2000; Watt & White, 1999; Venkatesh & Vitalari, 1987). One would expect that the owners within the FISCT sample would sleep less than their non-owner counterparts and drive down the average amount of sleep within the FISCT sample.

It may be that significant differences were not found in the present study due to greater within-group differences than between group differences. The mean amount of sleep by a group may not capture the differences in time spent sleeping that actually may exist. For example, parents of newborns in all of the groups (AUT, FISCT, computer owners, and non-owners) probably spend less time in sleep than retired couples in all of the groups. The use of the average amount of sleep in all of the groups decreases the differences in individual time expenditures. Other differences that may contribute to contradictory results are discussed later.

The one area of difference between the AUT and FISCT time periods was in time spent in interaction. However, the change was in the opposite direction than was projected. Participants in the FISCT study, regardless of sex or level of education, spent more time in interaction related activities than did the AUT participants. These results contradict a number of previous studies citing the isolating nature of computer use (Kraut, 1996; Kraut et al, 1998; Sleek, 1998; Stoll, 1995; Turkle, 1996). However, according to the COR model, this difference suggests that the FISCT participants were motivated to invest energy in interaction related activities. Therefore, some factor, either a historical or cohort difference, that was not measured in the current study may be related to the increase in time spent in interaction related activities, particularly in the areas of difference, indoor and outdoor play with children.

The possibility of a factor not measured by this study is supported by the results for the changes in amount of time spent in child care. Again, the FISCT participants spent more energy resources in the care of children than did the AUT participants. Follow up analyses were not conducted within the activity group of child care, however it can be assumed that the differences in this category lie in indoor and outdoor play as they did in the interaction grouping.

There were no changes in total screen time patterns. The lack of a difference in energy invested in screen time is somewhat surprising given that there was no change in amount of energy expended watching television, as hypothesized. The addition of home computers and the greater availability of movies at home would suggest that the amount of time spent in these activities added to a similar amount of television viewing would be greater in the FISCT sample.

Education appears to have had more of an effect on differences in patterns of television viewing and total screen time than did the time period. In the case of both television and total screen time, the higher the degree of educational attainment, the less likely the respondent was to watch television and spend time in front of screens in general. This is contrary to the assumption that a higher level of education leads to more professional jobs, which are more likely to result in computer proficiency, thereby increasing total screen time. However, it is consistent with the COR model which would indicate that those with higher educational attainment would be less likely to value television or movies and are less motivated to expend energies in these areas.

These results for television and total screen time may also explain previous contradictory findings about whether computer use displaces television. Prior research may have been conducted with a convenient sample of college students who have a similar educational background. Such a study would not reflect any differences in the amount of television viewing, but the lack of difference would be based on education rather than computer use.

Hypothesis 2.0: Differences in the nature of the activities

The results that computer owners spend more time in joint activities, are contrary to a number of previous studies about computer use and its solitary nature (Kraut et al., 1996, Sleek, 1998; Stoll, 1995; Turkle, 1996), such as Kraut and his associates' (1996) findings that higher levels of computer use lead to social isolation, depression, and loneliness.

The question arises as to why prior studies have found the computer to be isolating, but the present study finds that computer owners spend more time in joint pursuits than non-owners, particularly when computer use itself was found to be a solitary activity 78% of the time. The analyses for patterns of activities included work related activities as well in an attempt to understand the overall change in patterns of activities between the 1985 AUT and the 1998-1999 FISCT samples. Yet, the analyses for nature of the activity excluded work related activities in the effort to understand family time. It may be that energy invested in computer use is work-related, therefore the analyses of solitary or joint time related to computer use would be different if work related activities were included.

Another difference between the present study and previous studies citing a relationship between isolation and computer use (Kraut et al., 1998) is that the prior studies measured the amount of Internet use. If the present study had categorized computer owners into levels of computer use similar to Kraut's (1998), the results might suggest similar findings about solitary computer use. Given that the values in the computer use codes represent the number of minutes spent in these activities, analyses based on levels of computer similar to Kraut and his associates (1998) are possible. However, the purpose of the present study was only to explore overall differences in patterns of activities based on time period, sex, and computer ownership. A study using the FISCT data to investigate time pattern differences based on levels of computer use would add to the literature by either confirming Kraut and his associates (1998) previous findings or through introducing contradictory evidence of the relationship between computer use and isolation.

Finally, a COR explanation would be that the meaning of the behaviors which constitute solitary and joint time in the present study were not coded. Therefore, the actions themselves

were operationalized without taking into consideration the meaning of the behavior to the participant. As noted in the limitations to the theory section, COR hypothesizes relationships between interactions based on the perceived meaning of the behavior, therefore the participants may value some aspect of solitary or joint time that is not coded or hypothesized in the present study.

Hypotheses 2.1 – 2.2: With whom computer use occurs

Despite the differences in solitary and joint time discussed above, the nature of computer use itself is consistent with the hypotheses in the present study and the findings of previous research (Kraut et al., 1996, Sleek, 1998; Stoll, 1995; Turkle, 1996). Seventy-eight percent of computer time is solitary. It can be assumed that persons who use the computer in larger blocks of time, spend more time alone than do light to moderate computer users. Given the results of Hypothesis 2.0, the FISCT sample may not contain frequent or heavy computer users.

The hypothesized proportion of computer time spent with children was based in research that states parents purchase computers for children's use or to use with their children ("Who's In Line to Log On," 1997). However, the results of the present study indicate that participants did not use the computer with their children as often as they used it with their spouse. One possibility is that participants considered virtual chat as time spent together. This study was primarily concerned with physical space and assumes that the With Whom codes were based on persons sharing a geographic location rather than a cyber location. However, the question asked of participants did not specify whether 'with whom' meant in physical or virtual space. It may be that the present study's assumption that participants responses reflect physical space was false.

Despite the results for hypothesis 2.0, the COR model would suggest that the solitary use of computers is more valuable than the joint use of computers. It is possible, although sometimes more difficult to use the computer with another person, however almost 22% of the computer use occasions in the present study were joint. The COR framework implies that because an overwhelming majority of computer use occurs alone, there is something of value in this exchange. Again, it is important to remember that the present study focused on the definition of solitary use in a physical sense and excludes the possibility that the participants engaged in joint activities with others in cyberspace.

Hypothesis 3.0: Sex differences in patterns of activities by time period and ownership

The analyses did not reveal any differences between the sexes by ownership, meaning that the differences in the time invested in activities between owners and non-owners were not dependent upon sex as hypothesized. Specifically, women computer owners did not change the amount of time spent in personal care or in watching television. Likewise, male computer owners did not differ in amount of time invested in activity level, sleep, or household labor. When we consider previous literature about sex differences in computer use and sex differences in patterns of activities, these results are surprising.

In the results for sex differences, the lack of significance in some of the areas is as interesting as significance would have been for the hypothesized relationships. This portion of the present study evaluated differences in computer time between owners and non-owners by sex, yet no significant differences were found. In other words, male and female computer owners did not differ from non-owners in amount of time spent using the computer. From this we can assume that non-owners use a computer in an environment other than that of home, in

amounts that are roughly equal to the owners. Other environments available for computer use are work, school, college dorm, college computer lab, or Internet café, however these are not as convenient as having a computer at home and are often limited in terms of hours of operation.

One possibility is that the majority of the 268 computer owners in the FISCT sample are light to moderate users of the computer and do not accurately reflect the population of computer owners as a whole. One way to evaluate this possibility is to compare the means for computer use among the FISCT participants to available data about computer use in 1998 and 1999. In the FISCT study, male computer owners averaged .93 minutes per day (6.51 minutes per week) and female computer owners averaged 9.06 minutes per day (63.42 minutes per week) in computer time. As noted above, Kraut and his colleagues (1998) cite average computer use time to be around 2 hours per week. Without analyzing these values one cannot say that they are statistically different, yet it appears as though the FISCT computer owners spent less time in computer use than did the HomeNet participant families (Kraut et al., 1998).

Kraut and his colleagues (1998) gathered data from 1995 to 1998; therefore their data could be comparable to the FISCT data, although some differences between the studies may account for the difference in energy investment in computer use. The HomeNet study provided computers and the software to their participants. The fact that the HomeNet participants received computers, software, and Internet connection free of charge may have influenced the energy invested in computer use. According to the COR model the HomeNet participants were not motivated enough by computer use to have purchased their own. Since the HomeNet households did not have computers prior to the study, the participant families may have undergone a 'learning curve' during which time they used more or less time than families who were invested enough in the activity to have purchased their own computer.

The reasons for a lack of significant differences in computer time between owners and non-owners postulated above also apply to the lack of significance in the energy invested in total screen time. Owners and non-owners do not differ in the time invested in television viewing, or computer use, therefore we can assume that they also spend similar amounts of time in other screen related activities such as movie watching, given the lack of difference in total screen time. If the FISCT computer owners sampled do not represent the population of computer owners in 1998 and 1999, then the total amount of screen time of the FISCT sample is also not representative of the computer owners at the time.

The sampling for the FISCT study was conducted to provide a representative population of rural, urban, and suburban American families in the time period specified. The criteria for the stage-cluster sampling did not include age, ethnicity, or level of education. If the FISCT study had obtained a representative sample based on these demographic variables as well as the urbanicity, the energy investment and expenditure patterns may be different than that of the FISCT study. As noted later in this chapter, one of the limitations to this study is the inability to generalize this information to a larger population. Indeed, the factors that prevent this study from applying to larger populations might also have influenced the results as well.

Hypotheses 3.1 – 3.3: Male patterns of conserving energy resources

The first specific activity group of interest for male FISCT participants was that of active leisure. According to the results of the multivariate analyses male computer owners and non-owners do not differ in amount of time spent in active leisure, therefore the two samples are equally motivated to invest energy resources in active leisure. Considering the discussion above regarding potential differences in the computer owners in the present study compared to other computer use studies, this lack of significance can be explained. The lower amount of computer

use per week by the FISCT respondents, compared to a contemporaneous sample, explains the lack of active leisure displacement that might have otherwise occurred. Again, a comparison of the computer owners based on low or high of computer and Internet use may produce different results than the present study.

As with the results for Hypothesis 1.1, the results of the analyses for differences in male computer owners and non-owners time spent sleeping are contrary to previous literature that cites decreases in sleep with Internet use (Bird & Goss, 1990; Turow, 2001; Turow & Nir, 2000; Watt & White, 1999; Venkatesh & Vitalari, 1987). The same explanations cited above apply to the lack of significance for male FISCT participants; significant differences were not found in the presents study due to greater within group differences that between group differences. The mean amount of sleep by a group may not capture the differences in time spent sleeping that may exist. The use of the average amount of sleep in all of the groups decreases the differences in individual time expenditures.

The differences in the total time spent in household labor may explain how women can spend more time at work and more time in child care than in 1985. Female FISCT participants spent 82% of the amount of time in household labor than did the female AUT participants. This decrease in amount of time spent in housework leaves an additional 35 minutes per day available for other activities, such as caring for children. Given the results of the present study, one might assume that the energy women conserve through doing less household labor is invested in child care, specifically in indoor and outdoor play as noted above.

Women's decrease in time spent in household labor does not explain why men in the FISCT sample also spent more time in child care activities. Men invested 11 minutes more per day in household labor than the male AUT participants did. The time they conserved in an

activity other than household labor may be what is invested in child care activities. The activity from which energy was conserved was not an activity of interest to the present study because the only change in amount of energy spent in an activity grouping was for interaction, which increased. Energy might have been conserved in the areas of: (a) reading newspapers and magazines as more information becomes available online and this activity becomes part of computer use rather than reading; (b) mealtime if families conserve energy through getting fast food meals or takeout and meals are coded as the primary activity is travel; and (c) religious and/or volunteer activities as the boundaries between work and home become less distinct (English-Lueck, 1998; Gore, Leuwerke, & Krumboltz, 2002; Hill & Hawkins, 1996; Oravec, 2000).

Hypotheses 3.4 – 3.5: Female patterns of conserving energy resources

The lack of significant findings in the area of personal care may also be subject to the differences in computer use noted in previous sections. Another possible explanation may be that women in the FISCT study had already decreased their personal care time due to the rigors of a changing culture. There is evidence to support the idea that the American culture feels pressured for time (Milkie et al., 2004; Bianchi, 2000) and conserves energy resources (i.e. time) through limiting the amount of energy invested in personal care tasks. Therefore, the COR model would suggest that the FISCT sample as a whole may spend less time in personal care than did the AUT sample, however the within group differences, regardless of computer ownership are negligible.

The final activity group for which a difference between female computer owners and non-owners was hypothesized is television viewing. These results are subject to the same explanation as was discussed above for hypothesis 3.0; the computer owners in the FISCT

sample may not represent the computer owners of the mid to late 1990's when the average amount of time spent in computer use by the FISCT sample is compared to Kraut's (1998) participants average. Television viewing is an activity that has produced mixed results in the past, therefore the current findings are not consistent or inconsistent with prior research. However, the results were not as hypothesized and there are no differences in the amount of time spent watching television between the female computer owners and non-owners.

Hypothesis 4.0: Sex differences in the nature of activities

Consistent with the hypotheses, men in the FISCT study invested more energy resources in solitary activities than did women, regardless of ownership or education. Both men and women in the FISCT sample invested the majority of their energy resources in solitary activities, although men spent a larger portion alone than did women. Women, as expected, make up the difference in their time in time with their children alone (meaning without their spouse present). These results are expected based on the literature on sex differences in child care and time use.

Men and women agreed with one another about how much time they spent with their spouse and in activities with spouse and children. Even though the differences in these types of activities were not significant, they are an important measure of construct validity. Men and women's reports of the amount of time they spend together and together with their children are equal statistically, therefore we can assume that their reports of time spent alone in activities are also accurate.

Other factors

Child care

The activity group of child care was added to the analyses on sex differences in Hypothesis 3.0 due to the results for the INTERACT variable describe in Hypothesis 1.2. The

significant differences in the activities that comprise interaction were in the areas of indoor and outdoor play with children. These results explain some of the difference between the AUT and FISCT time periods that is not explained by the hypothesized activity groups.

As confirmed in the present study, women spend more time with children than do men. The results for differences in child care activities are unexpected because of the increase in the number of dual-earner couples and female headed single parent families between 1985 and 1998-1999 (Kroska, 2004; Milkie et al., 2004). If women, the primary caregivers, comprise more of the workforce in 1999 than they did in 1985, how is it possible that they also spend more time in child care? It is possible that the decreased time spent in household labor is re-invested in time with children.

The difference in the amount of time spent in child care activities is also evident in the comparisons of patterns of activities by ownership. Computer owners spend more time in child care activities than non-owners and this was the only activity group for which there was a difference between the two groups. This difference might be explained in part by the sample itself. The FISCT data heavily sampled older adults who are less likely to have children or spend time in child care. In 1999, older adults were also less likely to have already integrated a computer into their homes ("Who's in line to log on," 1997). One of the main reasons cited earlier for purchasing a home computer was children's academic needs (Kraut et al., 1996; "Who's in line to log on," 1997). Therefore, computer owners may be more likely to have children and thus more likely to spend time in child care than the non-owner group.

The above difference in age of the owner and non-owner groups does not explain the difference between the time periods. However, the FISCT participants represent a more affluent portion of Americans than the AUT sample, even when income was corrected for inflation.

Likewise, the computer owners within the FISCT data represent a more affluent population than the non-owners. It is possible that a greater household income makes it possible for one parent to stay at home and increase the average amount of time spent in child care for the FISCT participants as a whole and the computer owners within the FISCT group.

Related to the annual household income differences is the difference in the level of education between the FISCT and AUT groups as well as the owners and non-owners within the FISCT sample. The FISCT participants were much more likely to have had at least some college, whereas the AUT participants were more likely to have a high school education. The same is true for the difference between the owners and the non-owners; the computer owners were more likely to have at least some college education, whereas the non-owners were more likely to have a high school education. The difference in average level of education may also affect the amount of energy spent caring for children. Participants with a higher educational attainment may be more likely to have been exposed to information and education about the importance of time spent with children for their cognitive and emotional development.

The final explanation for differences between owners and non-owners in the amount of energy spent in child care is the possibility that computers enable owners to have more flexible work time allowing for more time spent in child care. An example may be a new mother who is able to stay at home for the first several months of her child's life, working part-time from her home via computer, rather than putting the child in daycare. Another example may be working flextime; an employee works one day per week from home via computer allowing her/him to spend more time in child care.

Interestingly, time with children is the activity in which parents feel most time pressured according to a study based in part on the FISCT data (Milkie et al., 2004). According to Milkie

and her associates (2004) study, fathers feel more pressure about spending time with their children than do mothers, due to longer work hours and less time available to spend with children. The present study confirms these results because women spend more time with children than do men in the FISCT study. The feelings of pressure for time to spend with children explain the increase in the overall amount of time spent by the FISCT sample when compared to the AUT sample and the increase in time spent with children by men between the AUT and the FISCT samples. It is evident in the feelings of time pressure noted by Milkie and her associates (2004) and the increase in energy resources invested in time with children reflect a change in the value placed on this activity.

Hardware

The speed and capability of computers and the Internet have changed significantly since the 1998 – 1999 data collection. Laptop computers have become more affordable, making it possible for a wider range of individuals and families to adopt them than in the late 1990's. The availability and relative affordability of wireless networking enables people to use computers in the same physical space, thereby blurring the boundary between a solitary and joint activity. Such parallel activities however do not always involve interaction between people sharing physical space. In fact, physical presence but preoccupation with virtual activities may serve to isolate family members from one another or increase feelings of frustration with a family member who is present physically, but not mentally or emotionally.

Alternative ways of spending time

In the section above on child care activities, it was postulated that parents might have found alternative ways to spend time with their children. According to the present study and several other pieces of research, adults are spending more time in paid work than previously and

this means less time with children (Bryant & Zick, 1996a, 1996b; Nock & Kingston, 1988; Robinson & Godbey, 1999; Zick & Bryant, 1996). Parents and couples have been evolving their definitions of joint time and finding ways to connect that are integrated into their daily lives. In other words, families are getting creative about their family time.

Several reasons necessitate this newfound creativity and flexibility in the definition of family time. According to the National Center for Education Statistics, the overall average level of educational attainment is rising in America (NCES, 2000). The present study found a relationship between level of education and time spent caring for children, with higher levels of education being associated with more energy invested in child care. Unfortunately, as the level of education rises, so does the average amount of time spent in paid work, therefore leaving less energy resources available for investment in family time. These relationships and the results for the increase in child care between the 1985 and the 1998-1999 time periods indicate that families are getting creative in how they spend time with one another and possibly how they define family time.

Strengths and limitations of the study

The present study adds to the literature by examining patterns of activities and the subsequent time spent in family and community interaction. This information can be used in conjunction with the family outcomes literature to understand the links between time use, family shared time, and family outcomes. Yet, there are many challenges and limitations to the study of information technologies and time use and the present study. The limitations involve: (a) the numbers of computer owners in the FISCT data; (b) age of the data; and (c) coding specificity.

The first limitation of the present study is the low frequency of computer owners in the FISCT sample. The high number of participants who are older, a demographic that had not yet

embraced the home computer in 1998 and 1999, combined with the few numbers of computer owners may limit the strength of the results. On the other hand, the 268 FISCT participants who own home comprise 23.3% of the entire sample. This percentage is consistent with or slightly higher than the estimated prevalence of home computers the year before the FISCT data collection began (16%; "Who's in Line to Log on," 1997). As noted in the discussion, even though this proportion of computer owners approximately the same as the population estimates, the owners themselves may not be representative of the population of computer users.

One challenge to studying information technologies and their influence on family interaction discussed previously is keeping up with the pace of advancements. This presents a challenge in the present study because the FISCT data was collected between 1998 and 1999. The types, speeds, and operating systems available at that time were significantly different than those currently available. Although this presents a limitation to the external validity of the present study, the information gained in this study provides a basis from which future studies based on current information technologies can be derived.

One important problem with coding exists in this study. The FISCT Activity codes do not include specific applications or programs for the Internet or for computer use in general. This forces an assumption that all applications and functions of the home computer have the same influence on activities that are likely to be displaced. This assumption raises a problem in drawing specific conclusions about displaced activities because hypotheses about computer use displacing similar activities cannot be tested. For example, playing online interactive games with anonymous others may replace playing video games with friends in the family living room. Both functions serve as entertainment for the player, but have different implications for interactions among family members living in the same home. Energy resources that were

invested in interaction with others at home are conserved and re-invested in an activity that takes place in solitary physical environment (computer use at home alone).

The lack of codes for specific applications or programs within computer or Internet use limits the ability to test hypotheses about time displacement because it assumes all are qualitatively the same. This assumption is false, of course, because the computer and Internet have business, communication applications, recreational, and household work related applications among others. These types of applications are analogous to some of the activity groups from the AUT and FISCT studies (See Appendix A) and are qualitatively different from one another; therefore have different purposes and motivations resulting in different implications for family time.

Another limitation of the present study is limited construct validity. As noted in Chapter 2, the lack of theory underlying technology's influence on human interaction means that the constructs in this area of research are often untested and inconsistently operationalized. The fact that the constructs in the present study, such as the activity groupings, lack of specificity in computer use coding, and family time, have not been empirically validated according to a theoretical framework limit the construct validity of this study.

Lastly, the present study gathered data from adults aged 18 or over. Less than 10% of the participants in the present study fall in the 18-22 year old category, therefore the results reported are from a parent perspective only. This is a potential limitation to the present study because generation is the strongest predictor of use (Kraut et al., 1998) and the age of participants is directly related to how likely and how often participants use the computer and Internet. It is possible that the parent-only perspective of this data explains the fact that the participants in the present study may use the computer less than the average amount at the time.

Implications for practice/research

Despite the lack of significant findings for a number of the hypotheses, the present study has implications for clinical practice and research. The results of the present study indicate that families may becoming creative in how they define family time by integrating time for connection into other household activities. Clinicians understand the need to ask clients questions about how they spend time together, however the research literature continues to have difficulty operationalizing 'family time.' The results of the present study emphasize the importance of investigating the myriad ways families define their time together. Thus, one implication for research is that families continue to redefine their time together to meet the needs of the current cultural speed-up (Hochschild, 1989).

The hypothesized differences presented in the methodology section suggest that the cultural speed-up acts as a divisive agent in families, working to prevent interaction among family members. Contrary to this assumption, the results of the present study indicate that families are making more effort to invest time in activities that involve interaction and activities that are related to children. Based on the COR model, these findings indicate that American adults placed more value on time with children in 1998-1999 than in 1985. The clinical implication of this finding is that families are actively working on finding fun and playful ways of interacting with their children. In particular, participants spent more time in indoor and outdoor play with children in 1998 –1999 than in 1985, indicating an investment in time with children that is not related to 'care' type activities such as meal preparation, giving baths, and homework.

The findings of the present study also have research implications for studies pertaining to computer use. The possibility that meaningful results were lost due to the lack of specificity in

coding computer and Internet time suggests that research in this area needs clearer articulation of 'computer time.' It is possible that categorizing computer time into components such as work tasks, email, chatting, surfing, research/homework, purchasing would have led to greater understanding of how the computer is used and what types of activities different uses of the computer displace. This issue is addressed further in the following section on directions for future research.

Directions for future research

The hypotheses about time displacement in the present study (Hypotheses 1.0 and 3.0) did not produce the expected results; therefore, questions about ways to improve upon the current research in order to obtain more information arise. The following section describes some of potential avenues of research that will enhance the body of knowledge about influence of information technology in the home environment on family interaction and family life.

Levels of computer use.

As noted earlier in this chapter, the results of the present study may have been different if the analyses were conducted according to levels of computer use rather than computer ownership itself. There is great variation in amount of time spent using the computer between owners and this conceptualization of computer use may provide robust results that are consistent with previous research (Kraut et al, 1998).

Another way of improving upon the present study would be to conduct a study based on computer owners who spend comparable amounts of time to computer user population. As noted previously, the FISCT sample of computer owners spent less time in computer use than did other samples from a similar time frame.

Perceptions

The element of parallel activities due to wireless networking and the greater availability, affordability, and transportability discussed above leads to a questions about the role of perceptions about time among family members. As noted in the above limitations to the theory section, resource theory and the conservation of resources model classify the meanings of behaviors, but not the actions themselves. The data used in the present study contains self-reports of time use, but not respondents' perception about the meaning of the activity. The hypotheses for the present study used meanings gathered from the available bodies of literature to postulate relationships and potential changes.

This leads to an area for future research in which information from participants about their activities that includes qualitative data about the meanings ascribed to the activities is gathered. For example, many suburban families spend significant amounts of time in the car traveling to and from child care, work, and other activities. Some families may value their travel time greatly because it is used to connect through discussion of their respective days, whereas another family may feel travel time is a necessary evil during which they experience stress over traffic and hurried schedules. The amount of time spent traveling may be similar, yet the meaning, and therefore value, of the time may differ between families.

Another example is that of household labor. Activities such as meal preparation and cleanup have potential for connection between family members when they are performed jointly. Parents and children or couples can relate to one another while performing household labor tasks, yet household labor is coded as a non-free time in the AUT and FISCT samples. An investigation of family time that incorporates time diaries as well as qualitative interviews about

the meaning of the family's activities will enhance the literature about the family energy investment.

Observational Research

The final area for future research on this topic is to conduct an observational study using qualitative interviews with family members about the meanings ascribed to time within their context combined with quantitative data in the form of digital recordings of computer time. This type of study would provide the necessary information about family perceptions of time and objective data about the amount of time spent using the computer, programs and applications used by the respondent, and interactions between family members during computer use. This information would be particularly helpful in adding to the couples literature about the impact of technology on couple dynamics and couple communication

Another use for this type of study is the specification of computer and Internet use. The data on which applications are used by the respondent would enable researchers to categorize the activities according to the task such as business related, connective or communication, games, or task oriented. Comparisons can be made between how much time is spent in these different categories and what relationship, if any, this has to outcome variables such as family life satisfaction, feelings of time pressure, depression, and isolation. Relationships between the amount of time spent in the different categories and qualitative data on meanings ascribed by family members can also be evaluated using this type of data.

Lastly, the partial eta squared results reported in the present study are very small and only account for a minute portion of the variance between time periods and ownership status. One way to test for direction of effects and for another explanation for the variance would be to conduct an ABAB design. In this design, participants would act as their own controls by

completing time diaries before computer ownership then after being given computers. The computers would be taken away, participants would complete time diaries, the computers would be given back, and a final set of time diaries completed. The comparison of patterns of activities with and without the computer will allow hypothesis testing regarding direction of effects. In addition, an ABAB design that incorporates measures about relationship satisfaction, family satisfaction, family cohesion, and individual variables such as depression and personality would provide a better understanding of the connection between family time use patterns and family outcome variables.

Conclusion

Several hypothesized relationships in the present study were not supported by the data analyses. But, despite the lack of significant relationships between key variables, the present study does add to the body of literature about human-technology interactions in several ways. First, this project is one of a few studies about human-technology interactions based in a theoretical framework. Although the COR model has limitations, it is useful in the present study because it helps one see that the energy expended in various activities actually reflects the commodities and resources that are valued across time periods and by men and women.

The COR framework used in the present study, states that the areas of energy investment indicate areas that are valued resources. Activity groupings such as interaction related and child care activities are valuable to Americans because they invested more energy in these activities in 1998 – 1999 than in 1985. Therefore, the payoff from connective activities (interaction and caring for children) must be worth the investment of their time, a limited and valuable commodity. This conclusion gains more support when considering the fact that Americans feel pressured for time more now than ever (Milkie et al., 2004). Americans are investing more time,

a resource that should be conserved because it is in short supply, in connective activities. This suggests that children may, themselves, be resources that are worthy of investment and valuable commodities. The results concerning caring for children were not part of the original hypotheses for the present study and were only included as part of follow-up analyses related to the results for interaction related activities to strengthen the results of the present study.

Finally, the relationship between technology at home and human interactions appears to be based on perceptions of time use, perceptions of valued activities, and a number of other meaning-related variables that are not measured in the present study. While this project provides a starting point for research about how families interact with one another related to computer and Internet use, there is much work to be done in exploring the meanings and subjective experiences of individual family members as well as the family system as a whole.

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APPENDIX A.

Activity Codes Summaries

Table A-1

Americans' Use of Time Activity Codes Summary (1985)

00-49 Non-free time	**50-59 Free Time**
00-09 PAID WORK	**50-59 EDUCATION/TRAINING**
00 Main job/ At home for pay	50 Attending F/T school
01 (not used)	51 Other classes
02 Unemployment	52 (not used)
03 (not used	53 (not used)
04 (not used)	54 Homework/Studying/Research
05 Second job	55 (not used)
06 meals at work	56 Other education
07 Non work activity	57 (not used)
08 Breaks	58 Telephone conversations
09 Travel to/from work	59 Travel, education

0-19 HOUSEHOLD WORK

10 Meal preparation

11 Meal cleanup

12 Cleaning house

13 Outdoor cleaning

14 Clothes care

15 (not used)

16 Home repairs/car care

17 Plant care/Animal care

18 (not used)

19 Other household

20-29 CHILD CARE

20 Baby care (under 5 y/o)

21 Child care (5-17y/o)

22 Helping/teaching

23 Talking/reading/discipline

24 Indoor playing

25 Outdoor playing

26 Medical care-child

27 Other child care

28 (not used)

29 Travel, child care

60-69 ORGANIZATIONAL

60 Professional/union

61 Special Interest

62 Political/civic

63 Volunteer/helping

64 Religious groups

65 Religious practices (By R)

66 Fraternal

67 Child/youth/family

68 Other organizations

69 Travel organizational

70-79 ENTERTAINMENT/SOCIAL

70 Sports events

71 Mass culture (circus, concerts)

72 Movies away from home

73 Theater/Ballet/Opera

74 Museums

75 Visiting

76 Parties

77 Bars/lounges

78 Other social

79 Travel, social

30-39 OBTAINING GOODS

30 Shopping for food

31 Shopping for clothes/HH items

32 Personal care services

33 Medical appointments

34 Administrative (PO, banking, etc)

35 Repair services

37 Other professional services

38 Errands

39 Travel, goods and services

40-49 PERSONAL NEEDS AND CARE

40 Showering, Bathing

41 Medical care at home (self, other)

42 Non-medical care at home

43 Eating at home

44 Eating not at home

45 Night sleep

46 Napping/Resting

47 (not used)

48 Private/Sex/Making out/None of your business

49 Travel, personal care

80-89 RECREATION SERVICES

80 Active sports

81 Outdoor (fishing, hiking, etc.)

82 Walking, biking, running

83 Hobbies

84 Domestic crafts

85 Art

86 Music/drama/dance

87 Parlor Games

88 Other Active leisure

89 Travel, recreation

90-99 COMMUNICATIONS

90 Radio

91 TV

92 Records/Tapes

93 Read books

94 Magazines/etc.

95 Reading newspaper

96 Conversations

97 Letters, writing, reading mail

98 Thinking/Relaxing

99 Travel Related to Passive Leisure

Table A-2

Family Interaction, Social Capital, and Trends in Time Use Activity Codes

Summary (1998-1999)

00-49 Non-Free Time	**50-59 Free Time**
00-09 PAID WORK	**50-59 EDUCATION/TRAINING**
00 (not used)	50 Attending F/T school
01 Main job	51 Other classes
02 Unemployment	52 Other education
03 Travel during work	53 (not used)
04 (not used)	54 Homework
05 Second job	55 Using Library
06 meals at work	56 Using Internet
07 (not used)	57 Playing games on a PC
08 Breaks	58 Other PC use
09 Travel to/from work	59 Travel, education
10-19 HOUSEHOLD WORK	**60-69 ORGANIZATIONAL**
10 Food preparation	60 Professional/union
11 Food cleanup	61 Special Interest
12 Cleaning house	62 Political/civic
13 Outdoor cleaning	63 Volunteer/helping
14 Clothes care	64 Religious groups
15 Car repair/maintenance	65 Religious practices(By R)

16 Other repairs (By Respondent)	66 Fraternal
17 Plant care	67 Child/youth/family
18 Animal care	68 Other organizations
19 Other household	69 Travel organizational
20-29 CHILD CARE	**70-79 ENTERTAINMENT/SOCIAL**
20 Baby care	70 Sports events
21 Child care	71 Entertainment
22 Helping/teaching	72 Movies/Videos
23 Talking/reading	73 Theater
24 Indoor playing	74 Museums
25 Outdoor playing	75 Visiting
26 Medical care-child	76 Parties
27 Other child care	77 Bars/lounges
28 (not used)	78 Other social
29 Travel, child care	79 Travel, social
30-39 OBTAINING GOODS	**80-89 RECREATION SERVICES**
30 Shopping for food	80 Active sports
31 Shopping for clothes/HH items	81 Outdoor
32 Personal care services	82 Exercise
33 Medical appointments	83 Hobbies
34 Gov't/financial services	84 Domestic crafts
35 Car repair services	85 Art
36 Other repair services	86 Music/drama/dance

37 Other services	87 Games
38 Errands	88 (not used)
39 Travel, goods and services	89 Travel, recreation
40-49 PERSONAL NEEDS AND CARE	**90-99 COMMUNICATIONS**
40 Showering, Bathing	90 Radio
41 Medical care	91 TV
42 Help and care	92 Records/Tapes
43 Eating	93 Read books
44 Personal hygiene	94 Magazines/etc.
45 Sleeping/Napping	95 Reading newspaper
46 (not used)	96 Conversations
47 Dressing, etc.	97 Letters, writing, paperwork
48 None of your Business Activities	98 Thinking/Relaxing
49 Travel, personal care	99 Travel Related to Passive Leisure

Table A-3

Merged File Activity Codes Summary

00-49 Non-free time	**50-59 Free Time**
00-09 PAID WORK	**50-59 EDUCATION/TRAINING**
01 Main job/ At home for pay	50 Attending F/T school
02 Unemployment	51 Other classes
03 Work Travel	52 Other education
04 (not used)	53 Telephone conversations
05 Second job	54 Homework/Studying/Research
06 Meals at work	55 Using library
07 (not used)	56 Using Internet
08 Breaks	57 Playing games on PC
09 Travel to/from work	58 Other PC use
	59 Travel, education
10-19 HOUSEHOLD WORK	**60-69 ORGANIZATIONAL**
10 Meal preparation	60 Professional/union
11 Meal cleanup	61 Special Interest
12 Cleaning house	62 Political/civic
13 Outdoor cleaning	63 Volunteer/helping
14 Clothes care	64 Religious groups
15 Car Repair	65 Religious practices (By R)
16 Other repairs	66 Fraternal

17 Plant care

18 Animal care

19 Other household

20-29 CHILD CARE

20 Baby care (under 5 y/o)

21 Child care (5-17y/o)

22 Helping/teaching

23 Talking/reading/discipline

24 Indoor playing

25 Outdoor playing

26 Medical care-child

27 Other child care

28 (not used)

29 Travel, child care

30-39 OBTAINING GOODS

30 Shopping for food

31 Shopping for clothes/HH items

32 Personal care services

33 Medical appointments

34 Administrative (PO, banking, etc)

35 Car Repair

37 Other Repair services

38 Errands

67 Child/youth/family

68 Other organizations

69 Travel organizational

70-79 ENTERTAINMENT/SOCIAL

70 Sports events

71 Mass culture (circus, concerts)

72 Movies/Videos

73 Theater/Ballet/Opera

74 Museums

75 Visiting

76 Parties

77 Bars/lounges

78 Other social

79 Travel, social

80-89 RECREATION SERVICES

80 Active sports

81 Outdoor (fishing, hiking, etc.)

82 Walking, biking, running

83 Hobbies

84 Domestic crafts

85 Art

86 Music/drama/dance

87 Parlor Games

39 Travel, goods and services	88 Other Active leisure
	89 Travel, recreation
40-49 PERSONAL NEEDS AND CARE	**90-99 COMMUNICATIONS**
40 Showering, Bathing	90 Radio
41 Medical care at home (self, other)	91 TV
42 Non-medical care at home	92 Records/Tapes
43 Eating at home	93 Read books
44 Personal Hygiene	94 Magazines/etc.
45 Sleep/ Napping/Resting	95 Reading newspaper
46 (not used)	96 Conversations
47 Dressing	97 Letters, writing, reading mail/ Paperwork
48 Private/Sex/Making out/None of your business	98 Thinking/Relaxing
49 Travel, personal care	99 Travel Related to Passive Leisure

APPENDIX B.

Constructed Variables

The primary investigators of both the AUT and FISCT data collections designed the studies to be parallel to one another so as to compare activities between time periods. However, the addition of computer activities to the list of activity codes and other small changes in coding of the FISCT sample required that some codes be reassigned in order to merge the files. In the AUT sample, Activity code 52 was added and the values from activity code 56 assigned to this variable to match the FISCT sample for 'other education.' Activity code 56 remained 'using the Internet' in the merged file. I moved the values from AUT variable activity code 58, telephone conversations, to a new code (53) as code 58 is 'other pc use' in the FISCT file.

In the AUT file, paid work was activity code 00 whereas paid work was activity code 01 in the FISCT file. I renamed the paid work code in the AUT file in order to merge the two files. Another simple code change was for activity code 88, other active leisure, in the FISCT file. The FISCT study did not code for 'other active leisure;' therefore activity code 88 was added to the FISCT data file and all respondents were given values of 0 for this variable.

In the AUT dataset, sleeping at night and napping or resting during the day were coded separately. Activity code 45 became the sum of time spent sleeping, napping, and resting in both files and activity code 46 is no longer present in any file. Another example of an activity that was coded separately in the AUT study, but not in the FISCT study, was eating. The AUT data contained separate codes for eating at home and not at home (43 and 44, respectively). Activity code 43 became the sum of time spent eating, regardless of location, in the merged file.

The FISCT data used activity code 44 as 'personal hygiene;' therefore, values of 0 were given to the AUT participants for Activity code 44. Table A-3 lists the Activity Codes for the merged datasets.

The next step in preparing the data for analysis was the creation of activity groups that consisted of the total number of minutes spent in related activities. Table B-1 contains a list of the new variables, their description, and the formulas for their construction.

Several activities from the merged file codes were not included in the above activity groups. Activity code 97, writing letters/paperwork was not included in any of the groups because of a change in the coding between the AUT and the FISCT data collections. The AUT coding defined this activity as writing for pleasure or correspondence. However, in the FISCT sample, this code represented writing for both pleasure and household paperwork. Household paperwork is not included in the AUT sample codes. In addition to the change in coding, the activity of writing did not fit well into a category and was not of importance to the study; therefore, it was not included in any of the activity groups. Another activity code that was not included in the above groups was 48. Activity code 48 was 'none of your business, private, sex, making out' in both samples. Because this code represents an ill-defined category and one cannot really be sure what constitutes 'none of your business,' it was not included in any of the groups. The last activity code that is not represented in the above groups is 42, help and care. This activity did not fit in the child care category because the recipient of the help or care was not defined, yet, this type of activity did not appear to fit in any other category and was not included.

The Table B-1 below provides a description of the constructed variable as well as the activity codes used in its construction.

Table B-1

Constructed Variables

Variable Name	Description	Summed Items
Worktime*	Sum of time spent in paid work or paid work related activities	01 Main Job 02 Unemployment 03 Travel during work 05 Second job 08 Meals at work 09 Travel to/from work
Mealtime	Sum of time spent in food preparation, eating, and food cleanup	10 Food preparation 11 Food cleanup 43 Eating
Hhlab*	Sum of time spent in cleaning inside and outside of house, laundry, animal care and other household care	12 Cleaning house 13 Outdoor cleaning 14 Clothes care 15 Car maintenance/Repair 16 Other repairs 17 Plant care 18 Animal care 19 Other household work

Table B-1

Constructed Variables

Variable Name	Description	Summed Items
		30 Shopping for food 31 Shopping for clothes/Household items 33 Medical appointments
Outside	Sum of time spent in outdoor cleaning, car repair, other repair, and plant care	13 Outdoor cleaning 15 Car maintenance/repair 16 Other repairs 17 Plant care
Ccare*	Sum of time spent in child care	20 Baby care (under 5y/o) 21 Child care (5+ y/o) 22 Helping/Teaching 23 Talking/reading/discipline 24 Indoor playing 25 Outdoor playing 26 Medical care child 27 Other child care 29 Travel related to child care
Pcare*	Sum of time spent in personal care	32 Personal care services 40 Showering/bathing

Table B-1

Constructed Variables

Variable Name	Description	Summed Items
		41 Medical care at home (self) 43 Eating 44 Personal hygiene 45 Sleeping/Napping 47 Dressing
Ed_Train	Sum of time spent in education or training	50 Attending FT school 51 Other classes 52 Other education 54 Homework/Studying 55 Using library 59 Travel, education
Svcs	Sum of time spent obtaining services from others	33 Medical Appointments 34 Gov't/Financial services 35 Car repair services 36 Other repair services 37 Other professional services

Table B-1

Constructed Variables

Variable Name	Description	Summed Items
		38 Errands
Active*	Sum of time spent in active leisure	80 Active Sports 81 Outdoor 82 Exercise 88 Other active leisure
Screen*	Sum of time spent in front of a screen	91 TV 92 Records/Tapes (includes VCR tapes in AUT sample) 72 Movies (includes VCR tapes in FISCT sample) 56 Using Internet 57 Playing games on PC 58 Other PC use
Travel	Sum of time spent traveling to and from Activities	09 Travel to/from work 29 Travel, child care 39 Travel, goods & services 49 Travel, personal care 59 Travel, education 69 Travel, organizational

Table B-1

Constructed Variables

Variable Name	Description	Summed Items
		79 Travel, social 89 Travel recreation 99 Travel, passive leisure
Volun	Sum of time spent volunteering	63 Volunteering/helping 66 Fraternal organizations 67 Children/Youth/Family 68 Other organizations
Relig	Sum of time spent in religious practice	64 Religious groups 65 Religious practice
Social	Sum of time spent in social activities	70 Sports events 71 Entertainment 73 Theater 74 Museums 75 Visiting 76 Parties 77 Bars/Lounges 78 Other social
Otherent	Sum of time spent in other entertainment	83 Hobbies

Table B-1

Constructed Variables

Variable Name	Description	Summed Items
		84 Domestic crafts 85 Art 86 Music/Drama/Dance 87 Games (parlor) 90 Radio
Read	Sum of time spent reading books, newspapers, and magazines	93 Reading books 94 Reading newspapers 95 Reading magazines
Conv	Sum of time spent in conversations	96 Conversations 53 Telephone conversations
Relax	Sum of time spent relaxing, thinking, doing nothing	98 Relaxing
Compuse*	Sum of time spent using computer or Internet	56 Using Internet 57 Playing games on PC 58 Other PC use
Sleep*	Sum of time spent sleeping	45 Sleeping/Napping/Resting
TV*	Sum of time spent watching tv	91 TV
Interact*	Sum of time spent in activities interacting with others	22 Helping/Teaching 23 Talking/Reading 24 Indoor playing

Table B-1

Constructed Variables

Variable Name	Description	Summed Items
		25 Outdoor playing 27 Other child care 43 Eating 66 Fraternal 68 Child/Youth/Family 75 Visiting 76 Parties 77 Bars/Lounges 80 Active Sports 87 Games (parlor)
Nature*	Categorical Dichotomous variable	0 = Solitary 1 = Joint
Solitary*	Sum of time spent alone in all activities except sleep	
Joint*	Sum of time spent in activities with spouse only, with children only, and with spouse and child in all activities	

Note: * represents an activity group of interest for this study

APPENDIX C.

Descriptive Statistics Tables

Table C-1

Descriptive Statistics for Activity Groups of Interest by Time Period, Sex of Respondent, and Level of Education

			AUT			FISCT		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std Dev.	N
Active Leisure	0-8th grade	Men	22.03	61.79	157	0.00	0.00	36
		Women	14.24	44.72	183	5.41	16.22	27
	Some High School	Men	24.38	64.54	197	45.20	81.35	51
		Women	10.11	38.42	252	6.58	30.10	73
	High School Grad	Men	29.17	75.99	777	28.26	70.45	180
		Women	12.14	38.86	1114	9.51	30.36	195
	Some College	Men	27.81	69.71	322	35.52	84.27	136
		Women	17.04	53.62	437	17.18	56.05	172

Table C-1

Descriptive Statistics for Activity Groups of Interest by Time Period, Sex of Respondent, and Level of Education

			AUT			FISCT		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std Dev.	N
	College Grad	Men	23.57	63.45	327	29.52	69.50	83
		Women	14.41	39.07	338	24.62	56.50	76
	Post Graduate	Men	20.44	53.81	163	29.95	66.96	53
		Women	21.33	50.15	123	28,06	68.92	18
	Total	Men	26.21	69.02	1943	29.66	72.83	539
		Women	13.74	42.93	2447	13.93	44.93	561
Total Screen Time	0-8th grade	Men	197.90	167.27	157	208.47	249.59	36
		Women	201.97	174.74	183	169.07	204.84	27
	Some High School	Men	177.73	156.09	197	149.90	193.58	51
		Women	168.80	138.93	252	192.04	218.24	73
	High School Grad	Men	152.48	146.77	777	135.93	155.21	180
		Women	146.20	129.58	1114	124.45	132.41	195

	Some College	Men	130.85	127.33	322	139.01	164.50	136
		Women	107.05	118.48	437	135.15	159.87	172
	College Grad	Men	115.20	119.19	327	119.04	128.81	83
		Women	97.23	108.16	338	114.20	142.41	76
	Post Grad	Men	121.33	117.48	163	137.17	137.02	53
		Women	93.55	96.51	123	101.39	133.27	18
	Total	Men	146.24	141.83	1943	140.40	164.57	539
		Women	136.30	131.92	2447	136.55	160.68	561
Household Labor	0-8th grade	Men	123.50	140.50	157	136.81	93.26	36
		Women	234.16	155.06	183	123.52	109.18	27
	Some High School	Men	120.58	157.78	197	167.14	199.85	51
		Women	191.06	138.17	252	169.58	183.62	73
	High School Grad	Men	103.07	128.47	777	113.53	134.32	180
		Women	203.26	148.35	1114	191.42	162.05	195
	Some College	Men	98.57	132.79	322	93.16	107.42	136
		Women	187.21	155.89	437	151.31	140.24	172

	College Grad	Men	108.33	130.72	327	100.92	124.03	83
		Women	184.40	14275	338	177.42	165.71	76
	Post Grad	Men	102.56	125.46	163	110.28	127.68	53
		Women	184.24	168.30	123	163.11	164.52	18
	Total	Men	106.59	133.60	1943	112.76	139.28	539
		Women	197.89	149.95	561	192.73	151.79	3008
Childcare	0-8th grade	Men	6.15	24.64	157	29.03	75.17	36
		Women	20.33	53.08	183	25.00	62.77	27
	Some High School	Men	8.42	32.12	197	8.24	20.85	51
		Women	31.58	73.02	252	59.04	98.31	73
	High School Grad	Men	11.53	45.08	777	27.58	74.98	180
		Women	39.07	80.82	1114	54.90	109.97	195
	Some College	Men	8.70	30.73	322	18.66	51.97	136
		Women	35.86	79.35	437	49.75	100.52	172
	College Grad	Men	17.30	53.18	327	21.72	53.68	83
		Women	45.96	92.04	338	58.70	93.22	76

	Post Grad	Men	11.39	26.59	163	42.51	98.11	53
		Women	26.28	56.94	123	17.89	49.27	18
	Total	Men	11.27	21.32	1943	24.16	66.30	539
		Women	36.63	78.84	2447	51.75	100.14	561
Personal Care	0-8th grade	Men	643.62	141.54	157	644.31	233.71	36
		Women	661.73	150.43	183	753.15	240.55	27
	Some High School	Men	620.59	149.92	197	636.22	136.82	51
		Women	634.49	134.61	252	664.14	162.05	73
	High School Grad	Men	593.27	133.66	777	611.96	199.61	180
		Women	619.67	130.89	1114	600.86	132.68	195
	Some College	Men	602.01	125.71	322	566.13	154.21	136
		Women	609.23	122.56	437	602.20	126.07	172
	College Grad	Men	598.62	132.37	327	612.25	146.11	83
		Women	613.06	118.65	338	593.20	128.37	76
	Post Grad	Men	596.67	116.09	163	606.04	154.30	53
		Women	597.50	130.00	123	619.83	110.36	18

	Total	Men	602.74	133.80	1943	604.31	175.14	539
		Women	620.45	130.40	2447	616.40	144.95	561
Paid Work	0-8th grade	Men	189.93	279.83	157	193.89	259.75	36
		Women	55.44	150.89	183	158.81	249.96	27
	Some High School	Men	275.74	298.17	197	162.43	256.87	51
		Women	150.76	232.45	252	146.79	256.55	73
	High School Grad	Men	309.22	299.77	777	320.28	322.25	180
		Women	173.90	246.16	1114	236.54	274.37	195
	Some College	Men	301.76	294.37	322	314.26	315.60	136
		Women	205.58	265.26	437	236.49	269.05	172
	College Grad	Men	334.82	292.15	327	332.83	307.40	83
		Women	196.70	248.40	338	241.66	266.28	76
	Post Grad	Men	314.87	284.02	163	317.68	292.07	53
		Women	231.36	281.17	123	225.72	281.97	18
	Total	Men	296.69	296.78	1943	297.06	309.26	539
		Women	174.35	247.61	2447	221.50	291.94	561

Computer Use	0-8th grade	Men	N/A	N/A	N/A	9.722	40.65	36
		Women	N/A	N/A	N/A	0.00	0.00	27
	Some High School	Men	N/A	N/A	N/A	0.00	0.00	51
		Women	N/A	N/A	N/A	3.49	29.85	73
	High School Grad	Men	N/A	N/A	N/A	6.25	38.83	180
		Women	N/A	N/A	N/A	3.05	23.23	195
	Some College	Men	N/A	N/A	N/A	11.21	47.88	136
		Women	N/A	N/A	N/A	12.40	69.76	172
	College Grad	Men	N/A	N/A	N/A	14.40	38.80	83
		Women	N/A	N/A	N/A	8.68	31.47	76
	Post Grad	Men	N/A	N/A	N/A	17.83	54.52	53
		Women	N/A	N/A	N/A	5.00	15.43	18
	Total	Men	N/A	N/A	N/A	9.54	41.53	539
		Women	N/A	N/A	N/A	6.65	44.11	561

Table C-2

Descriptive Statistics for Activity Groups of Interest by Computer Ownership, Sex of Respondent, and Level of Education

			Computer Owners			Computer Non-owners		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Active Leisure	0-8th grade	Men	0.00	0.00	6	0.00	0.00	28
		Women	0.00	0.00	10	8.59	19.96	17
	Some High School	Men	0.00	0.00	2	42.63	86.29	40
		Women	0.00	0.00	14	8.89	24.49	54
	High School Grad	Men	30.51	92.24	47	24.50	54.03	107
		Women	5.60	14.90	50	10.00	34.53	113
	Some College	Men	73.00	139.59	20	32.65	86.82	51
		Women	23.04	55.28	57	7.48	35.10	66
	College Grad	Men	20.00	49.12	17	45.75	92.23	20
		Women	27.36	74.24	28	29.52	52.84	21
	Post Grad	Men	33.00	59.25	15	25.25	73.08	20

Table C-2

Descriptive Statistics for Activity Groups of Interest by Computer Ownership, Sex of Respondent, and Level of Education

			Computer Owners			Computer Non-owners		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std. Dev.	N
		Women	74.17	108.00	6	0.00	0.00	6
	Total	Men	34.85	91.78	107	27.86	69.48	266
		Women	16.99	51.04	165	10.36	35.56	277
Total Screen Time	0-8th Grade	Men	195.00	82.16	6	213.75	281.69	28
		Women	54.00	1006.35	10	236.76	220.63	17
	Some High School	Men	180.00	0.00	2	160.13	210.96	40
		Women	218.93	274.96	14	177.02	200.33	54
	High School Grad	Men	102.77	115.95	47	147.50	166.60	107
		Women	105.34	128.93	50	140.14	140.53	113
	Some College	Men	119.00	117.19	20	160.80	200.18	51
		Women	147.82	151.92	57	141.06	162.52	66
	College Grad	Men	62.65	77.92	17	127.00	186.21	20

Table C-2

Descriptive Statistics for Activity Groups of Interest by Computer Ownership, Sex of Respondent, and Level of Education

			Computer Owners			Computer Non-owners		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std. Dev.	N
		Women	117.11	146.11	28	140.48	157.50	21
	Post Grad	Men	121.67	185.97	15	134.50	116.29	20
		Women	109.17	164.09	6	115.83	151.74	6
	Total	Men	108.69	122.54	107	156.41	192.97	266
		Women	128.68	158.63	165	152.98	166.33	277
HHLab	0-8th Grade	Men	182.50	13.69	6	135.36	216.58	28
		Women	161.50	124.01	10	101.18	96.38	17
	Some High School	Men	60.00	0.00	2	185.10	204.61	54
		Women	105.36	42.31	14	191.65	204.61	54
	High School Grad	Men	149.57	160.03	47	98.23	118.18	107
		Women	195.78	168.29	50	192.14	160.61	113
	Some College	Men	167.30	169.29	20	82.16	71.11	51

Table C-2

Descriptive Statistics for Activity Groups of Interest by Computer Ownership, Sex of Respondent, and Level of Education

			Computer Owners			Computer Non-owners		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std. Dev.	N
		Women	168.30	131.57	57	143.39	128.29	66
	College Grad	Men	151.17	177.92	17	88.95	111.32	20
		Women	189.29	190.73	28	185.90	166.78	21
	Post Grad	Men	66.00	69.31	15	129.50	159.89	20
		Women	157.50	125.33	6	210.17	179.06	6
	Total	Men	141.60	151.22	107	113.77	148.27	266
		Women	174.04	149.81	165	174.77	162.18	277
Child Care	0-8th Grade	Men	122.50	134.19	6	0.00	0.00	28
		Women	67.5	90.53	10	0.00	0.00	17
	Some High School	Men	0.00	0.00	2	4.5	16.00	40
		Women	85.71	119.34	14	57.59	95.49	54
	High School Grad	Men	44.02	80.61	47	26.03	79.95	107

Table C-2

Descriptive Statistics for Activity Groups of Interest by Computer Ownership, Sex of Respondent, and Level of Education

			Computer Owners			Computer Non-owners		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std. Dev.	N
		Women	66.78	124.91	50	45.85	85.18	113
	Some College	Men	38.00	88.09	20	16.86	52.29	51
		Women	46.05	82.08	57	54.09	106.68	66
	College Grad	Men	22.12	42.65	17	27.25	77.14	20
		Women	68.25	91.70	28	52.62	57.06	21
	Post Grad	Men	41.67	75.04	15	36.00	94.04	20
		Women	40.33	82.84	6	0.00	0.00	6
	Total	Men	42.66	80.91	107	19.14	65.49	266
		Women	60.56	101.50	165	46.81	90.26	277
Personal Care	0-8th Grade	Men	745.00	120.50	6	638.75	249.21	28
		Women	658.60	63.82	10	808.76	287.86	17
	Some High School	Men	635.00	0.00	2	644.55	153.66	40

Table C-2

Descriptive Statistics for Activity Groups of Interest by Computer Ownership, Sex of Respondent, and Level of Education

			Computer Owners			Computer Non-owners		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std. Dev.	N
		Women	632.14	205.43	14	565.61	149.08	54
	High School Grad	Men	603.61	199.05	47	626.95	204.26	107
		Women	575.26	117.13	50	619.69	144.60	113
	Some College	Men	580.65	68.74	20	551.55	178.84	51
		Women	618.25	106.53	57	617.88	140.11	66
	College Grad	Men	656.52	218.10	17	622.80	108.14	20
		Women	574.00	162.62	28	618.24	78.84	21
	Post Grad	Men	623.67	128.19	15	603.05	199.14	20
		Women	635.00	126.81	6	582.83	114.08	6
	Total	Men	619.07	172.02	107	614.27	192.99	266
		Women	601.95	130.93	165	637.15	158.30	277
Paid Work	0-8th Grade	Men	135.00	147.89	6	172.50	255.69	28

Table C-2

Descriptive Statistics for Activity Groups of Interest by Computer Ownership, Sex of Respondent, and Level of Education

			Computer Owners			Computer Non-owners		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std. Dev.	N
		Women	383.30	272.40	10	26.76	98.83	17
	Some High School	Men	495.00	0.00	2	182.35	269.13	40
		Women	113.93	226.39	14	157.06	272.20	54
	High School Grad	Men	346.60	328.20	47	299.40	322.70	107
		Women	333.00	268.56	50	170.51	255.81	113
	Some College	Men	237.15	309.01	20	308.92	293.20	51
		Women	223.00	247.57	57	231.11	274.33	66
	College Grad	Men	365.18	369.52	17	289.65	255.16	20
		Women	212.54	251.00	17	235.95	297.66	21
	Post Grad	Men	374.67	296.86	15	292.70	313.58	20
		Women	295.50	261.11	6	153.33	247.52	6
	Total	Men	323.93	319.37	107	269.03	299.64	266

Table C-2

Descriptive Statistics for Activity Groups of Interest by Computer Ownership, Sex of Respondent, and Level of Education

			Computer Owners			Computer Non-owners		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std. Dev.	N
		Women	257.65	261.42	165	178.09	262.80	277
Computer Use	0-8th Grade	Men	0.00	0.00	6	0.00	0.00	28
		Women	0.00	0.00	10	0.00	0.00	17
	Some High School	Men	0.00	0.00	2	0.00	0.00	40
		Women	18.21	68.15	14	0.00	0.00	54
	High School Grad	Men	1.06	7.29	47	.84	8.70	107
		Women	4.70	23.91	50	0.00	0.00	94
	Some College	Men	1.50	6.71	20	0.00	0.00	51
		Women	9.56	32.06	57	1.44	7.33	66
	College Grad	Men	0.00	0.00	17	3.00	13.42	20
		Women	16.43	45.48	28	0.00	0.00	21
	Post Grad	Men	1.33	5.16	15	0.00	0.00	20

Table C-2

Descriptive Statistics for Activity Groups of Interest by Computer Ownership, Sex of Respondent, and Level of Education

			Computer Owners			Computer Non-owners		
Activity Group	Education	Sex	Mean	Std. Dev.	N	Mean	Std. Dev.	N
		Women	0.00	0.00	6	10.00	24.49	6
	Total	Men	0.93	4.36	107	.56	6.62	266
		Women	9.06	35.51	165	.56	5.09	277