2003

A Study of the Relationship Between Loneliness and Internet Use Among University Students

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A STUDY OF THE RELATIONSHIP BETWEEN LONELINESS AND INTERNET USE AMONG UNIVERSITY STUDENTS

A Dissertation

Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

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January 2003

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To Nathan and Iris Glee Dittmann ("Grandma")

The first of a new generation
and a blessed memory from another.

ABSTRACT

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ABSTRACT OF GRADUATE STUDENT RESEARCH

Dissertation

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Title: A STUDY OF THE RELATIONSHIP BETWEEN LONELINESS AND INTERNET USE AMONG UNIVERSITY STUDENTS

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Name and degree of faculty chair: Nancy J. Carbonell, Ph.D.

Date completed: December, 2002

Problem

Research investigating the relationship between loneliness and various dimensions of Internet use is mixed. While some studies support the connection, other studies refute the link. More analysis in this area is needed to help clinicians, parents, college students, school counselors, and educators better understand the effects of the Internet on college-age students. This study attempts to expand understanding of the conflictual relationship that exists between loneliness and the dynamics of Internet use in undergraduate students.

Method

Four-hundred sixty-six randomly selected Andrews University undergraduate

students who lived in residence halls, university apartments, and the community completed the UCLA Loneliness Scale (Version 3) and the Internet Use Survey, a questionnaire developed by the researcher. Demographic information was also collected. Analysis of variance, multiple regression, and correlational analyses were performed to test the hypotheses of the study.

Results

Overall, results indicate the Internet does not seem to be influencing the loneliness levels in undergraduate students. Specifically, the amount of Internet use, type of Internet use, history of Internet use, reasons for using the Internet, preference for the Internet as a mode of communication, preference for type of Internet activity, and the changes in face-to-face interaction, talking on the phone, and overall communicating with family, friends, and others (besides family and friends) since using the Internet have a minimal effect on the loneliness experienced in undergraduate students.

Conclusions

In this study, Internet use does not contribute to loneliness among undergraduates using the Internet less than 40 hours per week. For most, use of the Internet is both highly enjoyable and useful. Loneliness is more prevalent in the few who use the Internet more than 40 hours per week and in those who prefer the Internet over face-to-face interaction or talking on the phone. Results showed an inverse relationship between loneliness and the number of years a student had used the Internet. Newer users are at a slightly higher risk of experiencing loneliness than those with a longer history of Internet use. Previous research has questioned the importance of Internet use as a contributing

factor in loneliness. In this study, the empirical findings regarding the overall relationships of loneliness and Internet use were weak.

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ACKNOWLEDGMENTS

God has placed so many people in my life who have continually supported and encouraged me throughout this entire process. I am deeply grateful to the following people who made this project possible.

My Professors: Dr. Carbonell--Thank you for your calm reassurance and belief in me during this project. I appreciated all of your time and invaluable guidance. Thank you for always challenging me and helping me develop skills I will use throughout my entire life. Dr. Thayer--I am sincerely grateful to you for teaching me so much and devoting so much time to me during my time at Andrews. I will always remember your patience, your kindness, and your unbelievable knowledge of statistics. It is an honor to have had an opportunity to learn from you. Dr. Waite--Thank you for placing confidence in me and supporting me throughout this project. I appreciate the time you devoted towards its completion. I have learned so much about the world of higher education from you, and I thank you.

My Family: Mom and Dad--the two most amazing people in my life. You have gone above and beyond the call of duty throughout my entire life. Words could not even come close to describing what you mean to me. Thank you for giving me your trust, your confidence, and, most importantly, your unconditional love and support. David--I have always looked up to my big brother. Thanks for being such a great role model. Your unlimited generosity, humor, and encouraging attitude are truly unique gifts. Melissa--

The courage and determination you demonstrate in your daily life are continually inspiring. You may be my little sister, but I learn from you everyday. Thank you for always making me smile and, most of all, for being my best friend. Shannon--I can't imagine our family without you. Your kindness, encouragement, and thoughtfulness are continually appreciated. Grandma and Grandpa Chapman, and Grandpa Dittmann--Your support has never wavered. It is truly an honor to be one of your grandchildren. Thank you for believing in me from day one. Grandma Dittmann--While you can't be here with me, you are remembered daily. The love, generosity, and faith that you always demonstrated to me will motivate me in the challenges I face throughout my entire life.

Last but not least: Thanks to the residence hall deans. Thanks to Bonnie Proctor for your always prompt and helpful feedback. Dr. Bailey--Thanks for helping me through a "disaster" or two and providing so much support throughout the difficult phases of this project. Your willingness to spend time with me did not go unnoticed and was highly appreciated. Jason--Thank you so much for all of the hours you spent helping me during data collection and being so encouraging to me during this project. And, thanks to Mark for the countless hours you spent helping me gather surveys. You have been with me every step of the way, and I will always be grateful. Thank you for all you have given to me in the past three years.

CHAPTER 1

INTRODUCTION

Background of the Study

Loneliness, a pervasive condition, afflicts all types of individuals regardless of race, gender, age, or cultural history (Rokach & Bacanli, 2001). The universal phenomena, recognized as a perpetually common problem, was heavily studied in the late 1970s through the 1980s, but received less attention in the 90s. In 1969, when asked to reflect over the past few weeks, approximately 26% of Americans surveyed felt "very lonely or remote from other people" (Bradburn, 1969, p. 56). Rokach and Brock (1997) reported similar proportions.

Loneliness seems to be especially prevalent among college students (e.g., Jones, Cavert, Snider, & Bruce, 1985; Moore & Schultz, 1983; Roscoe & Skomski, 1989; Schultz & Moore, 1986) with an estimated 30% of college students reporting loneliness as a problem (McWhirter, 1997). Loneliness is found to be particularly intense in traditional-age college students, especially freshmen (Cutrona, 1982; Diamant & Windholz 1981; Pearl, Klopf, & Ishii, 1990; Phillips & Pederson, 1972; Rubenstein & Shaver, 1982) due, in part, to emerging needs for intimacy during this transition from adolescence to adulthood (Hamachek, 1990; Sullivan, 1953; Weiss, 1973). In addition, going off to college for the first time separates one from one's parents, nearby emotional support

becomes scarce, family contact becomes limited, and the individual faces the difficulty of developing a whole new set of relationships.

The disturbance in current attachment patterns and the nascent trends toward independence, autonomy, individuality, separateness, and responsibility can create more intense needs for emotional attachment along with an increased susceptibility towards loneliness (Brennan, 1982). While a striving for independence emerges, a sense of dependence may still exist (Roscoe & Skomski, 1989). This new experience of vulnerability in an adult world may develop into loneliness in young adults (Williams, 1983).

Research has associated loneliness with several variables. Jones (1985) identifies four groups of variables that classify various factors related to loneliness. The first category, inadequate social skills, includes poor social skills (Jones, Freemon, & Goswick, 1981; Wittenberg & Reis, 1986), lower attentiveness and interest in others (Jones, Hobbs, & Hockenbury, 1982), a greater self-focus (Gerson & Perlman, 1979; Jones et al., 1982; Peplau & Perlman, 1982), less assertiveness (Brennan, 1982; Cutrona, 1982; Diamant & Windholz, 1981; Gerson & Perlman, 1979; Jones et al., 1981), and inexpressiveness (Diamant & Windholz, 1981; Gerson & Perlman, 1979; Hansson & Jones, 1981).

The second category, emotional arousal and conflict, includes associations between loneliness and depression (Diamant & Windholz, 1981; Fromm-Reichmann, 1959; Gaev, 1976; Hojat, 1982; Horowitz, French, & Anderson, 1982; Jackson & Cochran, 1991; Levin & Stokes, 1986; Loucks, 1980; Moore & Schultz, 1983; Russell, Peplau, & Cutrona, 1980; Russell, Peplau, & Ferguson, 1978; Weeks, Michela, Peplau, & Bragg, 1980; Young, 1982) and anxiety (Applebaum, 1978; Fromm-Reichmann, 1959;

Hays & DiMatteo, 1987; Hojat, 1982; Jones et al., 1981; Levin & Stokes, 1986; Russell et al., 1978; Solano & Koester, 1989).

The last two categories, poor self-regard and negativistic attitudes, include such factors as low self-esteem (Cutrona, 1982; Goswick & Jones, 1981; Hojat, 1982; Jackson & Cochran, 1991; Jones et al., 1981; Loucks, 1980; Russell et al., 1980; Russell et al., 1978; Young, 1982), aggression (Diamant & Windholz, 1981; Jackson & Cochran, 1991), an external locus of control (Diamant & Windholz, 1981; Hojat, 1982; Jones et al., 1981; Moore & Schultz, 1983; Stokes, 1985), hostility (Mijuskovic, 1996; Sadler, 1978; Sermat, 1980) a pessimistic view of others (Anderson, Horowitz, & French, 1983; Jones et al., 1981; Jones et al., 1982; Wittenberg & Reis, 1986), and hopelessness (Diamant & Windholz, 1981).

Recently, a highly publicized link between loneliness and various aspects of Internet use (Kraut et al., 1998) has spurred additional research. Some researchers report a relationship between various aspects of Internet use and loneliness (Loytsker & Aiello, 1997; Moody, 2001; Morahan-Martin & Schumacher, 2000). Specifically, Kraut et al.'s (1998) well-known study follows 93 families during their first 1 to 2 years on the Internet. Results suggest higher levels of Internet use are associated with increases in loneliness. Although this study draws criticism due to its small sample size, failure to randomly select participants, and the absence of a control group, Morahan-Martin and Schumacher (2000) also report a link between various aspects of Internet use and loneliness. In their study of 277 undergraduate Internet users, pathological users were significantly lonelier. In addition, they also later reported that participants testing high for loneliness are more

likely to use the Internet and email than were non-lonely subjects (Morahan-Martin & Schumacher, in review).

Kraut et al. (2002), in a more recent study, now discredit the link between loneliness and various aspects of Internet use, reporting that most of the negative effects found in Kraut et al.'s (1998) earlier study have dissipated after 3 years. In addition, similar findings were reported in a replication of the 1995-1996 study in 1998-1999. Kraut et al. (2002) stated that a correlation between loneliness and various aspects of Internet use was no longer apparent in his subjects. Another study by McKenna, Green, and Gleason (2002) found 6% of 145 users felt lonelier from using the Internet, while 47% actually reported that the Internet helped lessen individual feelings of loneliness.

While research on the impact of problems associated with the Internet is in its infancy (Greenfield, 1999), researchers agree that the Internet is influencing a growing number of people in society, whether it be positive or negative. The Internet has been described as "the fastest growing electronic technology in world history," (UCLA Center for Communication Policy, 2000) with an estimated 513 million people utilizing the Internet worldwide ("How Many Online?" 2001). The massive usage alone makes research in this area extremely important.

As Young (1996) suggests, characteristics of excessive Internet users match behavioral patterns in compulsive gamblers and alcoholics. The Internet addicts are unable to gain control, much like alcoholics who cannot control their drinking enough to avoid negatively impacting areas in their life. As in all other addictions, the Internet's influence on psychological health, social involvement, and/or academic achievement have

potentially enormous consequences on an individual's well-being. Prevention programs similar to any other addiction may need to be implemented at schools.

The vast array of information available, along with a totally new dimension of communication power, is driving the expansion of Internet use on college campuses at an astonishing rate. In fact, 28% of those who have access to the Internet are college students (Scherer, 1997). Students easily acquire access to the Internet, often at no charge. This places them among the prime targets for a malady described as Internet addiction, extant in approximately 8-13% of college students who have unhealthy Internet use (Anderson, 2001; Morahan-Martin & Schumacher, 2000; Scherer, 1997). Some researchers suggest that college students are at heightened risk for abusing the Internet (Kandell, 1998; Morahan-Martin & Schumacher, 2000) because of the particularly difficult developmental period they endure as they attempt to create a solid sense of self-identity and develop meaningful, intimate relationships (Kandell, 1998).

Specifically, Internet-dependent behavior appears to negatively impact marriages, class attendance, self-esteem, and impulsivity (Armstrong, Phillips, & Saling, 2000; Hellerstein, 1985; Young, 1996), and other studies conclude that excessive Internet users appear to be lonelier and more depressed (Morahan-Martin & Schumacher, 2000; Young, 1998). Internet addiction has been linked to significant impairment in academic, relationship, financial, and occupational pursuits (Young, 1996).

As we can see, the results of various studies in this area are inconclusive. More studies are needed to better understand how Internet use affects college students today, especially with regard to their social growth. Loneliness ranks fifth among the common health problems facing college students (Peplau, Russell, & Heim, 1979). If the Internet

appears to exacerbate this already "widely distributed and severely distressing" condition (Weiss, 1973, p. 9), university officials may be virtually forced to reconsider their individual policies for Internet availability and access.

Statement of the Problem

Research investigating the relationship between loneliness and various dimensions of Internet use is mixed. While some studies support the connection (Kraut et al., 1998; Loytsker & Aiello, 1997; Moody, 2001; Morahan-Martin & Schumacher, 2000), other studies refute the link (Kraut et al., 2002; McKenna et al., 2002). More analysis in this area is needed to help clinicians, parents, college students, school counselors, and educators better understand the effects of the Internet on college-age students. This study will attempt to expand understanding of the conflictual relationship that exists between loneliness and the dynamics of Internet use in undergraduate students.

Purpose of the Study

The primary purpose of this study is to examine the relationship between loneliness and various aspects of Internet use in college students. It will also attempt to explore if variables such as type of Internet use, history of Internet use, reasons for using the Internet, preference for the Internet as a mode of communication, preference for type of Internet activity, and the changes in face-to-face interaction, phone contact, and overall communication with family, friends, and others (besides family and friends) since using the Internet, have an effect on the loneliness experienced by undergraduate students.

Research Questions

The following research questions will be addressed:

1. How does the amount of time undergraduate students spend on the Internet relate to their loneliness?

2. Does the type of Internet use relate to loneliness in undergraduate students?

3. Are undergraduate students, who have a longer history of Internet use, more or less lonely?

4. Are individual reasons for using the Internet related to loneliness in undergraduate students?

5. Does a student's preference for the Internet as a mode of communication relate to loneliness?

6. Does a student's preference for type of Internet use relate to loneliness?

7. Does the Internet impact the amount of time a student spends face to face with family, friends, and others (besides family and friends), talking on the phone with family, friends, and others (besides family and friends), and communicating with family, friends, and others (besides family and friends), and how does this relate to loneliness?

8. Does the amount of Internet use, type of Internet use, history of Internet use, reasons for Internet use, preference for Internet use, preference for type of Internet use, and change in face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends) since using the Internet relate to loneliness in undergraduate students?

9. Do the demographic characteristics of the Internet user relate to loneliness in undergraduate students?

Hypotheses

From these nine research questions, this study investigates eight major hypotheses, with hypotheses 1 through 7 each having five additional sub-hypotheses exploring the impact of age, class, gender, ethnicity, and housing on loneliness.

Hypothesis 1: There will not be a statistically significant relationship between the amount of time an undergraduate student spends regularly on the Internet and his or her loneliness.

Hypothesis 2: There will not be a statistically significant relationship between loneliness and type of Internet use in undergraduate students.

Hypothesis 3: There will not be a statistically significant relationship between history of Internet use and loneliness in undergraduate students.

Hypothesis 4: There will not be a statistically significant relationship between individual reasons for using the Internet and loneliness in undergraduate students.

Hypothesis 5: There will not be a statistically significant relationship between a student's preference for the Internet as a mode of communication and loneliness.

Hypothesis 6: There will not be a statistically significant relationship between a student's preference for type of Internet use and loneliness.

Hypothesis 7: There will not be a significant relationship between loneliness and the impact the Internet has had on the amount of time a student spends face to face with family, friends, and others (besides family and friends), talking on the phone with family, friends, and others (besides family and friends), and communicating with family, friends, and others (besides family and friends).

Hypothesis 8: There will not be a statistically significant relationship between loneliness and the amount of Internet use, history of Internet use, reasons for Internet use, preference for Internet use as a mode of communication, preference for type of Internet use, and the amount of time a student spends on face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends) since using the Internet in undergraduate students.

Significance of the Study

Research emphasizes the pervasiveness and distressing effects of loneliness (Jones, Rose, & Russell, 1990; Rokach, 1998; Rokach & Brock, 1998). In college students, dropout rates, suicidal ideation, and alcoholism have been linked with loneliness (Cutrona, 1982; Medora & Woodward, 1986; Rotenberg & Morrison, 1993). As described previously, loneliness has been associated with a number of variables. It is important to determine if the Internet may be related to these already existing difficulties.

Further, results of this study have the potential to benefit clinicians, parents, college students, and school counselors. In conceptualizing the difficulties college students are facing, clinicians, parents, and school counselors may need to include Internet use as a potentially prominent factor in explaining behavioral issues. By extending understanding of the relationships between various aspects of Internet use and loneliness, this study will serve as one element of an expanding body of research dealing with the impact of new breakthrough technologies on psychological well-being.

Theoretical Framework

Although loneliness has always been a common problem, no consensus currently exists on a definition of the phenomena, possibly due to so many varying theoretical perspectives. The cognitive approach, which is the most researched of all theoretical approaches to loneliness, corresponds with the phenomenological approach to psychology with its emphasis on subjective perceptions. The cognitive approach stresses the normality of the phenomena and describes loneliness as a state of mind produced by an individual's thoughts. This unidimensional approach de-emphasizes specific causes of loneliness while focusing instead on general, underlying features (Peplau, Miceli, & Morasch, 1982; Peplau et al., 1979). This perspective describes the influence of cognitive processes on regulating the intensity of loneliness. Loneliness results when there is a perceived numerical and/or qualitative discrepancy between an individual's actual and desired interpersonal relationships (Peplau et al., 1979). Not only has this definition functioned as the primary basis for most loneliness research, it will also serve as the central definition for this research.

While the cognitive approach minimizes causal factors, it does address precipitating events and factors that can create a discrepancy between the person's desired and actual interpersonal relationships. Specifically, events that can affect a college student, such as leaving family and friends for college, the breakup of a romantic relationship, problems with friends and roommates, and difficulties with schoolwork, may create a discrepancy between actual and desired interpersonal relationships, which could lead to loneliness (Cutrona, 1982).

In addition, Erikson's theory of psychosocial development (Erikson, 1950) concurs with trends in loneliness in which loneliness peaks among late adolescents and early adults and decreases thereafter (Rubenstein & Shaver, 1980). According to Erikson's theory, in the late adolescent and young adulthood stage, each person faces the tasks of separating himself or herself from families of origin and attempts to establish meaningful identities of his or her own, leading to intimate relationships (Erikson, 1950). According to Erikson (1968), true intimacy can only be achieved once one has solved his or her identity struggles. If intimate relationships are not developed, a profound sense of isolation is likely.

Hamachek (1990) describes tendencies of isolated individuals to include: absence of a strong identity, intolerance of differences in others, preference for more isolation from others, and difficulty expressing feelings. Isolated individuals are further characterized as having less empathy (Gold & Rogers, 1995) and lacking in enduring relationships (Orlofsky, Marcia, & Lesser, 1973). Further, this "intimacy versus isolation" stage encountered by young adults (Erikson, 1950, 1968) can often result in young people being disappointed with their actual relationships when compared to their notion of ideal ones, which then leads to loneliness. Loneliness can hinder resolution of identity and intimacy concerns during this time (Ponzetti & Cate, 1988).

Thus, factors contributing to loneliness in college students appear to include cognitive development and developmental tasks (e.g., separation from parents, search for identity, and establishment of intimate relationships). External, environmental factors can interfere with these factors and influence the development of loneliness by disturbing the balance between needed and available relationships (Jones, Cavert, et al., 1985) and result

in loneliness. Regardless, the emergence of loneliness is a subjective experience often dependent on how the individual perceives his or her relationships.

An additional reason for this investigation was to further explore personal observations of my undergraduate and graduate experiences. "Internet junkies," a term used to describe those who use the Internet excessively, would commonly miss classes, fail to fulfill commitments, be unable to maintain long-standing friendships or relationships, and even drop out of school. I wondered if they slowly lost more contact with the "real world." Perhaps, they felt this unnatural situation as a gnawing and increasingly painful isolation, which motivated them to use the Internet even more to fill the void. For some students, this downward spiral of Internet use may have contributed to uncomfortable feelings of loneliness and, in turn, caused more Internet addiction, thus leading one to ineffectively function and meet academic commitments. The implications of this phenomenon on a significant proportion of an entire age group would indeed have major implications for society.

College-age students face a critical time in which necessary skills need to be developed that will no doubt impact them for the rest of their lives. The Internet, described as the "ultimate isolating technology" (Nie & Erbring, 2000), is readily accessible, especially on college campuses. If students do not have Internet access in their residence hall room, they will likely have an overabundance of nearby options. Use of the Internet has the potential to exacerbate this already difficult time and hinder resolution of the internal struggles that these students encounter, ultimately leading to a "breakdown in social interactions" or loneliness (Peplau & Perlman, 1982, p. 2). The cognitive approach

and other theories describe loneliness as a "normal" experience; however, this phenomenon is far from pleasant and can clearly lead to devastating outcomes.

Definition of Terms

Internet: Known as the "information highway;" a complex web of computer networks allowing users to exchange text, sound, video, and images (Koomen, 1997).

Internet use: Any time spent on the Internet sending and receiving email, newsgroups, Bulletin Board Services, Multi-User Dimensions (MUDs), instant messaging, chat rooms, and/or "surfing" the net.

Internet addiction: While no official diagnosis of "Internet addiction" exists, several researchers have proposed definitions. Kandell (1998) characterizes the phenomena as a "psychological dependence" that is not affected by the use of a particular Internet activity. He describes four characteristics of Internet addiction which include: increasing investment of resources on Internet-related activities, displeasing feelings when not logged on, rising tolerance of being online, and denial of troublesome behaviors.

Loneliness: A perceived discrepancy between an individual's actual and desired interpersonal relationships. Individual satisfaction and/or dissatisfaction with current social relationships will be measured using the UCLA Loneliness Scale (Version 3) (Russell, 1996).

Delimitations

The sample was restricted to undergraduate university students enrolled at

Andrews University. Thus, generalization of the results is limited to this population.

Limitations

The following limitations were inherent in the study design:

1. The instruments used to gather the data may limit potential conclusions of this study. The Internet Use Survey and UCLA Loneliness Scale (Version 3) are both self-report instruments, which could lead to social-desirability concerns influencing students' responses.

2. The students in this sample may not be comparable to those in other universities and colleges due to the potential differences in academic, cultural, and personal characteristics of Andrews University students.

3. Since loneliness measures were not available prior to Internet use, cause-and-effect interpretation could not be determined.

Organization of the Study

This study consists of five chapters.

Chapter 1 presents an overview of the study consisting of an introduction to loneliness and the Internet, statement of the problem, purpose of the study, research questions, significance of the study, a theoretical background of the study, definitions of terms, delimitations, and limitations.

Chapter 2 contains a discussion of the literature on loneliness, the Internet, and the relationship between each.

Chapter 3 presents the methodology implemented for data collection and data analysis used in the study. This includes descriptions of the sample, instrumentation, procedures, hypotheses, and statistical analyses used in the study.

Chapter 4 reports the findings of the study, which includes demographics of the obtained sample, results of the UCLA Loneliness Scale (Version 3) and the Internet Use Survey, and the interaction between each instrument. This chapter presents a description of the sample, a discussion of preliminary analyses, a description of subgroups analyzed, the results of each hypothesis, a summary of significant findings, and a summary of the chapter.

Chapter 5 includes a summary and discussion of the results of the study followed by a description of the implications and recommendations for future research.

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this chapter is to provide relevant background research for the present study. Discussions on loneliness, Internet use, and college students are explored.

An Introduction to Loneliness

Although loneliness has always been a perpetually common problem affecting all types of individuals regardless of race, gender, age, or cultural history (Rokach & Bacanli, 2001), little research was completed until the 1970s. A major reason was the absence of an adequate measure to assess the phenomenon. It was not until the publication of the UCLA Loneliness Scale (Russell et al., 1978) that loneliness research began to flourish. In addition, the lack of an operationalizable definition further halted research. Today, no agreement on a formal definition for loneliness exists; however, a single definition has commonly emerged and has been extensively used in research. The consensus is that loneliness is proportional to a perceived numerical and/or qualitative discrepancy between an individual's actual and desired interpersonal relationships (Peplau et al., 1979).

The Conceptualization of Loneliness

Loneliness is typically conceptualized by researchers in one of two ways. Some researchers perceive loneliness as a single phenomenon that differs in intensity. While experiences of loneliness vary, the core feelings are similar. Minimizing the causes for loneliness, this unidimensional perspective focuses on general themes in the loneliness experience. Most research endorses this perspective, as evidenced by the widespread use of the UCLA Loneliness Scale (Russell, 1996; Russell et al., 1980; Russell et al., 1978), a unidimensional measure.

In contrast, the multidimensional approach to loneliness attempts to distinguish between various forms of loneliness and believes loneliness cannot be adequately measured in a global context. Several types of loneliness have been identified by various researchers. For example, a hypothesis developed by Weiss (1973) emphasizes two types of loneliness: emotional and social loneliness. This approach, supported by Russell, Cutrona, Rose, and Yurko (1984), describes emotional loneliness as resulting from the lack of a close, intimate relationship with someone. Divorce, the death of a spouse, and the end of a romantic relationship can lead to this version of loneliness. On the other hand, social loneliness results from the absence of a network of social relationships with those who share similar interests. Social loneliness may be triggered by a major new life experience, such as starting college or moving to a new city or new environment.

In addition, Young (1982) distinguishes between chronic, situational, and transient loneliness. Lasting for a minimum of 2 years, chronic loneliness emerges when a person becomes dissatisfied with his or her current relationships for an extended period of time. Situational loneliness can occur when an individual encounters a crisis

(e.g., death and job loss). Transient loneliness includes brief, occasional periods of loneliness that are temporary. Attributions to personal and situational factors seem to be common in those who are transiently lonely, whereas the chronically lonely tend to attribute loneliness to enduring personal traits (Cutrona, 1982). The literature generally suggests this distinction as an important area for further research (Cutrona, 1982; Gerson & Perlman, 1979; Shaver, Furman, & Buhrmester, 1985).

Theories of Loneliness

Perlman and Peplau (1982) categorize loneliness into eight different theories: psychodynamic, phenomenological, interactionist, existential, privacy, general systems theory, sociological explanations, and the cognitive approach.

Psychodynamic: Psychodynamic theorists (e.g., Burton, 1961; Fromm-Reichmann, 1959; Peplau, 1955; Sullivan, 1953) suggest loneliness is a pathological phenomena resulting from maladaptive experiences in early childhood. Psychodynamic theorists (e.g., Burton, 1961; Fromm-Reichmann, 1959; Peplau, 1955) suggest loneliness results when the basic need for intimacy is not satisfied (Mahon, 1982).

Phenomenological: The phenomenological approach, which focuses on the present, also views loneliness as a pathological experience, possibly leading to depression, anxiety, neuroticism, and shyness, among others (Kalliopuska & Laitinen, 1987). Loneliness results from one's subjective evaluation of himself or herself as unworthy of love. One's real self is not revealed to others, and, therefore, loneliness results. A well-known proponent of this perspective, Carl Rogers, views loneliness as occurring when one

"feels sure that no one can understand, accept, or care for the part of his inner self that lies revealed" (Rogers, 1970, p. 107).

Interactionist: The interactionist approach, endorsed by Weiss (1973), emphasizes the present and views loneliness as a normal experience. This perspective stresses the relationship between situational and characterological factors in determining loneliness. Weiss hypothesizes two types of loneliness corresponding to the absence of particular types of interpersonal relationships: emotional loneliness and social loneliness (described previously).

Privacy Approach: A newer perspective, developed by Derlega and Margulis (1982), incorporates privacy and self-disclosure into their view of loneliness. Loneliness, which results from excessive privacy, is considered to be a normal experience influenced by individual and environmental factors.

General Systems Theory: Developed by Flanders (1982), this approach defines loneliness as "an adaptive feedback mechanism for bringing the individual from a current lack stress state to a more optimal range of human contact in quantity or form" (p. 170). The General Systems Theory, which emphasizes the interconnected nature of various spheres of life, attributes the reason for the increase in loneliness to a decrease in an individual's leisure time. This results in a reduction of emotional intimacy, which is hypothesized to increase loneliness. Furthermore, the increase in television viewing also reduces social contact, thereby, leading to loneliness.

Sociological explanations: These theories emphasize socialization and forces such as the mass media as contributors to loneliness (Perlman & Peplau, 1982). Main proponents of this approach include Claude Bowman (1955) and David Riesman (1958).

A rise in social and family mobility and reduction in primary group relations are cited as the prime influences perpetuating loneliness in society (Bowman, 1955). Riesman (1958) discusses "other-directed" individuals who are shaped by parents, teachers, and the mass media. He believes individuals become lonely as a result of neglect of their basic individual needs.

Existential: Differing from the previously described approaches, the existential approach perceives loneliness as a universal, positive part of human existence. Rather than search for causes, the experience of loneliness is regarded as an essential component of human life (Moustakas, 1961). As Mijuskovic (1996) states, "The fear of loneliness and the search and struggle for intimacy are the color and shape of human existence, they are the essence of man" (p. 49). All human behavior is motivated by the urge to avoid the pain associated with loneliness (Mijuskovic, 1977).

Cognitive: The cognitive approach, the most studied of the eight, corresponds with the phenomenological approach to psychology with its emphasis on subjective perceptions. The cognitive approach describes loneliness as a state of mind produced by an individual's thoughts. This unidimensional approach de-emphasizes specific causes of loneliness while focusing instead on general, underlying features (Peplau et al., 1982; Peplau et al., 1979). This perspective describes the influence of cognitive processes on regulating the intensity of loneliness. Loneliness results when there is a perceived numerical and/or qualitative discrepancy between an individual's actual and desired interpersonal relationships (Peplau et al., 1979).

While the cognitive approach minimizes causal factors, it does address causal attributions of loneliness. While no single cause of loneliness has emerged, Peplau et al.

(1982) identify precipitating events and factors that can create a discrepancy between the person's desired and achieved interpersonal relationships. They also believe that although certain predisposing factors and precipitating events may lead to loneliness, specific maintaining causes may prolong loneliness (Cutrona, 1982; Peplau et al., 1982).

Predisposing factors may include individual characteristics and situations, cultural values, and cultural norms. Precipitating events, such as loss of friend, leaving family and friends for college, breakup of a romantic relationship, problems with friends and roommates, family events such as divorce, difficulties with schoolwork, and medical problems, may create a discrepancy between actual and desired interpersonal relationships, which could lead to loneliness (Cutrona, 1982). Loneliness then results from certain cognitive processes about these events. For example, Peplau et al. (1979) identify attributional factors influential in maintaining loneliness. Specifically, if one perceives loneliness as ensuing from internal causes (e.g., lack of effort and poor social skills), he or she is likely to blame himself or herself for his or her loneliness and become more withdrawn than those who blame external causes. In contrast, those who blame external causes (being rejected by others, being in situations where it is difficult to make friends, or having bad luck) tend to be less withdrawn (Peplau et al., 1979). Further, pessimism and hopelessness coupled with lowered expectations of future interpersonal relationships may result when an individual attributes his or her loneliness to stable causes in contrast to unstable causes. Lastly, the perceived loss of control in balancing one's actual and desired interpersonal relationships is likely to result in loneliness (Anderson & Arnoult, 1985; Weeks et al., 1980). Controllable causes take the form of unstable factors a person could intentionally change, such as degree of effort. By contrast, uncontrollable causes consist

of factors the person is unable to influence, which might include internal factors (personality) or external characteristics of the person's social environment.

In addition to the cognitive approach, Erikson's theory of psychosocial development (Erikson, 1950), considered viable by researchers today, concurs with trends in loneliness in which loneliness is highest among late adolescents and early adults and decreases thereafter (Rubenstein & Shaver, 1980). According to Erikson's theory, in the late adolescent and young adult stage, each person faces the tasks of separating himself or herself from families of origin and attempting to establish meaningful identities so intimate relationships can develop (Erikson, 1950). According to Erikson, true intimacy can be achieved only when an individual has solved his or her identity struggles. If intimate relationships are not developed, a profound sense of isolation is likely (Erikson, 1968).

Hamachek (1990) describes tendencies of isolated individuals including: absence of a strong identity, intolerance of differences in others, preference for more isolation from others, and difficulty expressing feelings. Isolated individuals are further characterized as having less empathy (Gold & Rogers, 1995) and lacking in enduring relationships (Orlofsky et al., 1973). Further, this "intimacy versus isolation" stage encountered by young adults (Erikson, 1950, 1968) can lead to loneliness when young people become disappointed with their actual relationships compared to their notion of ideal ones. Loneliness can hinder resolution of identity and intimacy concerns during this time (Ponzetti & Cate, 1988).

Brennan (1982) suggests several influences contributing to loneliness in adolescents including: developmental changes (e.g., separation from parents, cognitive development, maturation, autonomy, disruption of self-concept, and struggle for

significance) and social structural factors (e.g., inadequate marginal social roles, excessive rejection and failure roles, unrealistic expectations and norms, social comparisons within adolescent culture, struggle for independence, changing family structures, and poor parent-child relationships). The developmental changes influence feelings of isolation, need for relationships, a sense of uncertainty towards the future, and disrupt the sense of self-identity. The social structural factors are said to affect the adolescent's attempts in developing satisfying relationships.

In summary, factors contributing to loneliness in college students appear to include cognitive development and developmental tasks (e.g., separation from parents, search for identity, and establishment of intimate relationships). External, environmental factors can interfere with these factors and influence the development of loneliness by disturbing the balance between needed and available relationships (Jones, Cavert, et al., 1985). As we can see, the emergence of loneliness is a subjective experience entirely dependent on how the individual perceives his or her relationships.

Variables Related to Loneliness

Loneliness has been linked to a number of personality and attitude variables. Jones (1985) identifies four groups of variables which classify various factors related to loneliness: inadequate social skills, emotional arousal and conflict, poor self-regard, and negativistic attitudes.

Ineffective interpersonal behaviors and poor social skills have been commonly found in lonely individuals (e.g., Anderson & Arnoult, 1985; Berg & Peplau, 1982; Brennan, 1982; Chelune, Sultan, & Williams, 1980; Gerson & Perlman, 1979; Hansson &

Jones, 1981; Horowitz & French, 1979; Jones et al., 1981; Jones et al., 1982; Solano, Batten, & Parish, 1982; Vitkus & Horowitz, 1987; Wittenberg & Reis, 1986). For example, Wittenberg and Reis (1986) examine social skills in pairs of roommates in their freshman year of college. Findings indicate that those who are lonely exhibit deficits in the ability to establish relationships and lack skills needed to form close, intimate relationships with others. This is contradictory to Vitkus and Horowitz (1987) who suggest lonely individuals do, in fact, possess social skills, but tend to adopt a passive role, giving the appearance of social ineptitude.

In a study of single, undergraduate students, Jones et al. (1981) link loneliness with certain personality characteristics that hinder friendship development. Positive correlations in both males and females are found between loneliness and shyness, public self-consciousness, and social anxiety while an inverse relationship between loneliness and self-esteem was reported. In addition, a lower attentiveness and interest for others, less responsiveness, and a greater self-focus have characterized interactions in the lonely (Jones et al., 1982).

Upon evaluating the interactions of those who are lonely, distinct differences in self-disclosure compared to those who are not lonely have been described. In a study of 218 undergraduates, Berg and Peplau (1982) report individuals who are lonelier are not as willing to self-disclose. They also have a history of revealing less. Those who are more communicative tended to report lower levels of loneliness. Lonely individuals seemed to be less sociable and have difficulty disclosing in new relationships and unstructured social situations (Berg & Peplau, 1982; Chelune et al., 1980). In addition, consistent with Solano et al. (1982) who concluded that lonely individuals, male or female, are less likely

to disclose to the opposite sex, Chelune and colleagues (1980) report that females seem to be particularly unwilling to reveal intimate information to males.

The lonely tend to possess a greater self-focus (Gerson & Perlman, 1979; Jones et al., 1982), have difficulty with self-identity (Mijuskovic, 1986), and are more likely to avoid one-on-one situations (Anderson & Arnoult, 1985). Further, as lonely individuals tend to possess negative feelings and expectations of themselves and others, they are not as likely to be involved in certain social processes (Hansson & Jones, 1981). Specifically, these individuals have lower confidence in their personal opinions, are less assertive about relaying their opinions, and seem more likely to be influenced by others.

Low levels of extroversion have also been associated with increased levels of loneliness (Cutrona, 1982; Hojat, 1982; Levin & Stokes, 1986; Saklofske, Yackulic, & Kelly, 1986; Stokes, 1985). In addition, lonely individuals are more likely to be inexpressive (Diamant & Windholz, 1981; Gerson & Perlman, 1979; Hansson & Jones, 1981), less assertive (Brennan, 1982; Cutrona, 1982; Diamant & Windholz, 1981; Gerson & Perlman, 1979; Jones et al., 1981), and shy and self-conscious in their interactions (Jones et al., 1981; Mijuskovic, 1986; Moore & Schultz, 1983; Schmitt & Kurdek, 1985; Solano & Koester, 1989).

Jones (1985) describes an emotional arousal and conflict factor which includes several variables such as anxiety, depression, neuroticism, psychoticism, and paranoia. Depression has been commonly associated with loneliness (Diamant & Windholz, 1981; Fromm-Reichmann, 1959; Gaev, 1976; Hojat, 1982; Horowitz et al., 1982; Jackson & Cochran, 1991; Levin & Stokes, 1986; Loucks, 1980; Moore & Schultz, 1983; Peplau & Perlman, 1982; Russell et al., 1980; Russell et al., 1978; Weeks et al.,

1980; Young, 1982). Consistent with other findings (Gaev, 1976; Russell, 1996; Russell et al., 1980; Russell, Kao, & Cutrona, 1987), Weeks and colleagues (1980) provided evidence of the distinction between the two phenomena when they attempted to combine the two constructs into a single factor. It was clear that although loneliness and depression were consistently correlated with each other, they were distinct factors.

Loneliness has also been associated with anxiety (Applebaum, 1978; Fromm-Reichmann, 1959; Hays & DiMatteo, 1987; Hojat, 1982; Jones et al., 1981; Levin & Stokes, 1986; Russell et al., 1978; Solano & Koester, 1989), along with increased levels of neuroticism (Hojat, 1982; Saklofske et al., 1986; Stokes, 1985), psychoticism (Hojat, 1982; Jackson & Cochran, 1991), and paranoia (Diamant & Windholz, 1981; Jackson & Cochran, 1991).

The third group of variables related to loneliness is poor self-regard. It includes the variable of low self-esteem. Low self-esteem has been commonly associated with increased levels of loneliness in undergraduates (Cutrona, 1982; Goswick & Jones, 1981; Hojat, 1982; Jackson & Cochran, 1991; Jones et al., 1981; Loucks, 1980; Russell et al., 1978; Russell et al., 1980; Young, 1982), and is also supported across wider age spans (deJong-Gierveld, 1987; Rubenstein & Shaver, 1980).

Negativistic attitudes comprise the fourth group of variables described by Jones (1985). Lonely individuals tended to negatively view themselves, others, and humanity (Anderson et al., 1983; deJong-Gierveld, 1987; Goswick & Jones, 1981; Hojat, 1982; Horowitz et al., 1982; Jackson & Cochran, 1991; Jones et al., 1981; Jones, Sansone, & Helm, 1983; Levin & Stokes, 1986; Loucks, 1980; Peplau et al., 1982; Wittenberg & Reis, 1986). In a study where college students were asked to engage in brief interactions

with strangers and then evaluate themselves and the other person using a "postinteractional inventory," the lonely rated themselves more negatively than the nonlonely and believed the stranger would rate them similarly (Jones et al., 1981). Jones et al. (1982) explain similar results. In addition, Jones and colleagues (1981) found that those who were lonely were more likely to not accept others or feel accepted by others. They also held a negative expectation for future interactions.

Other factors positively associated with loneliness included aggression (Diamant & Windholz, 1981; Jackson & Cochran, 1991), an external locus of control (Diamant & Windholz, 1981; Hojat, 1982; Jones et al., 1981; Moore & Schultz, 1983; Stokes, 1985), hostility (Mijuskovic, 1996; Sadler, 1978; Sermat, 1980), a pessimistic view of others (Anderson et al., 1983; Jones et al., 1981; Jones et al., 1982; Wittenberg & Reis, 1986), and hopelessness (Diamant & Windholz, 1981).

Other Correlated Factors

Loneliness has also been associated with alcoholism (Gaev, 1976; Hoover, Skuja, & Cosper, 1979; Weeks et al., 1980), obesity (Gaev, 1976; Hoover et al., 1979; Weeks et al., 1980; Wenz, 1977), excessive drug use (Gaev, 1976; Hoover et al., 1979), psychosomatic concerns (e.g., pain, chronic fatigue, and tension) (Berg, Mellstrom, Persson, & Svanborg, 1981; Jackson & Cochran, 1991), substance abuse (Rokach & Brock, 1998; Rokach, Lackovic-Grgin, Penezic, & Soric, 2000; Rotenberg, 1994), and an increased risk of suicide (Diamant & Windholz, 1981; Hoover et al., 1979; Wenz, 1977).

Loneliness has also been studied with various social network characteristics; however, studies have yielded inconsistent results. Some studies link loneliness to a

smaller social network, fewer close friends, and a lower frequency of interaction with those in one's social network (Cutrona, 1982; Russell et al., 1980; Levin & Stokes, 1986; Vaux, 1988). In addition, positive correlations between loneliness and time spent alone each day, time spent studying alone, frequency of eating dinner alone, and number of times spent alone on a weekend night have been reported (Hoover et al., 1979; Russell et al., 1980). Negative correlations between loneliness and dating frequency, participation in social activities, time spent with close friends, and time spent with females for both sexes have also been described (Brennan, 1982; Cutrona, 1982; Hoover et al., 1979; Jones, Carpenter, & Quintana, 1985; Jones & Moore, 1987; Levin & Stokes, 1986; Russell et al., 1980; Wheeler, Reis, & Nezlek, 1983). On the other hand, others report no relationship between some of these factors (Jones, 1981; Stokes, 1985; Williams & Solano, 1983). For example, Williams and Solano (1983) find no difference in number of close friends among lonely and non-lonely individuals; however, lonely individuals were more likely not to feel as close with their best friends.

One study examines the interactions of college students over a 4-day period (Jones, 1981). Results indicate that the actual number of interactions did not differ across lonely and non-lonely subjects. Lonely females tend to communicate with a greater variety of individuals and acquaintances and are less likely to spend time with family members. Lonely males communicate less with family and friends and spend more time with strangers.

In addition, while Stokes (1985) reports those subjects with dense social networks (i.e., the degree that members in an individual's social network are interdependent) feel less loneliness, Levin and Stokes (1986) failed to confirm this finding, concluding that no

correlation exists between network density and loneliness. Differences in findings across social network variables could result from varying sample sizes (too small), diverse sample characteristics (age), and various sampling procedures and measuring instruments for the same constructs.

Contrary to popular thought, it is not the frequency or quantity of social contacts that is most associated with loneliness. Rather, it is dissatisfaction with the quality and/or quantity of relationships that seems to be more strongly correlated with loneliness (e.g., Cutrona, 1982; deJong-Gierveld, 1987; Goswick & Jones, 1981; Jones, 1981; Jones & Moore, 1987; Rubenstein & Shaver, 1980; Saklofski et al., 1986; Williams & Solano, 1983). In a study of 354 freshmen studying at UCLA, Cutrona (1982) found qualitative indicators such as satisfaction with friendships, relationships with family members, and one's dating experience are better predictors of loneliness than measures such as number of friends and amount of social contact with friends and family members. College students who are lonely have as much social contact as non-lonely individuals (Jones, 1981). Thus, it appears the emergence of loneliness is a subjective experience highly associated with how an individual perceives, experiences, and assesses the quality and/or quantity of his or her relationships.

Loneliness and College Students

Loneliness seems to be especially prevalent among college students, with an estimated 30% of college students reporting loneliness as a problem (McWhirter, 1990). The phenomena, which seems to decrease in pervasiveness with age (Revenson & Johnson, 1984; Rubenstein & Shaver, 1980), is described as particularly intense in

traditional-aged college students, especially freshmen (Cutrona, 1982; Diamant & Windholz, 1981; Pearl et al., 1990; Phillips & Pederson, 1972; Rubenstein & Shaver, 1982). This may be partially due to emerging needs for intimacy during this transition from adolescence to adulthood described previously (Hamachek, 1990; Sullivan, 1953; Weiss, 1973). In addition, upon entry to college, perhaps for the first time, the individual is separated from his or her parents as nearby emotional support becomes scarce; family contact becomes limited; and the individual faces the difficulty of having to develop a whole new set of relationships (Shaver et al., 1985). Cutrona (1982) suggests that elevated expectations for relationships result in higher levels of loneliness in young adults. Mijuskovic (1986) describes an intense struggle to attain meaning and self-identity. As young adults separate from their families, they seek to develop a life for themselves academically, socially, and occupationally.

Loneliness in late adolescence is explained due to significant transitions that occur that can disrupt relationships (Ponzetti & Cate, 1988). The disturbance in current attachment patterns and the nascent trends towards independence, autonomy, individuality, separateness, and responsibility can create more intense needs for emotional attachment along with an increased susceptibility towards loneliness (Brennan, 1982). While a striving for independence emerges, a sense of dependence may still exist (Roscoe & Skomski, 1989). This new experience of vulnerability in an adult world can develop into loneliness in young adults (Williams, 1983).

In a study of university freshmen, 75% of the students report some degree of loneliness in the first 2 weeks of school, with 47% of these students classified as having moderate to severe loneliness (Cutrona, 1982). After 7 months, 25% still reported

feelings of loneliness. In individuals where loneliness decreased, "gradually making friends with the people around me" was a common denominator (p. 298). In other studies, Jackson, Sanderlind, and Weiss (2000) and Jones and Moore (1987) report stable levels of loneliness in college students over 7-week and 9-week periods, respectively. Thus, it seems that while most students adjust by the completion of their freshman year, some do not (Shaver et al., 1985).

Loneliness and Gender

Research regarding the association between loneliness and gender remains contradictory. While several studies describe equal levels of loneliness between college men and women (Berg & Peplau, 1982; Hojat, 1982; Jones et al., 1981; Saklofske et al., 1986; Solano, 1980), others state higher levels for men (Roscoe & Skomski, 1989; Saklofske & Yackulic, 1989; Schmitt & Kurdek, 1985; Schultz & Moore, 1986; Solano, 1980; Upmanyu, Upmanyu, & Dhingra, 1992; Wheeler et al., 1983) with others reporting higher levels of loneliness in women (McWhirter, 1997; Medora & Woodward, 1986; Rokach, 2000).

Some researchers suggest that when women score higher than men, it may be due to the fact that women are more willing to label themselves as lonely because it is more socially acceptable (Borys & Perlman, 1985). Therefore, if an assessment instrument includes the word "loneliness," gender differences are likely to exist. Borys and Perlman (1985) suggest that sex differences are typically absent in studies utilizing the UCLA Loneliness Scale, an instrument with no mention of the words "lonely" or "loneliness." McWhirter (1997) further suggests gender differences result from underlying causes of

loneliness in each sex. He suggests when women lack intimate relationships and when men lack a support group, loneliness levels will likely increase. Schultz and Moore (1986) describe the increased tendency in males to attribute loneliness to personal failure rather than external factors.

Sundberg (1988) suggests that the best predictor of loneliness in college students is the amount of time spent communicating with women. For both males and females, the more time spent interacting with women, the less likely one is to experience loneliness. This would also, she suggests, affect loneliness in college-age males since they are more likely to choose other men as friends.

The Internet

Utilized by an estimated 513 million people worldwide ("How Many Online?" 2001), the Internet has been described as the "most participatory form of mass speech yet developed" (Koomen, 1997, p. 272). Known as the "information highway," the Internet consists of a complex web of computer networks allowing users spanning the globe to exchange text, sound, video, and images (Koomen, 1997). The Internet provides an unrivaled opportunity for exchanging communication, accessing information, and sharing resources.

With origins dating back to 1969, the Internet emerged out of a project originally intended for the Advanced Research Projects Agency (ARPA) of the U.S. Department of Defense. Initially developed for communication between scientists for military purposes, use expanded to the academic world in the 1970s (Koomen, 1997). By the late 1970s, a new industry was created with the emergence of the personal computer. From that

relatively simple beginning, the Internet has unquestionably become one of the most important inventions in world history.

Major types of communication systems presently available on the Internet include electronic email (email), the World Wide Web (WWW), newsgroups, Internet Relay Chat (IRC), Instant Messaging, Bulletin Board Services, and Multi-User Dimensions (MUDs). The most popular modes of communication are email (Kraut, Lundmark, Kiesler, Mukhopadhyay, & Schleris, 1997; Nie & Erbring, 2000; Scherer, 1997; UCLA Center for Communication Policy, 2000; Wood & Smith, 2001) and the World Wide Web (Scherer, 1997; UCLA Center for Communication Policy, 2000):

Electronic mail: Recognized as the first form of communication on computers (Robson & Robson, 1998), email also seems to be the most popular Internet activity. Nie and Erbring (2000) report that of approximately 4,000 Internet users, 90% percent cite email as the most common Internet activity in which they engage. Described as a means of communication "between the telephone and the letter" (Wood & Smith, 2001), email allows users to transfer messages and files at their own convenience. It can also be used to transfer assignments, questions, and answers among students and instructors. Speed, low cost, convenience, and the capability to reach millions of people throughout the world explain its appeal.

World Wide Web: Tim Berners-Lee at CERN, the European Laboratory for Particle Physics, developed the World Wide Web (WWW) in 1989. Credited with spurring the Internet explosion, Berners-Lee proposed the project, known as the predecessor to the modern version of the web, to simplify conversation between researchers and their findings. A simple and inexpensive information service, the WWW

allows users to view text, graphics, sound, and video. They also can hyperlink (connect) to other media or documents.

Newsgroups: McKenna and Bargh (2000) estimated that more than 30,000 newsgroups were available in the year 2000, on the Internet, compared to only three sites in 1979 (Rheingold, 2000). Newsgroups, equivalent to a worldwide bulletin board, are discussion groups consisting of messages sent by other Internet users under a particular topic that are displayed publicly for everyone in the group to read. Newsgroups are distributed worldwide and allow users to browse by topic, create and post messages, and respond to existing messages in any given newsgroup. If users desire a topic that does not exist, they can create their own. Most topics are organized around social issues, hobbies, and current events.

Internet Relay Chat: Internet Relay Chat (IRC), described as "a playground" (Rheingold, 2000), enables two or more people at separate computers to converse with each other in real time (live). IRC allows interaction with users around the world at any hour of the day. Users, represented by nicknames, respond in private chat rooms about various topics and ideas. They often discuss feelings about such topics as relationships, families, childhoods, their future, and loneliness (Bromberg, 1996). Relying on only verbal content, this form of communication allows experimentation with communication and depictions of the self.

Instant Messaging. Instant messaging allows users to exchange messages with another individual in a private chat room. Several instant messaging systems exist; however, there is no standard. For instant messaging to occur, both users must use the same service, be online at the same time, and be willing to accept instant messages. The

recipient is alerted by a sound followed either by a window that allows the user to accept or deny the instant message or a window with a message. It is possible to have independent conversations with more than one person concurrently.

Bulletin Board Services: Bulletin Board Services are electronic message centers that allow users to review messages by others, leave their own messages, have conversations with others, and exchange information (download files). Unlike newsgroups, individuals who use Bulletin Board Services connect their computer to a central location.

Multi-User Dimensions: Similar to Internet Relay Chat, Multi-User Dimensions (MUDs) involve large numbers of users connecting for "real time" communication. However, unlike IRC's, MUDs allow players to create their own identity, altering it at will, and converse in virtual places like rooms of a house or simulations of an individually created world. Turkle (1995) describes two types of MUDs: one, inspired by the Dungeons and Dragons games, is adventurous and constructed around medieval fantasy themes; the other allows for more freedom as the user can play whatever captures his or her attention. Completely anonymous, MUDs can offer what Bromberg (1996) refers to as an "antidote" to lonely individuals (Bromberg, 1996).

College Students and the Internet

Use of the Internet on college campuses is expanding at an astonishing rate. Twenty-eight percent of those who access the Internet are full-time college students who can log on easily, often at no charge (Scherer, 1997). This places them among the prime targets for a malady termed Internet addiction, extant in approximately 8-13% of college

students who meet the criteria for unhealthy Internet use (Anderson, 2001; Morahan-Martin & Schumacher, 2000; Scherer, 1997). College students appear to be at heightened risk for abusing the Internet (Kandell, 1998; Morahan-Martin & Schumacher, 2000) due to the particularly difficult developmental period they endure as they attempt to create a solid sense of self-identity and develop meaningful, intimate relationships (Kandell, 1998). Young (1996) suggests that Internet addiction has been linked to significant impairment in academic, relationship, financial, and occupational pursuits.

While no official diagnosis of "Internet addiction" exists, several researchers have presented definitions and symptoms. Kandell (1998) characterizes the phenomena as a "psychological dependence" affected not by the type of Internet activity chosen but by the quantity. He describes four characteristics of Internet addiction which include: (a) a growing investment of resources of Internet-related activities; (b) displeasing feelings when not logged on (anxiety, depression, and loneliness are eased once logged on); (c) rising tolerance to the negative effects of being online; and (d) denial of troublesome behaviors.

Morahan-Martin and Schumacher (in review) report excessive Internet users are more likely to be lonely, while Young (1998) describes a depression that coexists with extreme Internet use. In addition, Internet-dependent behavior appears to affect marriages more than any other relationship. Lower class, class absenteeism, and other academic difficulties appear to be related to Internet addiction in some studies (Hellerstein, 1985; Young, 1996). In addition, low self-esteem and impulsivity (Armstrong et al., 2000) have been linked to addictive behavior.

Young (1996) equates characteristics of excessive Internet use to behavioral patterns similar to compulsive gamblers and alcoholics. The Internet addicts are unable to gain control over their Internet use, much like alcoholics who cannot control their drinking enough to avoid negatively impacting areas within their life. In addition, like the compulsive gambler who is incapable of stopping despite financial loss, those addicted appear to spend hours on the Internet despite significant impairments in academic, relationship, financial, and occupational areas (Young, 1996).

In a study of 496 Internet users from all walks of life, Young (1996) found Internet-dependent users spend approximately eight times more the number of hours on the Internet than nondependent users per week (38.5 hours versus 4.9 hours per week). Further, "addicts" access chat rooms and MUDs more often than nonaddicts while non-dependents report email, WWW (World Wide Web), and Information Protocols as their most commonly used Internet activities. (Information Protocols allow data to be sent from one computer to another on the Internet. Each computer has its own address(es) that distinguishes it from other computers.) Fifty-eight percent of the Internet-dependent users surveyed had been online between 6 months and 1 year while non-dependents had been accessing the Internet for more than 1 year. (To identify Internet-dependents, Young [1996] modified criteria used in the DSM-IV for pathological gambling. If individuals responded positively to five or more of an eight item measure, they were considered dependent on the Internet. All others were considered to be typical, nondependent Internet users. Examples of questions included in the measure were: "Do you stay online longer than originally intended?"; "Have you repeatedly made unsuccessful efforts to

control, cut back, or stop Internet use?"; and "Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?")

Pathological users are more likely to use the Internet for meeting new people, obtaining emotional support, communicating with others who share similar interests, and engaging in interactive games such as MUDs (Morahan-Martin & Schumacher, 2000). Additionally, pathological users seem to have increased confidence online. They describe an easier time of making friends and more enjoyment interacting with others online as compared to offline. Scherer (1997) found that Internet abusers were more likely to use the Internet to meet new people and less likely to socialize face to face. Young (1997) explains that Internet addicts tend to meet and socialize with new people online, while nonaddicts access the Internet to maintain existing friendships. Initiating new friendships and communicating with others online are activities engaged in more among heavy Internet users, while users who did not spend as much time on the Internet employed other means to accomplish these tasks (Hellerstein, 1985).

Loneliness and Internet Use

Research into the relationship between loneliness and various aspects of Internet use has resulted in conflictual findings. Some researchers report a correlation between loneliness and Internet use (Kraut et al., 1998; Loytsker & Aiello, 1997; Moody, 2001; Morahan-Martin & Schumacher, 2000; Young, 1998). The most popular study on this link follows 93 families during their first 1 to 2 years on the Internet (Kraut et al., 1998). Contrary to initial predictions, increases in loneliness, decreases in communication with family members, and a decline in social ties were associated with higher levels of Internet

use. In addition, similar to Young (1998), more depressive symptoms were found among heavier Internet users. However, this study was widely criticized for a small sample size, failure to randomly select participants, and the absence of a control group.

Morahan-Martin and Schumacher (2000) surveyed 277 undergraduate Internet users and found pathological users to be significantly lonelier. In another study by the same researchers, participants testing high for loneliness were more likely to use the Internet and email compared to non-lonely subjects (Morahan-Martin & Schumacher, in review). In addition, this research reported that lonely participants use the Internet for emotional support and are more likely to describe disruption in their lives as consequences of Internet use (Morahan-Martin & Schumacher, 2000). Lonely subjects tended to self-disclose more, share more intimate details, and felt more accepted on the Internet when compared with non-lonely subjects (Morahan-Martin, 1999).

Other studies have not found a relationship between loneliness and various aspects of Internet use. Kraut et al. (2002) have recently denounced the link between loneliness and Internet use. They report that after 3 years, most of the negative effects found in their earlier study lessened. They suggest that the uniqueness and novelty of the Internet lessen over time, leading subjects to decrease participation in unfulfilling Internet activities, while increasing time engaged in more rewarding activities. Another study by McKenna et al. (2002) finds that 6% of users feel lonelier from using the Internet, while 47% actually reported that the Internet helps lessen individual feelings of loneliness.

In those studies which do report an Internet use and loneliness connection, causation is difficult to determine. The reason for the hypothesized link continues to be debated. Do lonely individuals turn to the Internet and use it heavily, or does excessive

Internet use lead to loneliness? Morahan-Martin (1999) describes these opposing hypotheses.

The first hypothesis explains lonely individuals who turn to the Internet and use it excessively. Poor social skills (Jones et al., 1982; Wittenberg & Reis, 1986), inexpressiveness (Diamant & Windholz, 1981; Gerson & Perlman, 1979; Hansson & Jones, 1981), low levels of social contact (Corty & Young, 1981; Cutrona, 1982), difficulty making friends (Anderson & Arnoult, 1985), dissatisfaction with social relationships (Cutrona, 1982; deJong-Gierveld, 1987; Goswick & Jones, 1981; Jones & Moore, 1987; Rubenstein & Shaver, 1980; Saklofski et al., 1986; Williams & Solano, 1983), and low self-esteem (Cutrona, 1982; Goswick & Jones, 1981; Hojat, 1982; Jackson & Cochran, 1991; Jones et al., 1981; Loucks, 1980; Russell et al., 1978; Russell et al., 1980; Young, 1982) tend to characterize lonely individuals. In addition, they are more likely to suffer from depression (Diamant & Windholz, 1981; Fromm-Reichmann, 1959; Gaev, 1976; Hojat, 1982; Horowitz et al., 1982; Jackson & Cochran, 1991; Levin & Stokes, 1986; Loucks, 1980; Moore & Schultz, 1983; Russell et al., 1978; Russell et al., 1980; Weeks et al., 1980) and anxiety (Applebaum, 1978; Fromm-Reichmann, 1959; Hays & DiMatteo, 1987; Hojat, 1982; Jackson & Cochran, 1991; Jones et al., 1981; Levin & Stokes, 1986; Russell et al., 1978; Solano & Koester, 1989). This hypothesis describes higher amounts of Internet use in those who are lonely (i.e., those who typically have difficulty interacting with others face to face). The hypothesis attributes cause to the extensive social network available online and different "rules" of social interaction. Not only can the individual choose with whom to interact, but he or she can also communicate at his or her own leisure. The Internet provides a safe haven to practice and improve

social skills (which are often lacking in lonely individuals) and ease the negativistic attitudes associated with loneliness (Morahan-Martin, 1999). The anonymity, the irrelevance of physical distance, the absence of physical appearance issues, and the great flexibility of time described by McKenna and Bargh (2000) make the Internet an ideal place for the lonely individual.

The second hypothesis holds that Internet use causes loneliness. It is believed that increased time on the Internet disrupts real-life relationships. Individuals spend more time on the Internet in artificial and weaker online relationships, at the expense of face-to-face relationships. The absence of nonverbal cues prevalent in face-to-face interaction can create a "cold nature" (Wallace, 1999). Kandell (1998) reports a lower quality of online interactions when compared to face-to-face communication. Kiesler and Kraut (1999) report similar findings as subjects describe a decreased closeness in online relationships vis a vis face to face. Therefore, those who use the Internet less are believed to spend more time in more influential, closer relationships, and, therefore, are less lonely. Sanders, Field, Diego, and Kaplan (2000) support this hypothesis, indicating increased Internet use is related to weaker social ties. Those who report significantly better relationships with friends spend less time on the Internet.

The underlying premise of the second hypothesis (online relationships are weaker than face-to-face relationships) continues to be debated in research. In comparing the Internet with face-to-face interactions, four differences of the Internet are apparent. The Internet provides anonymity (McKenna & Bargh, 2000; Sproull & Faraj, 1997), lessens the importance of physical proximity (McKenna & Bargh, 2000; Sproull & Faraj, 1997)

and physical attractiveness (McKenna & Bargh, 2000), and allows the user more influence in how quickly relationships develop (McKenna & Bargh, 2000).

While some describe the shallowness and hostility of online communication, others emphasize the vast opportunities for genuine, satisfying, personal relationships made possible by the Internet. Online relationships have been characterized as genuine (Parks & Floyd, 1996; Walther, 1997), intense (Parks & Roberts, 1998), deep and meaningful (McKenna et al., 2002; Parks & Floyd, 1996), highly self-disclosing (McKenna & Bargh, 1999; Morahan-Martin, 1999; Parks & Floyd, 1996; Parks & Roberts, 1998), and satisfying (Parks & Floyd, 1996). Some argue that computer-mediated communication dehumanizes users while others believe it promotes alienation.

Negative Aspects of Online Communication

Several researchers describe the negative aspects of online communication. Greenfield (1999) warns that excessive Internet use can negatively impact relationships and marriages. Hiebert and Gibbons (2000) caution that asocial behavior could be fostered in shy people who use the Internet heavily. Internet use has also been linked to academic dismissal and depressive symptoms (Anderson, 2001; Hamburger & Ben-Artzi, 2000). Further, some state that more time on the Internet leads to decreased social ties (Hamburger & Ben-Artzi, 2000; Nie & Erbring, 2000; Shotton, 1991). Greenfield (1999) predicts that the technology has the capability to establish a more impersonal world. Nie and Erbring (2000) agree, describing the Internet as possibly the "ultimate isolating technology."

Sproull, Zubrow, and Kiesler (1986) suggest the absence of the "social contextual cues" that are present in face-to-face communication can potentially lead to flaming (name calling, verbal aggression, bluntness, and hostile communication) and greater self-absorption. Computer-mediated communication transmits less information among participants than face-to-face communication (Walther, 1997; Young, 1998). Therefore, online relationships are believed to be weaker (Cummings, Butler, & Kraut, in press; Kiesler & Kraut, 1999; Young, 1998).

Computer-mediated communication is defined simply as communication via computers. Specifically, it is any communication between two or more people, which can occur through various electronic means (e.g., email, IRC, BBSs). It can be asynchronous or synchronous. Synchronous communication occurs simultaneously between two or more users as in Internet Relay Chat (IRC) and Multi-User Dimensions (MUDs). Asynchronous communication does not occur in real time (e.g., email).

Riva and Galimberti (1998) add that the mutual commitment and the feedback associated with face-to-face communication are absent in computer-mediated communication. Flaming is more likely in computer users than individuals communicating face to face (Kiesler, Siegel, & McGuire, 1984; McKenna & Bargh, 2000; Parks & Floyd, 1996). Kandell (1998) states that the quality of online interaction is significantly limited when compared to face-to-face communication.

In a study evaluating bankers' and college students' appraisals of online and offline communication, Cummings et al. (in press) report weaker online relationships when compared to face-to-face relationships. In addition, they do not believe email is a substitute for face-to-face interaction. Participants communicated less with their primary

contact on email compared to their primary contact in their household. Kraut et al. (1998) report an increase in loneliness even when the primary intention of communicating on the Internet was for social purposes. In addition, diminished communication with family members, fewer social activities, lower levels of happiness, and declines in social networks were associated with increased loneliness and heavier Internet use.

Putnam (2000) warns that the ease of access to the Internet might entice individuals to spend more time alone, to communicate with real life strangers, and to develop superficial relationships while damaging relationships with family and friends. People spend less time communicating with their families when they use the Internet heavily (Hamburger & Ben-Artizi, 2000; Kraut et al., 1998; Nie & Erbring, 2000; UCLA Center for Communication Policy, 2000). Stoll (1995) also describes a reduction of commitment and pleasure of face-to-face relationships with heavier Internet use.

Positive Aspects of Online Communication

According to others, computer-mediated communication is not all bad (Rice & Love, 1987; Walther & Burgoon, 1992). Katz and Aspden (1997) suggest time spent with family, friends, community organizations, religious organizations, and leisure organizations remain relatively unaffected by Internet use. Others agree, finding no decrease in communication with family, friends, or professional colleagues (Robinson, Kestnbaum, Neustadtl, & Alvarez, 2000; UCLA Center for Communication Policy, 2000, 2001). In fact, the Internet has been described as improving the lives of its users (Katz & Aspden, 1997). The Internet can be stimulating to the intellect, can change mood, and allow communication with friends and family (Greenfield, 1999; UCLA Center for

Communication Policy, 2000). Furthermore, the Internet can be an ideal place to meet peers with similar interests (McKenna & Bargh, 2000; ActivMedia Research, 1998). For those who are socially anxious, often a characteristic of the lonely, and who have difficulty in face-to-face interactions, the Internet may provide a safer, less threatening place to meet new people (Greenfield, 1999; McKenna & Bargh, 2000). Those lonely individuals who have difficulty self-disclosing and who often feel isolated in real life, feel at ease due to the anonymity of the Internet (Morahan-Martin & Schumacher, 2000).

The Internet provides less accountability, and increased freedom to construct oneself how one chooses (McKenna & Bargh, 2000). The Internet can provide an opportunity for "social experimentation and interpersonal growth" (Turkle, 1995). An individual can create his or her own identity in anyway he or she desires, potentially increasing the individual's self-worth (McKenna & Bargh, 2000).

The Internet has reportedly led to an increase in an individual's social ties by providing an avenue for social relationships that would not likely develop in real life (McKenna & Bargh, 1999; McKenna et al., 2002; Morahan-Martin, 1999). Specifically, McKenna et al. (2002) report 68% of 568 surveyed describe the Internet as increasing their social circle. These findings are contrary to Nie and Erbring (2000) who report that the Internet leads to a smaller social circle; however, as McKenna et al. (2002) state, Nie and Erbring's (2000) finding is based on only 4.3% of the total sample of more than 4,000 Internet users.

In summary, more information is needed to determine whether online relationships are damaging or not. As Greenfield (1999) warns, problems associated with the Internet, which has been described as "the fastest growing electronic technology in world history"

(UCLA Center for Communication Policy, 2000), are just beginning. More research in this area would help to determine the exact impact of online communication on human interactions.

CHAPTER III

METHODOLOGY

Introduction

This chapter discusses the methodology of this study. The following sections are included in the chapter: (1) Purpose, (2) Research Design, (3) Population/Sample Selection, (4) Variables, (5) Instrumentation, (6) Testing Procedures, (7) Null Hypotheses and Statistical Design (Data Analysis), and (9) Chapter Summary.

Purpose

The primary purpose of this study was to examine the relationship between loneliness and various aspects of Internet use in college students. It attempted to explore whether such variables as type of Internet use, history of Internet use, reasons for using the Internet, preference for the Internet as a mode of communication, preference for type of Internet activity, the changes in face-to-face interaction, phone contact, overall communication with family, friends, and others (besides family and friends) since using the Internet, and specific demographic characteristics, had an effect on the loneliness experienced by undergraduate students.

Research Design

The research design was a correlational study. Using a cross-sectional survey approach, data were collected on loneliness, amount of Internet use, type of Internet use, history of Internet use, reasons for Internet use, student's preference for the Internet as a mode of communication, student's preference for type of Internet activity, changes in face-to-face interaction, phone contact, and overall communication with family, friends, and others (besides family and friends) since using the Internet, and specific demographic characteristics including age, gender, class, ethnicity, and housing.

Population/Sample Selection

The subjects in this study were undergraduate students enrolled at Andrews University during Spring Semester 2002. Data were gathered from undergraduates living in the women's residence hall, men's residence hall, university apartments, and the community. A power analysis was conducted to determine desired sample size. Correlation analyses were primarily used to test each hypothesis, so a power analysis for correlation was performed. A power analysis, conducted with a small-medium effect size, alpha of .01, and a power level of .95 (β= .05), yielded an estimated sample size of 440. This is considered stringent criteria, as a power level of .80 (β= .20) is considered standard in social science research (Cohen, 1988; Rudestam & Newton, 2001).

Instrumentation

The UCLA Loneliness Scale (Version 3) and the Internet Use Survey, a questionnaire designed by the researcher, were the two instruments used in this study. The UCLA Loneliness Scale (Version 3) indicated scores of loneliness, while the Internet

Use Survey provided information about the participant's Internet use along with demographic information.

Variables

The dependent or criterion variable of the study was the loneliness index determined by the subject's score on the UCLA Loneliness Scale (Version 3). The independent variables included amount of Internet use (total amount of time on the Internet weekly), type of Internet use (email, World Wide Web, newsgroups, chat rooms, Multi-User Dimensions, Bulletin Board Services), history of Internet use (0-6 months, 6-12 months, 1-2 years, 2-3 years, 3 or more years), specific reasons for Internet use (for academic use, for business and work, to maintain relationships, to meet new people, to talk to others who share similar interests, to stay informed in areas of interest, for recreation, relaxation, and playing games, to shop, for instant messaging, to find travel information, to find medical and health information, to job search, and for banking), preference for the Internet as a mode of communication, and preference for type of Internet activity.

The UCLA Loneliness Scale (Version 3)

The UCLA Loneliness Scale (Version 3) (Russell, 1996) measures self-rated satisfaction and dissatisfaction with current social relationships. The scale consists of 20 items in which 9 items are worded in a positive, non-lonely direction and 11 items in a negative, lonely direction. Subjects respond according to a 4-point Likert scale ranging from 1 (never) to 4 (always). Positively worded items were reversed for scoring. The scale yields a single, global index of loneliness with potential scores ranging from 20-80.

Higher scores indicate higher amounts of loneliness with lower scores equating to lower amounts of loneliness. The scale not only focuses on the quality of interpersonal relationships, reflecting the subject's conclusion comparing his or her actual versus desired relationships, but also indicates the intensity of an individual's perception of loneliness. Russell (1982) describes the scale as representing a unitary state that results from relational deficits.

Development of the UCLA Loneliness Scale (Version 3)

As described earlier, research on loneliness was limited until the 1970s. One of the reasons for the delay was the absence of an adequate measure to assess loneliness. Several measures developed before the UCLA Loneliness Scale were sparsely utilized and never officially published. In addition, the measures were time consuming (38 to 75 items) (Russell et al., 1978). It was not until the publication of the 20-item UCLA Loneliness Scale (Russell et al., 1978) that loneliness research substantially increased.

The original UCLA Loneliness Scale (Russell et al., 1978) developed from a 75-item pool developed by R.J. Sisenwein in 1964, emphasized such themes as perceived loneliness, social isolation, strained interpersonal relationships, and feelings of emptiness (Russell et al., 1978). It is believed that while the loneliness experience varies from person to person, common themes of loneliness can be examined. The scale demonstrated high internal consistency (coefficient alpha of .96) and revealed some stability with test-retest correlations of .73 over a 2-month period (Russell et al., 1978) and .62 over a 7-month period (Cutrona, 1982). However, the scale possessed several problems that needed

correction, including concerns for response bias, discriminant validity, and social desirability.

The Revised UCLA Loneliness Scale (Russell et al., 1980) addressed these concerns. The scale demonstrated highly acceptable internal consistency (coefficient alpha of .94) (Hartshorne, 1993; Russell et al., 1980). Concurrent validity (i.e., phenomena theoretically associated to loneliness distinguishable from those not related) was indicated by significant correlations with the Beck Depression Inventory (r = .62), the Costello-Comrey Anxiety Scale (r = .32), and the Costello-Comrey Depression Scale (r = .55). In addition, self-reported emotions such as depression, emptiness, and isolation all have correlations with loneliness above .40 (Russell et al., 1980). No significant correlations were found with emotions such as embarrassment, sensitivity, and thoughtfulness, which are not theoretically related to loneliness.

While the original scale consisted of only items worded in a negative (lonely) direction, the Revised UCLA Loneliness Scale (Russell et al., 1980) includes 10 items representing satisfaction with social relationships (worded in a positive direction) and 10 items reflecting dissatisfaction with social relationships (worded in a negative direction). Discriminant validity, which came into question with the original measure, was critical to establish due to strong relationships between loneliness and other constructs (e.g., depression, self-esteem, and social support). When compared to a "self-labeling loneliness index," comprised of six items, Russell et al. (1980) reported lower correlations between the Revised UCLA Loneliness Scale and other mood and personality measures (e.g., Beck Depression Inventory [depression], r = .505; Texas Social Behavior Inventory [self-esteem], r = -.493; State-Trait Anxiety Inventory [anxiety], r = .359; and the Marlowe-

Crowne Social Desirability Inventory [social desirability] r = -.203). A "self labeling loneliness index" correlated significantly with the Revised UCLA Loneliness Scale (r = .705). (The "self labeling loneliness index" is the sum of six questions in which the individual identifies himself or herself as lonely. Examples include: "During your lifetime, how often have you felt lonely," "During the past two weeks, how lonely have you felt?")

The most recent version of the scale, the UCLA Loneliness Scale (Version 3) (Russell, 1996), responds to issues raised in the Revised UCLA Loneliness Scale (Russell et al., 1980), including confusion in some questions. A more simplified version of the scale has emerged. A further revision involves initiating every statement with "How often do you feel . . ." In addition, 11 items are now worded in a negative direction and 9 are worded in a positive direction. In the Revised UCLA Loneliness Scale, the developers of the instrument attempted to write reversals of the original statements obtained from lonely people for the original UCLA Loneliness Scale. Item-total correlations for both the positively and negatively worded items determined which items were included. As Miller and Cleary (1993) state, the positively and negatively worded items have not reduced the validity of the scale.

The three versions of the UCLA Loneliness scales are highly reliable scales (Cramer & Barry, 1999; Cuffel & Akamatsu, 1989; Hartshorne, 1993; Hays & DiMatteo, 1987; Knight, Chisholm, Marsh, & Godfrey, 1988; Russell, 1996; Russell et al., 1980; Russell et al., 1978). Specifically, the first version of the scale yielded a coefficient alpha of .96 in a sample size of 239 students (Russell et al., 1978). A coefficient alpha of .94 was found for the second version of the scale in two separate studies with 162 students and 237 students, respectively (Russell et al., 1980). For Version 3, coefficient alphas

ranging from .89 to .94 across several different samples reflect a highly internally consistent measure. Specifically, of the 489 students in the college student sample, a coefficient alpha of .92 was obtained. A sample of 310 nurses yielded a coefficient alpha of .94 while a sample of 316 teachers produced a coefficient alpha of .89. Lastly, a coefficient alpha of .89 was obtained in a sample of 301 elderly individuals (Russell, 1996).

Cramer and Barry (1999) compared various loneliness measures and found the highest level of internal consistency to be demonstrated by the UCLA Loneliness Scale (Version 3) (r = .73). The UCLA Loneliness Scale has also demonstrated reliability in samples from various cultures including Zimbabwe (Wilson, Cutts, Lees, Mapungwana, & Levison, 1992), Iran (Hojat, 1982), and Puerto Rico (Jones, Carpenter, et al., 1985). In addition, test-retest reliability data suggest stability over a 1-year period (Russell, 1996).

The validity of the UCLA Loneliness Scales has been studied in several ways. Construct validity is reflected in the scale's associations with depression, social self-esteem, anxiety, self-rated feelings of abandonment, emptiness, hopelessness, isolation, and social dissatisfaction (Russell et al., 1980). Correlations between the UCLA Loneliness Scale and various personality variables have been reported, including greater public self-consciousness (r = .38) and social anxiety (r = .49), higher levels of shyness (r = .50), greater social isolation (r = .48), lower self-esteem (r = -.45), less altruism (r = -.29), less acceptance of others (r = -.40), and more external locus of control (r = .23) (Jones et al., 1981). Also, loneliness scores have been found to be more related to perceived quality of relationships instead of quantity of social contact (Cutrona, 1982). Specifically, 42% of the variance in the UCLA Loneliness Scale was explained by

satisfaction with friendships, romantic associations, and family while only 12% of the variance in the UCLA Loneliness Scale was accounted for by the frequency of contact among those relationships (friends, romantic associations, and family). Furthermore, significant relationships between scores on the UCLA Loneliness Scale (Version 3) and neuroticism (r = .49), introversion-extroversion (r = -.40), self-esteem (r = -.60), and depression (r = .52) reflect the scale's construct validity (Russell, 1996).

Convergent validity is reflected in the scale's correlation with other measures of loneliness, including the NYU Loneliness Scale, the Differential Loneliness Scale, and the Bradley Loneliness Scale as well as the Social Provisions Scale, a measure of social support (Rubenstein & Shaver, 1982; Russell, 1996; Russell et al., 1987; Schmidt & Sermat, 1983; Solano, 1980). Although, as previously described, correlations exist between loneliness, self-esteem, depression, and social support measures, discriminant validity of the instrument is supported because the magnitude of the correlations are smaller than other measures of loneliness (Jones & Moore, 1987; Jones & Moore, 1989; Russell, 1996; Russell et al., 1980; Russell et al., 1987; Weeks et al., 1980). In addition, it appears scores are not seriously affected by the social desirability concerns of the participant (Russell, 1996; Russell et al., 1980).

Several researchers have provided different findings concerning the factorial structure of the UCLA Loneliness Scale. Hays and DiMatteo (1987) and Hojat (1982) reported as many as five different factors in the UCLA Loneliness Scale while Austin (1983) identified three and others report a two-factor structure (Hojat, 1982; Knight et al., 1988; Wilson et al., 1992). On the other hand, more recently, Hartshorne (1993), Oshagan and Allen (1992), and Russell (1996) supported the unidimensionality of the

UCLA Loneliness Scale. Russell (1996) attributed the differences in previous findings to the positively and negatively worded items. In other words, two factors resulting from the item wording seem to exist; however, according to Russell, there is a "general bipolar loneliness factor" confirming the unidimensionality of the scale. The debate over the number of factors in the scale seems to have lessened since Russell's (1996) study.

Q-sort methodology, rating scales, size-item measures, and projective techniques are among the approaches utilized in the measurement of loneliness (Jones et al., 1990). Among the many scales developed, the UCLA Loneliness Scale has emerged as the most frequently used and psychometrically sound loneliness instrument in assessing loneliness. The UCLA Loneliness Scale (Version 3) appears to provide a brief, highly reliable, and valid assessment of loneliness in college students and, therefore, seems highly appropriate for the purposes of this study.

Internet Use Survey

The Internet Use Survey was designed to correspond to the research questions presented in chapter 1. The instrument included specific information regarding Internet use in undergraduate students. Specifically, Question 1 asked if the individual had used the Internet. Question 2 asked for an estimation of the amount of time the user spent on the Internet per week. Question 3 requested the respondent to estimate how long he or she had been using the Internet at least once a week with potential answers being 0-6 months, 6-12 months, 1-2 years, 2-3 years, and 3 or more years. Next, the respondent was asked to estimate, in hours and minutes, how much time is spent on various Internet activities each week. The activities included email, newsgroups, MUDs, chat rooms,

World Wide Web, Bulletin Board Services, and Instant Messaging. The next question introduced the respondent to the 7-point Likert scale to rate from 1, severe dislike, through 7, very enjoyable, how much he or she enjoys the Internet activities listed in the previous question. In Questions 6-11, the respondent rated his or her preference for the phone, Internet, or face to face when communicating with a family member or friend who lived in the respondent's community about different types of matters--personal and important matters, important but not personal matters (i.e., business and academic related), and trivial matters. Those questions were followed by asking how the Internet had affected the amount of time spent face to face, talking on the phone, and communicating with family, friends, and others (besides family and friends). Lastly, specific reasons for Internet use (for academic use, for business and work, to maintain relationships, to meet new people, to talk to others who share similar interests, to stay informed in areas of interest, for recreation, relaxation, and playing games, to shop, for instant messaging, to find travel information, to find medical and health information, to job search, and for banking) were rated on a 5-point Likert scale (1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = very frequently). General demographic questions (age, gender, class, ethnicity, and housing) completed the survey.

The input of several professionals and students was obtained for clarity of questions, suggestions on wording, methodological considerations, and items that should be added or deleted. In addition, a pilot test was conducted to further improve the survey.

After data collection was completed, some limitations of the instrument became evident. While no confusion occurred in the pilot study or the primary study, the responses of the history questions overlapped (i.e., 0-6 months, 6-12 months, 1-2 years, 2-

3 years, 3+ years). A better question would have also included a longer time span for use. Most of the sample had used the Internet for 3 or more years. The research could not determine if differences existed within this group.

In addition, a question asking how long the user spent *each day* over a typical week on the Internet and various Internet activities would have allowed the researcher to determine if most of the use is at one time or spread out over the week. Also, the question asking the respondent to estimate the time he or she spends on the Internet per week seemed unreliable. It rarely added up to what the respondent stated when asked to break down his or her use by type of Internet activity.

Lastly, in the section relating to preference for phone, Internet, or face-to-face interaction when communicating to a family member or friend who lives in the respondent's community, the questions asking the respondent to distinguish between phone or face-to-face interaction could have been eliminated as they were not used in analyses.

Testing Procedures

After approval was obtained from the Institutional Review Board at Andrews University, a list of all undergraduate students, including necessary demographic and living information, was obtained. Permission was also granted from residence hall deans to attend required worship services for male undergraduate students and to place surveys in the mailboxes for the female undergraduates. Different survey methods were used for the male and female residence halls due to the dean of women's request for the research instruments to be placed in the women's mailboxes instead of collecting them at the

women's worship services. All respondents who received a survey were given a token of appreciation (candy bar) for participating in the study. The participants were asked to complete the UCLA Loneliness Scale (Version 3) and the Internet Use Survey.

Four-hundred seventy-two surveys were placed in the mailboxes at the women's residence hall (Lamson Hall). A follow-up postcard was placed in all mailboxes approximately 1 week later. Additional surveys were also made available at this time. A low response rate was obtained (111 surveys, 23.5%), so I received approval from the Institutional Review Board and the residence hall deans to personally hand deliver surveys to randomly selected residents of the women's residence hall. A container was made available for returns to ensure confidentiality. An additional 64 surveys were obtained yielding a final sample of 175 for the women's residence hall. This generated a final response rate of 44.3%.

For the women's residence hall sample, 26 of the surveys were eliminated because the respondents were graduate students. According to Andrews University's records, the total number of undergraduate students living in the women's residence hall was 393. In addition, eight surveys were haphazardly completed (i.e., impossible answers, several incomplete questions, and skipped pages) and were not included in the final analysis. A total of 175 surveys were used in the final analyses for the women's residence hall.

The researcher also attended required worships in the men's residence hall (Burman Hall) for 2 weeks asking volunteers to complete the survey. No identifying information was placed on the surveys. To obtain a higher number of responses, I went door to door in the two men's residence halls (Burman Hall and Meier Hall) requesting volunteers to fill out the survey. Permission from the Institutional Review Board and

residence hall deans was obtained. A container placed in the men's lobby was made available for survey returns to ensure confidentiality.

A total of 195 male undergraduates were in their rooms when I went to the men's residence halls; however, 7 refused to participate. A response rate of 96.4% was obtained. Ten surveys were not usable due to incompleteness and circling several answers for each of several questions. A total of 178 surveys were used in the final analyses from the men's residence halls.

To obtain a sample from the students living in the community, 200 surveys were mailed to randomly selected undergraduate students. A self-addressed envelope was provided to return the completed surveys. No identifying information was placed on these surveys to ensure confidentiality. Seventy-eight surveys were returned yielding a response rate of 39%. No surveys were removed from final analyses.

Lastly, surveys were personally hand delivered to all undergraduates living in university apartments. Of the 69 undergraduates living in the university apartments, 2 refused the survey. All consenting participants were given a self-addressed envelope. Thirty-six surveys were returned generating a response rate of 52.2%. One was eliminated due to incompleteness yielding a final sample of 35. A summary of the response rates is presented in Table 1.

Null Hypotheses and Statistical Design (Data Analysis)

From the eight research questions, seven major hypotheses were tested, with hypotheses 1 through 7 having five additional sub-hypotheses examining how age, class, gender, ethnicity, and housing relate to loneliness. The subhypotheses were tested

Table 1

Summary of Response Rates

Type of housing	Undergraduate Population	Surveys Given/ Returned	Response Rate (%)	Usable Surveys
Residence Halls				
Males	399	195 / 188	96.4	178
Females	393	472[a] / 209	44.3	175
University Apartments	69	69 / 36	52.2	35
Community	689	200 / 78	39.0	78
			Total	466

[a] Graduate students were not eliminated from the initial mailing in the women's residence hall; therefore, more surveys were given than the total *undergraduate* population for the women's residence hall.

using Analysis of Variance.

Hypothesis 1: There will not be a statistically significant relationship between the amount of time an undergraduate student spends weekly on the Internet and loneliness.

This hypothesis was tested using correlational analyses and Analysis of Variance.

Hypothesis 2: There will not be a statistically significant relationship between loneliness and type of Internet use in undergraduate students.

This hypothesis was tested using correlational analyses and Analysis of Variance.

Hypothesis 3: There will not be a statistically significant relationship between history of Internet use and loneliness in undergraduate students.

This hypothesis was tested using correlational analyses and Analysis of Variance.

Hypothesis 4: There will not be a statistically significant relationship between individual reasons for using the Internet and loneliness in undergraduate students.

This hypothesis was tested using correlational analyses and Analysis of Variance.

Hypothesis 5: There will not be a statistically significant relationship between a student's preference for the Internet as a mode of communication and loneliness in undergraduate students.

This hypothesis was tested using regression/correlational analyses and Analysis of Variance.

Hypothesis 6: There will not be a statistically significant relationship between a student's preference for type of Internet use and loneliness in undergraduate students.

This hypothesis was tested by correlational analyses and Analysis of Variance.

Hypothesis 7: There will not be a significant relationship between loneliness and the impact the Internet has had on the amount of time a student spends face to face with family, friends, and others (besides family and friends), talking on the phone with family, friends, and others (besides family and friends), and communicating with family, friends, and others (besides family and friends).

This hypothesis was tested using correlational analyses and Analysis of Variance.

Hypothesis 8: There will not be a statistically significant relationship between the amount of Internet use, history of Internet use, reasons for Internet use, preference for Internet use as a mode of communication, preference for type of Internet use, and the amount of time a student spends face to face, talking on the phone, and communicating with family, friends, and others (besides family or friends) since using the Internet and loneliness in undergraduate students.

This hypothesis was tested by stepwise multiple regression.

Chapter Summary

This chapter describes the type of research being conducted, the selected sample, variables utilized in data analysis, the instruments being administered, testing procedures, null hypotheses, and the corresponding statistical analyses conducted.

CHAPTER IV

RESULTS

Introduction

This study was designed to determine the relationship between loneliness and various aspects of Internet use. To determine levels of loneliness, participants were asked to complete the UCLA Loneliness Scale (Version 3). Information about various aspects of the Internet was obtained through the Internet Use Survey. The following demographic variables were also included: age, class, gender, ethnicity, and housing. This chapter presents a description of the sample, a discussion of preliminary analyses, a description of subgroups analyzed, the results of each hypothesis, a summary of significant findings, and a summary of the chapter.

Description of the Sample

Demographic Information

The sample consisted of 466 undergraduate students. A fairly equal distribution of males and females was obtained, with 244 females and 222 males. The majority of the sample was between the ages of 18-22 (73.8%). An adequate distribution over class was also obtained. Across ethnicity, the present sample was consistent with the overall undergraduate population at Andrews University. One hundred thirteen (24.2%) indicated they were African-American/Black; 43 (9.2%) were Asian/Pacific Islander; 63

(13.5%) were Hispanic/Latino(a); 187 (40.1%) were Caucasian; 26 (5.6%) were multi-ethnic; and 27 (5.8%) responded to the other category. Lastly, most of the participants in the sample lived in residence halls (N= 353; 75.8%), with approximately 24% living in university apartments or the community. Community participants constituted approximately 16% of this study, while making up approximately 45% of the actual overall undergraduate population. The research purposefully oversampled residence hall students because of the easy access to the Internet throughout the campus. A summary of the demographic variables is provided in Table 2. The total undergraduate population of each demographic variable at Andrews University is also presented.

Internet Use Information

All 466 respondents reported weekly Internet use. Most of the sample used the Internet less than 10 hours per week. Only 5% of the sample used the Internet 40 or more hours per week. The four respondents who reportedly used the Internet more than 70 hours per week were excluded from the final analyses because the surveys seemed to be haphazardly completed. It was believed the information was either not accurate or more factors were involved in the overuse than measured in the study. Table 3 presents a summary of the total amount of weekly Internet use for the obtained sample.

When asked to report the amount of time spent on email, newsgroups, Multi-User Dimensions, chat rooms, World Wide Web, Bulletin Board Services, and instant messaging, the World Wide Web was found to be the most used Internet activity of the sample with an average of 4.48 hours of use per week. This was followed by instant messaging (M=3.50) and email (M=3.02). Chat rooms, newsgroups, Multi-User

Table 2

Frequencies of Demographic Variables

Demographic Variable	*N*	%[a]	Population at Andrews University/(%)
Age			
22 years and under	359	77.0	1,108 (71.8)
23+ years	103	22.1	435 (28.2)
Class			
Freshman	141	30.3	404 (26.8)
Sophomore	84	18.0	329 (21.8)
Junior	118	25.3	310 (20.6)
Senior	119	25.5	465 (30.8)
Ethnicity			
African-American/Black	113	24.2	433 (28.2)
Asian Pacific Islander	43	9.2	199 (13.0)
Hispanic/Latino(a)	63	13.5	187 (12.2)
Caucasian	187	40.1	717 (46.7)
Gender			
Male	222	47.6	710 (45.8)
Female	244	52.4	840 (54.2)
Housing			
Residence Halls	353	75.8	792 (51.1)
University Apartments	35	7.5	69 (4.5)
Community	78	16.7	689 (44.4)

[a]Totals are less than 100% due to missing data.

Table 3

Frequencies of Total Amount of Weekly Internet Use in Undergraduates

Amount of Internet use (Hours per week)	Frequency	Percentage[a]
.01 through 5	142	30.5
5.01 through 10	131	28.1
10.01 through 20	102	21.9
20.01 through 40	63	13.5
40.01 through 70	22	4.7

[a]The total is less than 100% due to missing data.

Dimensions, and Bulletin Board Services were not as popular with each activity having a mean under one hour.

To assess level of enjoyment for each Internet activity, a 7-point Likert scale (1 = severe dislike; 2 = somewhat dislike; 3 = neutral; 4 = somewhat enjoyable; 5 = somewhat enjoyable; 6 = enjoyable; 7 = very enjoyable) was used. Instant messaging, email, and World Wide Web were the three most enjoyed Internet activities with means of 6.40, 6.28, and 6.19, respectively. Newsgroups, Multi-User Dimensions, and Bulletin Board Services followed with the least preferred activity being chat rooms. Table 4 provides the means and standard deviations for amount of time spent on each Internet activity and the level of enjoyment for each.

Table 4

Means and Standard Deviations for Amount of Use of Each Internet Activity and Level of Enjoyment for Each Activity

	Hours/Week of Use		Level of Enjoyment[b]	
Internet Activity	Mean	Standard Deviation	Mean	Standard Deviation
World Wide Web	4.48	6.23	6.19	.710
Instant Messaging	3.50	6.05	6.40	.712
Email	3.02	3.16	6.28	.729
Chat rooms	.57	2.33	5.58	.687
Newsgroups	.44	1.53	5.78	.756
Multi-User Dimensions	.30	1.72	5.70	.720
Bulletin Board Services	.25	1.08	5.69	.826

[b] Respondents used a 7-point Likert scale (1=Severe dislike through 7=Very enjoyable) to rate their level of enjoyment for each Internet activity.

The majority of the sample had used the Internet weekly for three or more years (N=332; 71.2%). Only 7.3% of the sample had used the Internet for less than a year. Table 5 presents a summary of the history of Internet use for the obtained sample.

Table 5

Frequency and Percentages for History of Weekly Internet Use

Length of Internet use for at least once a week	Frequency	Percentage (%)[a]
0-1 year	34	7.3
1-2 years	41	8.8
2-3 years	58	12.4
3 or more years	332	71.2

[a]The total is less than 100% due to missing data.

When rating how much the Internet had changed face-to-face interaction with family, friends, and others (besides family and friends), an examination of the results revealed that face-to-face interaction had decreased more in friends and others (besides family and friends) than family. Approximately 17% reported decreases in face-to-face interaction with family compared to approximately 28% indicating decreases in face-to-face interaction with friends and others (besides family and friends). Only a small portion of the sample reported increases in face-to-face interaction since using the Internet.

Approximately 33% indicated decreases in time spent talking on the phone with family and others (besides family and friends), while approximately 45% reported decreases in time spent talking with friends on the phone. Only a small portion of the sample specified increases in talking on the phone since using the Internet.

When rating how much the Internet has changed overall communication, the majority of the sample reported no changes. Approximately 31% indicated increases in communication with family and others (besides family and friends) since using the Internet. Forty percent of the sample specified increases in communication with friends. Table 6 provides a summary of these findings.

Academic use and maintaining relationships with family and friends were the two most frequently used reasons for Internet use while instant messaging was also a commonly used activity for Internet use. Meeting new people, talking to others who share similar interests, finding medical and health information, job searching, and banking were the most infrequently used reasons for Internet use. A summary of various reasons for Internet use in the undergraduates sampled is provided in Table 7.

When comparing phone use versus Internet use, most preferred the phone when discussing personal matters with family and friends. When discussing important matters with family and/or friends, most of the sample was divided between preferring the phone or having no preference. In deciding between face-to-face interaction or the Internet, the sample overwhelming preferred face-to-face interaction when discussing personal matters. Table 8 provides a summary of these findings.

Loneliness Information

The primary purpose of this study was to determine if amount of Internet use is

Table 6

Percentages of Changes in Face-to-Face Interaction, Talking on the Phone, and Overall Communication With Families, Friends, and Others Since Using the Internet

Type of Change	Significantly Decreased	Slightly Decreased	No Change	Slightly Increased	Significantly Increased
Change in face to face with family	3.0	14.2	76.0	4.3	1.7
Change in face to face with friends	4.3	22.7	61.8	7.3	3.0
Change in face to face with others	4.7	24.0	59.9	7.5	2.8
Change in talking on the phone with family	6.2	26.4	56.7	6.4	3.0
Change in talking on the phone with friends	11.8	33.7	44.6	6.2	2.8
Change in talking on the phone with others	9.9	23.0	53.9	7.9	4.3
Change in communicating with family	1.9	9.7	56.2	24.2	6.9
Change in communicating with friends	2.1	9.9	45.3	26.0	14.8
Change in communicating with others	2.6	12.4	51.7	22.5	9.4

Note. Totals are less than 100% due to missing data.

Table 7

Percentages of Reasons for Using the Internet

Reason	Never	Rarely	Sometimes	Often	Very Frequently
For academic use	1.3	3.6	21.0	37.3	36.7
For business use	12.9	15.0	30.3	22.3	18.7
To maintain relations w/ family and friends	3.2	7.7	24.2	30.5	33.9
To meet new people	45.5	26.6	14.6	7.1	5.6
To talk to others who share my interests	35.4	28.8	19.5	8.8	6.4
To stay informed in areas of my interests	11.6	15.2	29.4	25.8	17.4
Recreation, relaxation, and games	12.4	20.4	26.8	22.3	17.8
To shop	24.5	22.5	30.0	13.9	8.2
For instant messaging	15.7	10.1	18.5	19.1	36.3
To find travel information	7.5	17.8	33.5	25.1	15.0
To find medical and health information	20.6	30.9	30.7	10.7	5.8
For job searching	28.3	26.6	26.6	10.9	6.7
For banking	45.9	17.4	16.7	11.6	8.2

Note. The totals are less than 100% due to missing data.

Table 8

Frequency and Percentages for Preference for Internet as a Mode of Communication

	Phone or Internet?				
Variable	Definitely the phone	Probably the phone	No preference	Probably the Internet	Definitely the Internet
Personal matters with friend	58.4	22.3	12.9	5.2	1.1
Personal matters with family	62.7	21.0	7.3	5.4	3.0
Important matters with friend	17.6	26.2	31.3	19.1	4.9
Important matters with family	23.2	37.1	23.6	10.9	3.9

	Face to face or Internet?				
	Definitely face to face	Probably face to face	No preference	Probably the Internet	Definitely the Internet
Personal matters with friend	58.8	26.8	6.4	3.2	3.4
Personal matters with family	59.4	25.3	7.3	3.9	3.4
Important matters with friend	20.0	34.5	29.8	10.3	3.2
Important matters with family	26.8	38.6	21.2	9.7	2.1

Note. Totals are less than 100% due to missing data.

significantly related to levels of loneliness in undergraduate students. To determine if this relationship exists, loneliness scores from the UCLA Loneliness Scale (Version 3) were correlated with each individual's weekly amount of Internet use. Specific results are presented later in the chapter.

Each individual loneliness score was determined by totaling the responses to the 20 items in the UCLA Loneliness Scale (Version 3). Items 1, 5, 6, 9, 10, 15, 16, 19, and 20 were reverse scored (1=4, 2=3, 3=2, 4=1). Scores on the UCLA Loneliness Scale (Version 3) range from 20-80 with higher scores indicating higher degrees of loneliness. The majority of the sample did not exhibit high levels of loneliness with a mean score of 41.15 (SD = 9.39). Only 3% scored above 60, indicating a moderate degree of loneliness. The highest score in the sample was 71. This is very similar to Russell (1996) whose sample of 487 undergraduates also did not exhibit high levels of loneliness (M=40.08; SD= 9.50). The mean for each item of the UCLA Loneliness Scale (Version 3) is presented in Table 9.

Preliminary Analyses

Factor Analyses

To determine the number of factors in the UCLA Loneliness Scale (Version 3), a principal components factor analysis was conducted. Using the criterion of the number of eigenvalues greater than 1, a three-factor solution resulted. The negatively worded items loaded on factor 1 while the positively worded items split between factors 2 and 3. Only three items loaded heaviest on factor 3. No clear distinction could be made between factors 2 and 3.

Table 9

Mean Loneliness Scores for the 20 Items of the UCLA Loneliness Scale (Version 3)

Item	Mean	*SD*
How often do you feel that you are "in tune" with the people around you?[a]	1.74	.653
How often do you feel that you lack companionship?	2.38	.817
How often do you feel that there is no one you can turn to?	2.06	.904
How often do you feel alone?	2.28	.821
How often do you feel part of a group of friends?[a]	1.65	.706
How often do you feel that you have a lot in common with the people around you?[a]	1.91	.675
How often do you feel that you are no longer close to anyone?	2.08	.826
How often do you feel that your interests and ideas are not shared by those around you?	2.34	.819
How often do you feel outgoing and friendly?[a]	1.79	.685
How often do you feel close to people?[a]	1.82	.664
How often do you feel left out?	2.28	.739
How often do you feel that your relationships with others are not meaningful?	2.17	.815
How often do you feel that no one really knows you well?	2.39	.898
How often do you feel isolated from others?	2.18	.812
How often do you feel you can find companionship when you want it?[a]	1.80	.782
How often do you feel that there are people who really understand you?[a]	2.01	.816
How often do you feel shy?	2.60	.811
How often do you feel that people are around you but not with you?	2.49	.763
How often do you feel that there are people you can talk to?[a]	1.61	.735
How often do you feel that there are people you can turn to?[a]	1.58	.700
Total Loneliness score	41.15	9.39

Note. Scores on the UCLA Loneliness Scale (Version 3) range from 20-80. Respondents rate the items according to a 4-point Likert scale: 1=Never; 2=Rarely, 3=Sometimes, 4=Always.
[a] Indicates item was reversed for scoring.

A subsequent principal components factor analysis was run specifying two factors, revealing a solution with positively worded items loading on one factor and negatively worded items loading on another. After examination by the researcher and several professionals, the consensus was that no differences could be determined between the two factors other than direction of wording. Examples of items from each factor are provided in Table 10. By using two factors, no substantive interpretation could have been made (see also Knight et al., 1988). Therefore, for treatment of these data, a one-factor solution was used.

Russell (1996) reported evidence supporting the undimensionality of the scale. He conducted confirmatory factor analysis of the UCLA Loneliness Scale (Version 3) hypothesizing a bipolar global loneliness factor in which all the items would load significantly with two factors corresponding to the negative (lonely) items and the positive (nonlonely) items. He found this model provided a good fit to his data.

Reliability Analysis

A reliability analysis was also conducted on the UCLA Loneliness Scale (Version 3) yielding a coefficient alpha of .91, reflecting a highly reliable scale. Russell (1996) found similar results in his sample of 487 undergraduate students with a coefficient alpha of .92. The UCLA Loneliness Scale has consistently been found to be a highly reliable instrument (e.g., Cramer & Barry, 1999; Cuffel & Akamatsu, 1989; Hartshorne, 1993; Hays & DiMatteo, 1987; Knight et al., 1988; Russell, 1996; Russell et al., 1980; Russell et al., 1978).

Table 10

Examples of Items Loading on Factors 1 and 2 From the Factor Analysis Performed on the UCLA Loneliness Scale (Version 3)

Factor 1	Factor 2
How often do you lack companionship?	How often do you feel you can find companionship when you want it?
How often do you feel that there is no one you can turn to?	How often do you feel that there are people you can turn to?
How often do you feel that you are no longer close to anyone?	How often do you feel close to people?
How often do you feel that your interests and ideas are not shared by those around you?	How often do you feel that you have a lot in common with the people around you?

Testing the Hypotheses

Analysis of variance, multiple regression, and correlational analyses were performed to test the hypotheses of the present study. Results of these tests are reported under each hypothesis heading.

For correlational analyses, due to the disadvantage inherent in the pairwise procedure with each analyses not being based on the same subjects, listwise comparisons were also conducted. The listwise procedure uses cases with complete data and includes the same number of subjects for each analysis. Comparing the two procedures, the differences between the correlations were very small. For example, when correlating history of Internet use and loneliness in freshmen, the resulting correlation is -.261 with a sample size of 141. When doing the same correlation using the listwise procedure, a

correlation of -.266 was found with a sample size of 84. When correlating loneliness and how much the Internet has changed face-to-face interaction, talking on the phone, and communication with family, friends, and others (besides family and friends) in females, the correlation using the pairwise procedure is -.086 with a sample size of 234. When doing the same correlation with 11 other independent variables, the listwise comparison resulted in r = -.147 (N =136).

In most cases, using the listwise procedure resulted in a sharp decrease in sample size when correlating loneliness and the variable of interest within subgroups; however, smaller drops were found when correlating loneliness and the variable of interest across the entire sample. Therefore, in this chapter, all analyses based on subgroups used pairwise procedure to maximize the sample size for each analysis. Analyses based on the total sample used listwise procedure. To prevent a large loss in sample size, the listwise procedure was conducted separately on each hypothesis instead of combining all relevant variables across all hypotheses into one group for analysis.

For each of the demographic variables studied (age, class, gender, ethnicity, and housing), a one-way analysis of variance (ANOVA) was conducted. No significant differences were found for loneliness between the age, class, gender, and housing groups. As presented in Table 11, a significant difference was found among the various ethnic groups. Post-hoc analysis (Tukey's HSD) revealed that African-Americans/Blacks were significantly lonelier than Caucasians (M=43.1 versus M= 39.6). It is important to note that Asians and Blacks had similar mean loneliness scores and Hispanics and Caucasians had similar mean loneliness scores; however, due to small sample sizes for Asians and Hispanics, no significant differences resulted.

Table 11

One-Way Analysis of Variance for Demographic Variables and Loneliness

Demographic Variables	*N*	*M*	*SD*	*F*
Age				
Under 22	359	41.3	9.30	$F(1, 462) = .268, p = .605$
23+ years	103	40.8	9.58	
Class				
Freshman	141	41.2	9.62	$F(3, 462) = .386, p = .763$
Sophomore	84	40.2	9.07	
Junior	118	41.4	9.72	
Senior	119	41.6	9.19	
Gender				
Male	222	40.7	9.14	$F(1, 466) = 1.15, p = .285$
Female	244	41.6	9.60	
Ethnicity				
Afr. Amer/Black	113	43.1	8.64	$F(3, 406) = 4.39, p = .005$*
Asian/Pac. Island	43	42.7	8.54	
Hispanic/Latino(a)	63	39.8	9.61	
Caucasian	187	39.6	9.14	
Housing				
Residence Halls	353	41.4	9.32	$F(1, 466) = 1.04, p = .309$
Uni Apt/Community	113	40.4	9.57	

*$p < .05$.

Description of Subgroups Analyzed

For each hypothesis, I analyzed the relationship between loneliness and various independent variables for all subjects and selected subgroups. Depending on the hypothesis, between 22 and 39 subgroups were analyzed. Subgroups analyzed in each hypothesis included: age, class, gender, ethnicity, housing, history of Internet use, number of Internet activities used, and total amount of Internet use greater than 40 hours per week. The subgroups developed were not mutually exclusive (i.e., the variable of "grade" was divided into freshmen, sophomores, freshmen and sophomores combined, juniors, seniors, and juniors and seniors combined. Also, the variable "number of activities" was divided into those who use one activity, more than one activity, more than three activities, and more than five activities). Descriptions and rationales for the subgroups for each hypothesis are presented below.

Age

Loneliness, which seems to decrease in pervasiveness with age (Revenson & Johnson, 1984; Rubenstein & Shaver, 1980), is found to be particularly intense and prevalent among traditional-age college students, especially freshmen (Cutrona, 1982; Diamant & Windholz, 1981; Pearl et al., 1990; Phillips & Pederson, 1972; Rubenstein & Shaver, 1982). College students have also been found to be more likely to use the Internet because of increasingly easy access on college campuses. UCLA Center for Communication Policy (2000) states about 84% males and 79% females ages 19-24 access the Internet. To evaluate potential relationships between age, loneliness, and various aspects of the Internet, age was analyzed in each hypothesis.

Class

Loneliness is particularly intense in college students, especially freshmen (Cutrona, 1982; Diamant & Windholz, 1981; Pearl et al., 1990; Phillips & Pederson, 1972; Rubenstein & Shaver, 1982). While many students adjust at the completion of their freshman year, many do not (Shaver et al., 1985). In addition, it has been reported that the higher the education level, the higher likelihood of Internet use (Nie & Erbring, 2000; UCLA Center for Communication Policy, 2000). UCLA Center for Communication Policy (2000) states that as many as 55.3% of the 2,096 respondents access the Internet at school. Therefore, class level was divided into six categories: freshmen, sophomores, juniors, seniors, freshmen and sophomores combined (underclassmen), and juniors and seniors combined (upperclassmen) to evaluate potential relationships between loneliness, class, and various aspects of the Internet.

Gender

Research regarding the relationship between loneliness and gender is mixed. While some researchers report higher levels of loneliness in men, others describe females as more lonely. Others find no differences between the sexes.

Some researchers suggest that when women score higher than men, it may be due to the fact that women are more willing to label themselves as lonely because it is more socially acceptable (Borys & Perlman, 1985). Therefore, if an assessment instrument includes the word "loneliness," gender differences are likely to exist. Borys and Perlman (1985) suggest that sex differences are typically absent in studies utilizing the UCLA Loneliness Scale, an instrument with no mention of the words "lonely" or "loneliness." This is confirmed by several researchers who found no mean differences in loneliness in

males and females using the UCLA Loneliness Scale (e.g., Berg & Peplau, 1982; Hojat, 1982; Oshagan & Allen, 1992; Saklofske et al., 1986).

Until recently, males have predominately used the Internet; however, the gender gap has decreased in recent years, with as many as 50% of all Internet users being women (Odell, Korgen, Schumacher & Delucchi, 2000). In other countries, however, the gender gap remains large. For example, Teo and Lim (2000) report that, in Singapore, only 11% of all Internet users are women. Therefore, since a diverse sample was obtained (24.2% African-American/Black, 9.2% Asian/Pacific Islander, 13.5% Hispanic/Latino(a), and 40.1% Caucasian), gender was analyzed in each hypothesis to evaluate relationships between loneliness and various aspects of Internet use.

Ethnicity

Cross-cultural studies on loneliness are sparse (Rokach & Sharma, 1996). However, Ostrov and Offer (1978) suggest loneliness is prevalent in our culture and may actually be encouraged because of the importance placed on achievement and competition in our highly industrialized society. Wintrob (1987) agrees, describing North America as a "mechanized society" in which individuals attempt to develop instant relationships which end up resulting in feeling isolated and unconnected with those around us.

Large ethnic differences exist on Internet use. McConnaughey and Lader (1997) suggest that Caucasians are more likely to own a computer and, therefore, use more than other ethnic groups. This is contrary to Ervin and Gilmore (1999) who found that even though African-Americans are less likely to own a computer, they still use the computer more than Caucasians. In addition, Internet access in Europe and Asia is described by

Weil and Rosen (1997) as falling far behind the United States. Therefore, ethnicity was examined in each hypothesis to attempt to broaden understanding of loneliness and various aspects of Internet use.

Housing

On most college campuses, the Internet is readily available. In the community, the number of those with Internet access is growing at an exponentially high rate. Gattiker (2001) reported that, in 1993, fewer than 250,000 households were connected to the Internet at home. By 1999, the number jumped to more than 100 million households with Internet access (UCLA Center for Communication Policy, 2000). While Cutrona (1982) and Roscoe and Skomski (1989) found no relationship between loneliness and place of residence (i.e., on-campus versus off-campus housing), this study evaluated any differences that may exist in loneliness and various aspects of Internet use between those living in residence halls and those living in the university apartments or the community.

History of Internet Use

Recently, Kraut et al. (2002) has stated that most of the negative effects of the Internet seem to dissipate after 3 years of use. An earlier study by Kraut et al. (1998) reported a relationship between higher levels of Internet use and increases in loneliness. To evaluate these findings, those who have used the Internet for 3 or more years and those who have used it less than 3 years were selected for analyses in each hypothesis.

Internet Use Greater Than 40 hours per Week

Higher levels of Internet use have been associated with increased levels of loneliness (Kraut et al., 1998; Morahan-Martin & Schumacher, 2000). In this study, 40

or more hours of Internet use per week was considered excessive. To evaluate this finding, each hypothesis included an analysis for those with total amount of weekly Internet use of 40 hours or more.

Number of Activities

Morahan-Martin and Schumacher (2000) found more Internet activities are used among pathological users (as compared to healthier users). Therefore, the number of activities individuals engage in was selected for analysis in each hypothesis. Specifically, the four subgroups included were those who: use one activity, use more than one activity, use more than three activities, and use more than five activities.

Results

For each hypothesis, correlational analyses and two-way ANOVAs were conducted. Two-way ANOVAs were performed with each demographic variable (age, class, gender, ethnicity, and housing) and the Internet variable of interest. The main effects will not be interpreted because one-way ANOVAs on each demographic variable were previously described. Please refer to Table 11 for the results.

All correlations obtained in the study were small to moderate. The largest correlations occurred in subgroups with small sample sizes with corresponding large confidence intervals for the correlations, therefore, the generalizability of these relationships is limited. To increase generalizability of the findings, larger and more balanced sample sizes across all subgroups would have been preferred.

Null Hypothesis 1

The first null hypothesis states there will not be a statistically significant

relationship between the amount of time an undergraduate student spends weekly on the Internet and loneliness. Total amount of weekly Internet use was determined by developing two scales. The first scale includes the sum of time spent weekly on each Internet activity (email, World Wide Web, Multi-User Dimensions, Bulletin Board Services, newsgroups, chat rooms, and instant messaging) (TOTALAMT). The second scale includes the sum of ratings of how often the Internet is used for various activities (i.e., for academic use, for business and work, to maintain relationships with family and friends, to meet new people, to talk to others who share similar interests, to stay informed of areas of interests, for recreation, relaxation, and games, to shop, for instant messaging, to find travel information, to find medical and health information, to job search, and for banking) (TOTALNET). The letters in parentheses following each description correspond to the variable name of the scale listed in the Appendix. The Appendix contains more detailed descriptions of the scales.

For this hypothesis, analyses were completed for each item and each scale. For each scale, specific subgroups described in the previous section were selected. Additional subgroups for this hypothesis included enjoyment and dissatisfaction with email, the World Wide Web, Multi-User Dimensions, Bulletin Board Services, instant messaging, chat rooms, and newsgroups. ANOVAs were also conducted to determine if there were significant interactions among each demographic variable and time per week of weekly Internet use. Thirty-eight analyses were conducted on time per week of Internet use, 38 analyses were conducted on frequency of Internet use, and six analyses were conducted on time per week of Internet use grouped into high, medium, and low categories. Of the 82 analyses, there were eight significant findings.

Analyses on Total Sample

When amount of Internet use was correlated with loneliness, a small, but significant, negative correlation was found (r= -.099). Results indicate that the more undergraduates use the Internet, the less lonely they are likely to be. Frequency of Internet use was also correlated with loneliness resulting in a nonsignificant finding (r= -.062). While the second finding was not significant, both correlations were nearly identical and very small. Results for correlational analyses performed on the total sample for Hypothesis 1 are presented in Table 12.

Analyses on Subgroups

When specific subgroups were selected for analyses, seven significant negative correlations ranging from -.099 to -.373 and 11 nonsignficant positive correlations were found. The largest significant negative correlations were found among subgroups with small sample sizes (below 55), thus limiting the generalizability of these relationships. Consistent with analyses conducted on the total sample, significant correlations among the subgroups indicate that higher levels of Internet use result in lower levels of loneliness. Nonsignificant correlations ranged from .001 to .642. The larger nonsignificant correlations were in subgroups with smaller sample sizes. Results for correlational analyses performed on the subgroups for Hypothesis 1 are presented in Table 12.

ANOVA Findings

The relationship between loneliness and time spent per week on the Internet was also analyzed using two-way ANOVA with six variables: history of Internet use, age,

Table 12

Correlational Analyses Performed for Hypothesis 1

Items/Scales	DV	Selected Groups	Result
Correlational analyses			
1) Time per week of net use	lonely	Total Sample	r = -.099* N=437
2) Frequency of net use	lonely	Total Sample	r = -.062 N=437
3) Time per week of net use	lonely	Fresh/Soph	r = -.052 N=221
4) Frequency of net use	lonely	Fresh/Soph	r = -.070 N=212
5) Time per week of net use	lonely	Junior/Senior	r = -.132* N=235
6) Frequency of net use	lonely	Junior/Senior	r = -.075 N=227
7) Time per week of net use	lonely	Freshman	r = -.110 N=140
8) Frequency of net use	lonely	Freshman	r = -.070 N=132
9) Time per week of net use	lonely	Sophomore	r = .055 N= 81
10) Frequency of net use	lonely	Sophomore	r = -.077 N= 80
11) Time per week of net use	lonely	Junior	r = -.113 N=117
12) Frequency of net use	lonely	Junior	r = -.093 N=114
13) Time per week of net use	lonely	Senior	r = -.153 N=118
14) Frequency of net use	lonely	Senior	r = -.054 N=113
15) Time per week of net use	lonely	22 years and under	r = -.115* N=354
16) Frequency of net use	lonely	22 years and under	r = -.034 N=342
17) Time per week of net use	lonely	23+ years	r = .011 N=102
18) Frequency of net use	lonely	23+ years	r = -.182 N= 98
19) Time per week of net use	lonely	Male	r = -.123 N=219
20) Frequency of net use	lonely	Male	r = .070 N=212
21) Time per week of net use	lonely	Female	r = -.052 N=241
22) Frequency of net use	lonely	Female	r = -.054 N=231
23) Time per week of net use	lonely	Afr Amer/Black	r = -.192* N=110
24) Frequency of net use	lonely	Afr Amer/Black	r = -.153 N=107
25) Time per week of net use	lonely	Asian/Pac Island	r = -.204 N= 42
26) Frequency of net use	lonely	Asian/Pac Island	r = -.233 N= 41
27) Time per week of net use	lonely	Hispanic	r = -.063 N= 63
28) Frequency of net use	lonely	Hispanic	r = -.096 N= 58
29) Time per week of net use	lonely	Caucasian	r = -.056 N=185
30) Frequency of net use	lonely	Caucasian	r = -.031 N=181
31) Time per week of net use	lonely	Residence Halls	r = -.115* N=347
32) Frequency of net use	lonely	Residence Halls	r = -.107 N=336
33) Time per week of net use	lonely	Uni Apts/Commun	r = -.045 N=113
34) Frequency of net use	lonely	Uni Apts/Commun	r = .005 N=107
35) Time per week of net use	lonely	Total amt > 40	r = .116 N= 22
36) Frequency of net use	lonely	Total amt > 40	r = -.084 N= 20
37) Time per week of net use	lonely	# of activities > 1	r = -.089 N=441

Table 12--*Continued.*

Items/Scales	DV	Selected Groups	Result
38) Frequency of net use	lonely	# of activities > 1	r = -.041 N=423
39) Time per week of net use	lonely	# of activities > 3	r = -.129 N=121
40) Frequency of net use	lonely	# of activities > 3	r = .026 N= 20
41) Time per week of net use	lonely	# of activities > 5	r = .064 N= 16
42) Frequency of net use	lonely	# of activities > 5	r = -.115 N= 16
43 Time per week of net use	lonely	# of activities = 1	r = .004 N= 16
44) Frequency of net use	lonely	# of activities = 1	r = -.333 N= 16
45) Time per week of net use	lonely	History of use = 3+	r = -.085 N=327
46) Frequency of net use	lonely	History of use = 3+	r = -.038 N=317
47) Time per week of net use	lonely	History of use < 3	r = .001 N=132
48) Frequency of net use	lonely	History of use < 3	r = -.018 N=125
49) Time per week of net use	lonely	Enjoy email a lot	r = -.067 N=346
50) Frequency of net use	lonely	Enjoy email a lot	r = -.063 N=330
51) Time per week of net use	lonely	Enjoy www a lot	r = -.053 N=333
52) Frequency of net use	lonely	Enjoy www a lot	r = -.040 N=322
53) Time per week of net use	lonely	Enjoy newsgrp a lot	r = -.111 N= 68
54) Frequency of net use	lonely	Enjoy newsgrp a lot	r = -.139 N= 62
55) Time per week of net use	lonely	Enjoy chat rm a lot	r = -.116 N= 49
56) Frequency of net use	lonely	Enjoy chat rm a lot	r = -.104 N= 45
57) Time per week of net use	lonely	Enjoy mud a lot	r = -.148 N= 33
58) Frequency of net use	lonely	Enjoy mud a lot	r = -.085 N= 30
59) Time per week of net use	lonely	Enjoy bbs a lot	r = -.373* N= 34
60) Frequency of net use	lonely	Enjoy bbs a lot	r = -.342 N= 29
61) Time per week of net use	lonely	Enjoy im a lot	r = -.114 N= 95
62) Frequency of net use	lonely	Enjoy im a lot	r = -.071 N=285
63) Time per week of net use	lonely	Don't enjoy email	r = -.179 N= 12
64) Frequency of net use	lonely	Don't enjoy email	r = -.492 N= 12
65) Time per week of net use	lonely	Don't enjoy www	r = .642 N= 5
66) Frequency of net use	lonely	Don't enjoy www	r = -.065 N= 5
67) Time per week of net use	lonely	Don't enjoy nwsg	r = -.136 N= 58
68) Frequency of net use	lonely	Don't enjoy nwsg	r = -.308* N= 55
69) Time per week of net use	lonely	Don't enjoy chat	r = -.104 N=114
70) Frequency of net use	lonely	Don't enjoy chat	r = -.052 N=111
71) Time per week of net use	lonely	Don't enjoy mud	r = -.232 N= 66
72) Frequency of net use	lonely	Don't enjoy mud	r = -.218 N= 63
73) Time per week of net use	lonely	Don't enjoy bbs	r = -.151 N= 72
74) Frequency of net use	lonely	Don't enjoy bbs	r = -.179 N= 67
75) Time per week of net use	lonely	Don't enjoy im	r = .113 N= 26
76) Frequency of net use	lonely	Don't enjoy im	r = -.091 N= 25

*$p < .05$. **$p < .01$.

class, gender, ethnicity, and housing. No significant interactions were found. The only nondemographic significant main effect was for history. Post-hoc analysis (Tukey's HSD) revealed those who have used the Internet for 1 year or less are significantly lonelier than those who have used it for 3 or more years (Means: 44.73 versus 39.92). In addition, those who have used the Internet for 1-2 years are lonelier than those who have used it for 3 or more years (Means: 47.24 versus 39.21). Therefore, those who have used the Internet for a shorter period of time (less than 2 years) are likely to be lonelier than those who have used it for a longer period of time (3 or more years). A significant main effect for ethnicity was found, which is consistent with one-way ANOVA results presented in Table 11. Tables 13-18 summarize the results of the two-way ANOVAs, including the unweighted means. Standard deviations are not reported because unweighted means are estimated calculations of what the means would have been if the cells were proportional in size.

Null Hypothesis 2

The second null hypothesis states there will not be a statistically significant relationship between type of Internet use and loneliness in undergraduate students. Type of Internet use was determined by developing 13 scales. Scales included in the analyses were: (1) the sum of "live" activities (LIVE); (2) the frequency the user engages in "live" activities (LIVE13); (3) the sum of nonsocial activities (LONEACT); (4) the two most popular activities of the obtained sample (POPULAR); (5) the two least popular activities of the obtained sample (NOTPOPUL); (6) the sum of socially oriented activities (INTERACT); (7) the frequency the user engages in socially oriented activities (NOLONENE); (8) the frequency the user engages in activities that are not "live"

Table 13

Two–Way Analysis of Variance of Time Per Week of Internet Use With Age

Variables	*M*	*F*
Age		$F(1, 456) = .085, p = .771$
Under 22	40.44	
23 +	39.82	
Time per Week of Internet Use		$F(4, 456) = .800, p = .525$
.01 through 5 hours	41.68	
5.01 through 10 hours	40.18	
10.01 through 20 hours	41.98	
20.01 through 40 hours	39.92	
40.01 through 70 hours	36.88	
Age x Time per Week of Internet Use		$F(4, 456) = .694, p = .597$

Table 14

Two–Way Analysis of Variance of Time Per Week of Internet Use With Class

Variables	*M*	*F*
Class		$F(3, 456) = .029, p = .993$
Freshman	40.45	
Sophomore	40.40	
Junior	40.04	
Senior	40.34	
Time per Week of Internet Use		$F(4, 456) = 1.02, p = .395$
.01 through 5 hours	41.75	
5.01 through 10 hours	40.91	
10.01 through 20 hours	41.07	
20.01 through 40 hours	40.57	
40.01 through 70 hours	37.23	
Class x Time per Week of Internet Use		$F(12, 456) = .902, p = .545$

Table 15

Two–Way Analysis of Variance of Time Per Week of Internet Use With Gender

Variables	*M*	*F*
Gender		$F(1, 460) = .921, p = .338$
Male	39.81	
Female	40.87	
Time per Week of Internet Use		$F(4, 460) = 1.31, p = .267$
.01 through 5 hours	41.88	
5.01 through 10 hours	40.99	
10.01 through 20 hours	40.96	
20.01 through 40 hours	40.86	
40.01 through 70 hours	37.00	
Gender x Time per Week of Internet Use		$F(4, 460) = 1.41, p = .229$

Table 16

Two–Way Analysis of Variance of Time Per Week of Internet Use With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 400) = 2.80, p = .040$*
African-American/Black	42.40	
Asian/Pacific Islander	41.05	
Hispanic	39.04	
Caucasian	38.57	
Time per Week of Internet Use		$F(4, 400) = 2.15, p = .074$
.01 through 5 hours	42.81	
5.01 through 10 hours	40.61	
10.01 through 20 hours	41.37	
20.01 through 40 hours	40.56	
40.01 through 70 hours	35.98	
Ethnicity x Time per Week of Internet Use		$F(12, 400) = .711, p = .741$

*$p < .05$.

Table 17

Two–Way Analysis of Variance of Time Per Week of Internet Use With Housing

Variables	*M*	*F*
Housing		$F(4, 460) = 1.01, p = .405$
Residence Halls	40.56	
Uni Apt/Community	39.15	
Time per Week of Internet Use		$F(1, 460) = .729, p = .394$
.01 through 5 hours	41.72	
5.01 through 10 hours	40.19	
10.01 through 20 hours	41.33	
20.01 through 40 hours	40.30	
40.01 through 70 hours	35.75	
Housing x Time per Week of Internet Use		$F(4, 460) = .333, p = .856$

Table 18

Two–Way Analysis of Variance of Time Per Week of Internet Use With History of Use

Variables	*M*	*F*
History of Use		$F(3, 459) = 4.97, p = .002$**
0-1 Year	44.96	
1-2 Years	47.24	
2-3 Years	42.70	
3 + Years	39.21	
Time per Week of Internet Use		$F(4, 459) = .482, p = .749$
.01 through 5 hours	43.44	
5.01 through 10 hours	42.94	
10.01 through 20 hours	41.49	
20.01 through 40 hours	45.34	
40.01 through 70 hours	44.24	
History of Use x Time per Week of Internet Use		$F(11, 459) = 1.27, p = .237$

**$p < .01$.

(NOLIVE13); (9) the frequency the user engages in activities that are not socially oriented (LONENET); (10) the sum of activities in which it is possible to interact with other people (INTERACT); (11) the sum of the most commonly used activities by Internet nondependents (NONDEP); (12) the sum of the most commonly used activities by Internet dependents (DEPEND); and (13) the sum of socially oriented activities (SOCIALAC).

For this hypothesis, analyses were completed for each item and each scale. Specifically, amount of each Internet activity (email, World Wide Web, Multi-User Dimensions, Bulletin Board Services, newsgroups, chat rooms, and instant messaging) was correlated individually with loneliness. Specific subgroups described in the previous section were selected to be correlated with loneliness. Two sets of ANOVAs were also conducted to determine if there were significant interactions among each demographic variable and activities not socially oriented and those in which the user is not likely to know the person directly.

Twenty-two analyses were conducted on the sum of time spent on activities in which the user is not likely to interact with a person or the user is not likely to know the other person directly if there is interaction, five analyses were conducted on the time spent weekly on Internet activities in which the user is not likely to interact with a person or the user is not likely to know the other person directly grouped into high, medium, and low categories, and five analyses were conducted on the sum of World Wide Web use grouped into high, medium, and low categories. Of the 52 analyses, there were 12 significant findings.

Analyses on Total Sample

When correlating loneliness with the seven items on amount of weekly use of each Internet activity (email, World Wide Web, chat rooms, Multi-User Dimensions, Bulletin Board Services, instant messaging, and newsgroups) and the 13 scales previously described, three significant findings ranging from -.104 to -.113 were found. Results indicate those who use a higher amount of the World Wide Web, nonsocial activities (newsgroups, Multi-User Dimensions, Bulletin Board Services, World Wide Web), and nondependent activities (email and World Wide Web) are less likely to be lonely. Results for correlational analyses performed on the total sample for Hypothesis 2 are presented in Table 19.

Analyses on Subgroups

When specific subgroups were selected for analyses, six significant correlations ranging from -.111 to -.197 were found. Of the 22 correlations, 7 were positively correlated; however, none of these were significant. Among the significant subgroups, results indicate that more use of nonsocial activities will result in a lower level of loneliness. This is consistent with the correlation of -.113 conducted on the total sample between loneliness and use of nonsocial activities. Nonsignificant correlations ranging from -.007 to -.185 were found. Larger nonsignificant correlations were in subgroups with smaller sample sizes. Results for correlational analyses performed on the subgroups for Hypothesis 2 are presented in Table 19.

ANOVA Findings

The relationship between loneliness and the total amount of World Wide Web use

Table 19

Correlational Analyses Performed for Hypothesis 2

Items/Scales	DV	Selected Groups	Result	
Correlational analyses				
1) Amount of email use	lonely	Total Sample	r = -.045	N=405
2) Amount of www use	lonely	Total Sample	r = -.104*	N=405
3) Amount of mud use	lonely	Total Sample	r = -.067	N=405
4) Amount of chat room use	lonely	Total Sample	r = .013	N=405
5) Amount of bbs use	lonely	Total Sample	r = -.075	N=405
6) Amount of im use	lonely	Total Sample	r = -.033	N=405
7) Amount of newsgroup use	lonely	Total Sample	r = -.061	N=405
8) Amount of live activities	lonely	Total Sample	r = -.057	N=405
9) Amount of im and email	lonely	Total Sample	r = -.045	N=405
10) Nonsocial activities	lonely	Total Sample	r = -.113*	N=405
11) Most popular activities	lonely	Total Sample	r = -.087	N=405
12) Least popular activities	lonely	Total Sample	r = -.084	N=405
13) Social activities	lonely	Total Sample	r = -.036	N=405
14) Frequency of live act	lonely	Total Sample	r = -.008	N=405
15) Frequency of not live act	lonely	Total Sample	r = -.066	N=405
16) Frequency of social act	lonely	Total Sample	r = -.013	N=405
17) Interactive activities	lonely	Total Sample	r = -.063	N=405
18) Frequency of less social act	lonely	Total Sample	r = -.062	N=405
19) Nondependent activities	lonely	Total Sample	r = -.104*	N=405
20) Dependent activities	lonely	Total Sample	r = -.027	N=405
21) Nonsocial activities	lonely	# of activities > 1	r = -.111*	N=424
22) Nonsocial activities	lonely	# of activities > 3	r = -.150	N=121
23) Nonsocial activities	lonely	# of activities > 5	r = .015	N= 20
24) Nonsocial activities	lonely	History = 3+ years	r = -.139*	N=306
25) Nonsocial activities	lonely	History < 3 years	r = .074	N=118
26) Nonsocial activities	lonely	Total amount > 40	r = .013	N= 22
27) Nonsocial activities	lonely	22 years and under	r = -.142*	N=328
28) Nonsocial activities	lonely	23+ years	r = .107	N= 94
29) Nonsocial activities	lonely	Male	r = -.100	N=207
30) Nonsocial activities	lonely	Female	r = -.102	N=218
31) Nonsocial activities	lonely	Afr Amer/Black	r = -.084	N=100
32) Nonsocial activities	lonely	Asian Pacific Islander	r = -.138	N= 40
33) Nonsocial activities	lonely	Hispanic/Latino(a)	r = -.185	N= 56
34) Nonsocial activities	lonely	Caucasian	r = -.093	N=172
35) Nonsocial activities	lonely	Freshman	r = -.123	N=127
36) Nonsocial activities	lonely	Sophomore	r = .013	N= 76
37) Nonsocial activities	lonely	Junior	r = -.197*	N=110
38) Nonsocial activities	lonely	Senior	r = -.044	N=108
39) Nonsocial activities	lonely	Residence Halls	r = -.153**	N=323
40) Nonsocial activities	lonely	Uni Apts/Commun	r = .031	N=102
41) Nonsocial activities	lonely	Fresh/Soph	r = -.078	N=203
42) Nonsocial activities	lonely	Junior/Senior	r = -.138*	N=218

*p < .05. **p < .01.

and activities not socially oriented and believed to be more associated with loneliness were analyzed using two-way ANOVA with five variables: age, class, gender, ethnicity, and housing. No significant interactions were found. In both sets of analyses, a significant main effect for ethnicity was found, which is consistent with one-way ANOVA results presented in Table 11. Tables 20-29 summarize the results of the two-way ANOVAs conducted for Hypothesis 2.

Table 20

Two–Way Analysis of Variance of Activities Not Socially Oriented and More Likely to Be Associated With Loneliness With Age

Variables	*M*	*F*
Age		$F(1, 422) = .004, p = .947$
22 years and under	40.95	
23 +	41.02	
Total Amount of Nonsocial Activities		$F(2, 422) = .928, p = .396$
Low through 2.00 hours	40.10	
2.01 through 6.00 hours	41.81	
6.01 through high	41.04	
Age x Total Amount of Nonsocial Activities		$F(2, 422) = 2.66, p = .071$

Table 21

Two–Way Analysis of Variance of Activities Not Socially Oriented and More Likely to Be Associated With Loneliness With Class

Variables	*M*	*F*
Class		$F(3, 421) = .166, p = .920$
Freshman	40.85	
Sophomore	40.21	
Junior	41.00	
Senior	41.18	
Total Amount of Nonsocial Activities		$F(2, 421) = 2.93, p = .055$
Low through 2.00 hours	40.84	
2.01 through 6.00 hours	42.22	
6.01 through high	39.37	
Class x Total Amount of Nonsocial Activities		$F(6, 421) = 1.79, p = .100$

Table 22

Two–Way Analysis of Variance of Activities Not Socially Oriented and More Likely to Be Associated With Loneliness With Gender

Variables	*M*	*F*
Gender		$F(1, 425) = .815, p = .367$
Male	40.43	
Female	41.27	
Total Amount of Nonsocial Activities		$F(2, 425) = 2.07, p = .128$
Low through 2.00 hours	40.61	
2.01 through 6.00 hours	42.12	
6.01 through high	39.82	
Gender x Total Amount of Nonsocial Activities		$F(2, 425) = .662, p = .516$

Table 23

Two–Way Analysis of Variance of Activities Not Socially Oriented and More Likely to Be Associated With Loneliness With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 368) = 3.52, p = .015$*
African-American/Black	42.70	
Asian/Pacific Islander	42.59	
Hispanic	39.17	
Caucasian	39.48	
Total Amount of Nonsocial Activities		$F(2, 368) = .779, p = .459$
Low through 2.00 hours	41.39	
2.01 through 6.00 hours	41.55	
6.01 through high	40.02	
Ethnicity x Total Amount of Nonsocial Activities		$F(6, 368) = .084, p = .998$

*$p < .05$.

Table 24

Two–Way Analysis of Variance of Activities Not Socially Oriented and More Likely to Be Associated With Loneliness With Housing

Variables	*M*	*F*
Housing		$F(1, 425) = 2.14, p = .145$
Residence Halls	41.22	
Uni Apt/Community	39.63	
Total Amount of Nonsocial Activities		$F(2, 425) = 1.69, p = .186$
Low through 2.00 hours	40.23	
2.01 through 6.00 hours	41.79	
6.01 through high	39.25	
Housing x Total Amount of Nonsocial Activities		$F(2, 425) = .308, p = .735$

Table 25

Two–Way Analysis of Variance of Total Amount of World Wide Web Use With Age

Variables	*M*	*F*
Age		$F(1, 457) = .028, p = .867$
22 years and under	41.20	
23 +	41.02	
Total Amount of WWW use		$F(2, 457) = .380, p = .684$
Low through 1.17 hours	41.44	
1.18 through 4.00 hours	40.47	
4.01 through high	41.41	
Age x Total Amount of WWW use		$F(2, 457) = 1.14, p = .320$

Table 26

Two–Way Analysis of Variance of Total Amount of World Wide Web Use With Class

Variables	*M*	*F*
Class		$F(3, 457) = .351, p = .788$
Freshman	41.15	
Sophomore	40.14	
Junior	41.29	
Senior	41.45	
Total Amount of WWW use		$F(2, 457) = .651, p = .522$
Low through 1.17 hours	41.69	
1.18 through 4.00 hours	40.89	
4.01 through high	40.44	
Class x Total Amount of WWW use		$F(6, 457) = 1.24, p = .284$

Table 27

Two–Way Analysis of Variance of Total Amount of World Wide Web Use With Gender

Variables	*M*	*F*
Gender		$F(1, 461) = .614, p = .434$
Male	40.69	
Female	41.38	
Total Amount of WWW use		$F(2, 461) = .754, p = .471$
Low through 1.17 hours	41.80	
1.18 through 4.00 hours	40.76	
4.01 through high	40.56	
Gender x Total Amount of WWW use		$F(2, 461) = 1.50, p = .861$

Table 28

Two–Way Analysis of Variance of Total Amount of World Wide Web Use With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 401) = 4.65, p = .003$**
African-American/Black	43.16	
Asian/Pacific Islander	42.78	
Hispanic	39.76	
Caucasian	39.55	
Total Amount of WWW use		$F(2, 401) = 1.68, p = .188$
Low through 1.17 hours	42.59	
1.18 through 4.00 hours	41.06	
4.01 through high	40.29	
Ethnicity x Total Amount of WWW Use		$F(6, 401) = .717, p = .636$

**$p < .01$.

Table 29

Two–Way Analysis of Variance of Total Amount of World Wide Web Use With Housing

Variables	*M*	*F*
Housing		$F(1, 461) = .969, p = .325$
Residence Halls	41.30	
Uni Apt/Community	40.28	
Total Amount of WWW use		$F(2, 461) = .587, p = .556$
Low through 1.17 hours	41.54	
1.18 through 4.00 hours	40.60	
4.01 through high	40.22	
Housing x Total Amount of WWW use		$F(2, 461) = .014, p = .986$

Null Hypothesis 3

The third null hypothesis states there will not be a statistically significant relationship between history of Internet use and loneliness in undergraduate students. History of Internet use was determined by developing one scale. This scale consisted of four categories: those using the Internet at least weekly for (a) less than 1 year, (b) 1 to 2 years, (c) 2 to 3 years, and (d) 3 or more years (HISTORYX). HISTORYX corresponds to the variable name of the scale listed in the Appendix. The Appendix contains a more detailed description of the scale.

For this hypothesis, history of Internet use was correlated with loneliness to determine if those who have spent more years on the Internet are less lonely. Specific subgroups described in the previous section were then selected. Additional subgroups for this hypothesis include use of social activities, history of use greater than a year, use of nonsocial activities, and enjoyment and dissatisfaction with email, the World Wide Web,

Multi-User Dimensions, Bulletin Board Services, instant messaging, chat rooms, and newsgroups. ANOVAs were also conducted to determine if there was a significant interaction among each demographic variable and history of Internet use. Forty-five correlational and ANOVA analyses were conducted on history of Internet use resulting in 27 significant findings.

Analyses on Total Sample

When history of Internet use was correlated with loneliness, a small, but significant, negative correlation at the .01 level resulted (r= -.184). Results indicate the longer the undergraduate has been regularly using the Internet, the less lonely he or she is likely to be. Results for the correlational analysis performed on the total sample for Hypothesis 3 are presented in Table 30.

Analyses on Subgroups

When correlating history of Internet use with the subgroups described previously, significant negative relationships ranging from -.153 to -.477 were found. Only one positive correlation was found; however, it was not significant. The largest correlation between history of Internet use and loneliness was among those who use the Internet for more than 40 hours (r= -.477). However, the low sample size limits the generalizability of the relationship. Results indicate that for a number of the subgroups, the longer the undergraduate has used the Internet, the less lonely he or she is likely to be. Nonsignificant relationships ranging from -.076 to .356 were found. The larger nonsignificant correlations were in subgroups with smaller sample sizes. Results for

Table 30

Correlational Analyses Performed for Hypothesis 3

	Items/Scales	DV	Selected Groups	Result	
Correlational analyses					
1)	History of weekly net use	lonely	Total Sample	r = -.184**	N=465
2)	History of weekly net use	lonely	History < 3+ years	r = -.076	N=133
3)	History of weekly net use	lonely	Social activities > 0	r = -.179*	N=458
4)	History of weekly net use	lonely	Freq of social act > 0	r = -.187**	N=457
5)	History of weekly net use	lonely	Fresh/Soph	r = -.224**	N=225
6)	History of weekly net use	lonely	Junior/Senior	r = -.153*	N=236
7)	History of weekly net use	lonely	Freshman	r = -.261**	N=141
8)	History of weekly net use	lonely	Sophomore	r = -.135	N= 84
9)	History of weekly net use	lonely	Junior	r = -.188*	N=118
10)	History of weekly net use	lonely	Senior	r = -.117	N=118
11)	History of weekly net use	lonely	22 years and under	r = -.197**	N=359
12)	History of weekly net use	lonely	23+ years	r = -.096	N=102
13)	History of weekly net use	lonely	Male	r = -.202**	N=222
14)	History of weekly net use	lonely	Female	r = -.165**	N=243
15)	History of weekly net use	lonely	Afr Amer/Black	r = -.163	N=112
16)	History of weekly net use	lonely	Asian/Pacific Islander	r = -.143	N= 43
17)	History of weekly net use	lonely	Hispanic	r = -.183	N= 63
18)	History of weekly net use	lonely	Caucasian	r = -.223**	N=187
19)	History of weekly net use	lonely	Residence halls	r = -.193**	N=353
20)	History of weekly net use	lonely	Uni Apt/Comm	r = -.163	N=112
21)	History of weekly net use	lonely	Hi >1 yr/# less soc act > 0	r = -.141	N=136
22)	History of weekly net use	lonely	# of activities > 1	r = -.174**	N=443
23)	History of weekly net use	lonely	# of activities > 3	r = -.259**	N=121
24)	History of weekly net use	lonely	# of activities > 5	r = -.174	N= 20
25)	History of weekly net use	lonely	# of activities = 1	r = -.301	N= 18
26)	History of weekly net use	lonely	Enjoy email a lot	r = -.154**	N=348
27)	History of weekly net use	lonely	Don't enjoy email	r = -.123	N= 12
28)	History of weekly net use	lonely	Enjoy www a lot	r = -.128*	N=335
29)	History of weekly net use	lonely	Don't enjoy www	r = .356	N= 5
30)	History of weekly net use	lonely	Enjoy mud a lot	r = -.431*	N= 33
31)	History of weekly net use	lonely	Don't enjoy mud	r = -.218	N= 67
32)	History of weekly net use	lonely	Enjoy chat rooms a lot	r = -.379**	N= 50
33)	History of weekly net use	lonely	Don't enjoy chat rooms	r = -.053	N=117
34)	History of weekly net use	lonely	Enjoy bbs a lot	r = -.376*	N= 34
35)	History of weekly net use	lonely	Don't enjoy bbs	r = -.091	N= 72
36)	History of weekly net use	lonely	Enjoy newsgrps a lot	r = -.247*	N= 68
37)	History of weekly net use	lonely	Don't enjoy newsgrps	r = -.230	N= 59
38)	History of weekly net use	lonely	Enjoy im a lot	r = -.162**	N=299
39)	History of weekly net use	lonely	Don't enjoy im a lot	r = -.091	N= 27
40)	History of weekly net use	lonely	Total amount > 40	r = -.477*	N= 22

*p < .05. **p < .01.

correlational analyses performed on the subgroups for Hypothesis 3 are presented in Table 30.

ANOVA Findings

The relationship between loneliness and the history of weekly Internet use was also analyzed using two-way ANOVA with five different variables: age, class, gender, ethnicity, and housing. No significant interactions were found; however, in four of the five analyses, significant main effects for history of weekly Internet use with loneliness were found. Consistent with the main effect found in Hypothesis 1 for history of weekly Internet use and loneliness, post-hoc analysis suggests those who have used the Internet for less than a year are significantly lonelier than those who have used the Internet for 3 or more years. (Means ranged from 44.56 through 45.04 versus 39.92 through 40.08.) In addition, those who have used the Internet for 1 to 2 years are significantly lonelier than those who have used the Internet for 3 or more years. (Means ranged from 44.38 through 44.73 versus 39.92 through 40.11.) Tables 31-35 summarize the results of the two-way ANOVAs conducted for Hypothesis 3.

Null Hypothesis 4

The fourth null hypothesis states there will not be a statistically significant relationship between individual reasons for using the Internet and loneliness in undergraduate students. Individual reasons for using the Internet were determined by developing three scales. Scales included in the analyses were: (1) frequency of engaging in social activities (SOCIAL13); (2) how much time the user spends on activities in which he or she is likely to know the person he or she is corresponding with

Table 31

Two–Way Analysis of Variance of History of Internet Use With Age

Variables	*M*	*F*
Age		$F(1, 461) = .623, p = .430$
22 years and under	43.32	
23 + years	42.09	
History of Internet Use		$F(3, 461) = .268, p = .045$*
0-1 Year	43.55	
1-2 Years	44.05	
2-3 Years	43.03	
3 + Years	40.19	
Age x History of Internet Use		$F(3, 461) = .268, p = .848$

*$p < .05$.

Table 32

Two–Way Analysis of Variance of History of Internet Use With Class

Variables	*M*	*F*
Class		$F(3, 461) = .671, p = .570$
Freshman	43.02	
Sophomore	41.28	
Junior	43.90	
Senior	43.71	
History of Internet Use		$F(3, 461) = 4.47, p = .004$**
0-1 Year	44.49	
1-2 Years	44.51	
2-3 Years	42.89	
3 + Years	40.02	
Class x History of Internet Use		$F(9, 461) = 1.41, p = .180$

**$p < .01$.

Table 33

Two–Way Analysis of Variance of History of Internet Use With Gender

Variables	*M*	*F*
Gender		$F(1, 465) = .232, p = .630$
Male	42.85	
Female	43.48	
History of Internet Use		$F(3, 465) = 5.88, p = .001$**
0-1 Year	44.98	
1-2 Years	44.82	
2-3 Years	42.89	
3 + Years	40.08	
Gender x History of Internet Use		$F(3, 465) = 1.26, p = .287$

**$p < .01$.

Table 34

Two–Way Analysis of Variance of History of Internet Use With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 405) = 1.03, p = .380$
African-American/Black	44.47	
Asian/Pacific Islander	44.25	
Hispanic	42.16	
Caucasian	42.03	
History of Internet Use		$F(3, 405) = 3.02, p = .030$*
0-1 Year	46.20	
1-2 Years	44.30	
2-3 Years	41.92	
3 + Years	40.48	
Ethnicity x History of Internet Use		$F(9, 405) = .338, p = .962$

*$p < .05$.

Table 35

Two–Way Analysis of Variance of History of Internet Use With Housing

Variables	*M*	*F*
Housing		$F(1, 465) = .046, p = .830$
Residence Halls	43.38	
Uni Apt/Community	43.05	
History of Internet Use		$F(3, 465) = 5.05, p = .002$**
0-1 Year	44.15	
1-2 Years	44.73	
2-3 Years	44.16	
3 + Years	39.83	
Housing x History of Internet Use		$F(3, 465) = .742, p = .528$

**$p < .01$.

(DOKNOW); and (3) how much time the user spends on activities in which he or she is not likely to know the person he or she is corresponding with (NOKNOW). The letters in the parentheses following each description correspond to the variable name of the scale listed in the Appendix. The Appendix contains more detailed descriptions of the described scales.

For this hypothesis, analyses were completed for each item and each scale. Each individual reason for Internet use included in the Internet Use Survey was correlated individually with loneliness. For the frequency of engaging in social activities variable, specific subgroups described in the previous section were selected. Two sets of ANOVAs were also conducted to determine if there were significant interactions among each demographic variable and frequency of social activities and how much time the user engages in social activities.

Twenty-three analyses were conducted on amount of time spent on social activities; five analyses were conducted on amount of time spent weekly on social activities grouped into high, medium, and low categories; five analyses were conducted on frequency of social activities grouped into high, medium, and low categories; and the other scales were individually correlated with loneliness. Of the 49 analyses conducted, there were 7 significant findings.

Analyses on Total Sample

When correlating 13 individual reasons for using the Internet and loneliness, three significant negative correlations ranging from -.098 to -.132 were found. Results indicate that less loneliness is likely in those who use the Internet more for academic use, business use, and activities in which the user is likely to know the person he or she is corresponding with (i.e., using the Internet to maintain relationships and for instant messaging). Results for correlational analyses performed on the total sample for Hypothesis 4 are presented in Table 36.

Analyses on Subgroups

When specific subgroups were selected for analyses, one significant negative correlation was found. While approximately half of the correlations in this hypothesis were positive, none were significant. Results indicate that the more Asian/Pacific Islanders use activities in which they are likely to know the other person they are corresponding with (i.e., using the Internet to maintain relationships and for instant messaging), the less lonely they are likely to be. The low sample size limits the generalizability of this finding (N= 43). Results for correlational analyses performed

Table 36

Correlational Analyses Performed for Hypothesis 4

Items/Scales	DV	Selected Groups	Result	
Correlational analyses				
1) Academic use	lonely	Total Sample	r = -.132**	N=443
2) Business use	lonely	Total Sample	r = -.099*	N=443
3) Maintain relationships	lonely	Total Sample	r = -.073	N=443
4) Meet new people	lonely	Total Sample	r = .060	N=443
5) Talk w/ others share inter.	lonely	Total Sample	r = .049	N=443
6) Stay inform with interests	lonely	Total Sample	r = -.071	N=443
7) Relax/recreation/games	lonely	Total Sample	r = .010	N=443
8) Shop	lonely	Total Sample	r = -.029	N=443
9) Instant messaging	lonely	Total Sample	r = -.089	N=443
10) Find travel information	lonely	Total Sample	r = -.087	N=443
11) Find medical information	lonely	Total Sample	r = .001	N=443
12) Job search	lonely	Total Sample	r = .036	N=443
13) For banking	lonely	Total Sample	r = -.062	N=443
14) Social activities	lonely	Total Sample	r = -.023	N=443
15) Activities know others	lonely	Total Sample	r = -.098*	N=443
16) Act's don't know others	lonely	Total Sample	r = .060	N=443
17) Social activities	lonely	22 years and under	r = .015	N=353
18) Social activities	lonely	23+ years	r = -.120	N=101
19) Social activities	lonely	Male	r = -.038	N=218
20) Social activities	lonely	Female	r = .016	N=240
21) Social activities	lonely	Afr Amer/Black	r = -.100	N=110
22) Social activities	lonely	Asian/Pacific Islander	r = -.365*	N= 43
23) Social activities	lonely	Hispanic	r = .153	N= 61
24) Social activities	lonely	Caucasian	r = -.002	N=185
25) Social activities	lonely	Freshman	r = .016	N=137
26) Social activities	lonely	Sophomore	r = .089	N= 73
27) Social activities	lonely	Junior	r = -.056	N=346
28) Social activities	lonely	Senior	r = .077	N=112
29) Social activities	lonely	Fresh/Soph	r = .052	N=220
30) Social activities	lonely	Junior/Senior	r = -.062	N=234
31) Social activities	lonely	Residence Halls	r = .032	N=117
32) Social activities	lonely	Univ Apt/Commun	r = -.155	N=117
33) Social activities	lonely	# of activities > 1	r = .021	N=438
34) Social activities	lonely	# of activities > 3	r = .043	N=118
35) Social activities	lonely	# of activities > 5	r = -.232	N= 19
36) Social activities	lonely	# of activities = 1	r = -.393	N= 16
37) Social activities	lonely	History < 3 years	r = .032	N=129
38) Social activities	lonely	History = 3+ years	r = -.001	N=328
39) Social activities	lonely	Total amount > 40	r = -.099	N= 22

*$p < .05$. **$p < .01$.

on the subgroups for Hypothesis 4 are presented in Table 36.

ANOVA Findings

Individual reasons for Internet use were also analyzed using two-way ANOVA with five variables: age, class, gender, ethnicity, and housing. Each of these five variables was analyzed with frequency of engaging in social activities (maintaining relationships, instant messaging, talk with others who share interests, and meeting new people) grouped into high, medium, and low categories. It was found that loneliness is influenced by interactions between those who use the Internet for social reasons and housing. The effect of using the Internet for social reasons was stronger for those living in university apartments or the community than those living in the residence halls. Those who use social activities the most and live in university apartments or the community were the loneliest (Mean = 44.46). Table 37 summarizes this interaction.

The five variables were also analyzed using two-way ANOVA with amount of use of social activities (i.e., instant messaging, email, and chat rooms). No significant interactions resulted. In both sets of analyses, a significant main effect for ethnicity was found, which is consistent with the one-way ANOVAs presented in Table 11. Tables 38-47 summarize the results of the two-way ANOVAs conducted for Hypothesis 4.

Null Hypothesis 5

The fifth null hypothesis states there will not be a statistically significant relationship between a student's preference for the Internet as a mode of communication and loneliness in undergraduate students. Students' preference for the Internet as a mode of communication was determined by developing 11 scales. Scales included in the

Table 37

Means for the Interaction Between Frequency of Social Activities and Housing With Loneliness

Frequency of Social Activities	Housing	Mean
Low through 11.00	Residence Halls	42.20
	University Apartments/Community	39.96
11.01 through 13.00	Residence Halls	41.18
	University Apartments/Community	38.41
13.01 through high	Residence Halls	40.71
	University Apartments/Community	44.46

Table 38

Two–Way Analysis of Variance of Frequency of Social Activities With Age

Variables	*M*	*F*
Age		$F(1, 454) = .541, p = .463$
22 years and under	41.27	
23 + years	40.46	
Frequency of Social Activities		$F(2, 454) = .771, p = .463$
Low through 11.00	41.19	
11.01 through 13.00	41.44	
13.01 through high	40.13	
Age x Frequency of Social Activities		$F(2, 454) = .643, p = .526$

Table 39

Two–Way Analysis of Variance of Frequency of Social Activities With Class

Variables	*M*	*F*
Class		$F(3, 454) = .321, p = .810$
Freshman	41.18	
Sophomore	40.26	
Junior	41.60	
Senior	41.33	
Frequency of Social Activities		$F(2, 454) = .802, p = .449$
Low through 11.00	41.40	
11.01 through 13.00	40.27	
13.01 through high	41.61	
Class x Frequency of Social Activities		$F(6, 454) = 1.16, p = .328$

Table 40

Two–Way Analysis of Variance of Frequency of Social Activities With Gender

Variables	*M*	*F*
Gender		$F(1, 458) = 1.25, p = .264$
Male	40.68	
Female	41.67	
Frequency of Social Activities		$F(2, 458) = .441, p = .643$
Low through 11.00	41.43	
11.01 through 13.00	40.59	
13.01 through high	41.50	
Gender x Frequency of Social Activities		$F(2, 458) = 1.54, p = .216$

Table 41

Two–Way Analysis of Variance of Frequency of Social Activities With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 399) = 3.65, p = .013$*
African-American/Black	42.95	
Asian/Pacific Islander	42.59	
Hispanic	39.61	
Caucasian	39.78	
Frequency of Social Activities		$F(2, 399) = .474, p = .623$
Low through 11.00	41.96	
11.01 through 13.00	40.80	
13.01 through high	40.95	
Ethnicity x Frequency of Social Activities		$F(6, 399) = 1.69, p = .123$

*$p < .05$.

Table 42

Two–Way Analysis of Variance of Frequency of Social Activities With Housing

Variables	*M*	*F*
Housing		$F(1, 458) = .154, p = .695$
Residence Halls	41.36	
Uni Apt/Community	40.94	
Frequency of Social Activities		$F(2, 458) = 1.99, p = .138$
Low through 11.00	41.08	
11.01 through 13.00	39.79	
13.01 through high	42.58	
Housing x Frequency of Social Activities		$F(2, 458) = 3.16, p = .043$*

*$p < .05$.

Table 43

Two–Way Analysis of Variance of Total Amount of Social Activities With Age

Variables	*M*	*F*
Age		$F(1, 457) = .243, p = .623$
22 years and under	41.20	
23 + years	40.65	
Total Amount of Social Activities		$F(2, 457) = .446, p = .640$
Low through 2.5 hours	41.19	
2.6 through 7.0 hours	41.44	
7.01 through high	40.13	
Age x Total Amount of Social Activities		$F(2, 457) = .090, p = .914$

Table 44

Two–Way Analysis of Variance of Total Amount of Social Activities With Class

Variables	*M*	*F*
Class		$F(3, 457) = .285, p = .836$
Freshman	40.93	
Sophomore	40.19	
Junior	41.17	
Senior	41.43	
Total Amount of Social Activities		$F(2, 457) = .269, p = .764$
Low through 2.5 hours	41.20	
2.6 through 7.0 hours	41.15	
7.01 through high	40.44	
Class x Total Amount of Social Activities		$F(6, 457) = .634, p = .703$

Table 45

Two–Way Analysis of Variance of Total Amount of Social Activities With Gender

Variables	*M*	*F*
Gender		$F(1, 461) = 1.27, p = .260$
Male	40.49	
Female	41.48	
Total Amount of Social Activities		$F(2, 461) = .582, p = .559$
Low through 2.5 hours	41.31	
2.6 through 7.0 hours	41.35	
7.01 through high	40.30	
Gender x Total Amount of Social Activities		$F(2, 461) = .921, p = .399$

Table 46

Two–Way Analysis of Variance of Total Amount of Social Activities With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 401) = 4.48, p = .004$**
African-American/Black	43.13	
Asian/Pacific Islander	42.55	
Hispanic	39.58	
Caucasian	39.48	
Total Amount of Social Activities		$F(2, 401) = 1.10, p = .334$
Low through 2.5 hours	41.28	
2.6 through 7.0 hours	42.15	
7.01 through high	40.13	
Ethnicity x Total Amount of Social Activities		$F(6, 401) = 1.90, p = .080$

**$p < .01$.

Table 47

Two–Way Analysis of Variance of Total Amount of Social Activities With Housing

Variables	*M*	*F*
Housing		$F(1, 461) = .730, p = .393$
Residence Halls	41.31	
Uni Apt/Community	40.41	
Total Amount of Social Activities		$F(2, 461) = .183, p = .833$
Low through 2.5 hours	40.96	
2.6 through 7.0 hours	41.22	
7.01 through high	40.40	
Housing x Total Amount of Social Activities		$F(2, 461) = .286, p = .752$

analyses were: (1) the sum of all personal matters when communicating to a friend or family member on the phone or on the Internet (PERPHNET); (2) the sum of all personal matters when communicating to a friend or family member on the Internet over face to face (PERNETF2); (3) the sum of all personal and important matters when communicating to a friend or family member on the Internet over face to face (PEIMPNFF); (4) the sum of all personal and important matters when communicating to a family member or friend face to face, on the phone, or on the Internet (PEIMNFF); (5) the sum of all personal and important matters when communicating to a family member face to face, on the phone, or on the Internet (PERIMFAM); (6) the sum of all personal and important matters when communicating to a friend face to face, on the phone, or on the Internet (PERIMFRD); (7) the sum of personal, important, and trivial matters when communicating to a family member face to face, on the phone, or on the Internet (ALLFAMIL); (8) the sum of personal, important, and trivial matters when

communicating to a friend face to face, on the phone, or on the Internet (ALLFRIEN); (9) the sum of personal, important, and trivial matters when communicating to a family member or a friend face to face, on the phone, or on the Internet (ALLFAMFR); (10) the sum of all personal and important matters when communicating to a family member or friend face to face, on the phone, or on the Internet (PERIMFF); and (11) the sum of personal matters when communicating to a family member or friend face to face, on the phone, or on the Internet (ALLPERSO). The letters in parentheses following each description correspond to the variable name listed in the Appendix. The Appendix contains more detailed descriptions of the scales.

For this hypothesis, three analyses were completed on all students for each scale separately. Please see Table 48. To evaluate combinations of scales, forward and backward stepwise procedures were conducted. Two sets of ANOVAs were also performed to determine if there were significant interactions among each demographic variable and the sum of all personal matters when communicating with family members, friends, or others (besides family and friends) on the Internet, face to face, or phone, and the sum of all personal matters when communicating to a friend or family member on the Internet over face to face.

Analyses on Total Sample

When correlating the 11 scales described previously to loneliness, it was found each scale yielded a positive significant correlation to loneliness ranging from .095 to .194. Results for correlational analyses performed on the total sample for Hypothesis 5 are presented in Table 48.

Table 48

Correlational Analyses Performed for Hypothesis 5

	Items/Scales	DV	Selected Groups	Result	
Correlational analyses					
1)	Phone/Net pers mat frd/fam	lonely	Total Sample	r = .114*	N=443
2)	Net/Face pers mat frd/fam	lonely	Total Sample	r = .194**	N=443
3)	Phone/Net pers/impt frd	lonely	Total Sample	r = .096*	N=443
4)	Net/Face, pers/impt matters	lonely	Total Sample	r = .151**	N=443
5)	All matters, all commun, fam	lonely	Total Sample	r = .146**	N=443
6)	All matters, all commun, frd	lonely	Total Sample	r = .118*	N=443
7)	Phone/Net all matters fam	lonely	Total Sample	r = .095*	N=443
8)	Phone/Net all matters frd	lonely	Total Sample	r = .121*	N=443
9)	Phone/Net all matter fam/frd	lonely	Total Sample	r = .120*	N=443
10)	All matters, all commun	lonely	Total Sample	r = .149**	N=443
11)	Phone/Net personal	lonely	Total Sample	r = .188**	N=443
12)	Net/Face pers mat frd/fam	lonely	History = 3+ years	r = .154*	N=326
13)	Net/Face pers mat frd/fam	lonely	History < 3 years	r = .239*	N=132
14)	Net/Face pers mat frd/fam	lonely	23 + years	r = .032	N=100
15)	Net/Face pers mat frd/fam	lonely	22 years and under	r = .247*	N=354
16)	Net/Face pers mat frd/fam	lonely	Afr Amer/Black	r = .086	N=110
17)	Net/Face pers mat frd/fam	lonely	Asian/Pac Islander	r = .414*	N= 43
18)	Net/Face pers mat frd/fam	lonely	Hispanic	r = -.038	N= 63
19)	Net/Face pers mat frd/fam	lonely	Caucasian	r = .275*	N=183
20)	Net/Face pers mat frd/fam	lonely	Residence Halls	r = .190*	N=347
21)	Net/Face pers mat frd/fam	lonely	Uni Apts/Commun	r = .160	N=111
22)	Net/Face pers mat frd/fam	lonely	Freshman	r = .295*	N=139
23)	Net/Face pers mat frd/fam	lonely	Sophomore	r = .095	N= 84
24)	Net/Face pers mat frd/fam	lonely	Junior	r = .198*	N=115
25)	Net/Face pers mat frd/fam	lonely	Senior	r = .089	N=116
26)	Net/Face pers mat frd/fam	lonely	Male	r = .206*	N=220
27)	Net/Face pers mat frd/fam	lonely	Female	r = .184	N=238
28)	Net/Face pers mat frd/fam	lonely	Junior/Senior	r = .221*	N=223
29)	Net/Face pers mat frd/fam	lonely	Fresh/Soph	r = .151*	N=231
30)	Net/Face pers mat frd/fam	lonely	# of activities = 1	r = -.078	N= 17
31)	Net/Face pers mat frd/fam	lonely	# of activities > 1	r = .186*	N=437
32)	Net/Face pers mat frd/fam	lonely	# of activities > 3	r = .262*	N=120
33)	Net/Face pers mat frd/fam	lonely	# of activities > 5	r = .451*	N= 20
34)	Net/Face pers mat frd/fam	lonely	Total amount > 40	r =-.459*	N= 21

*p < .05. **p < .01.

Regression Findings

To evaluate combinations of scales, initially a forward stepwise procedure was conducted with criteria for automated entry/removal of PIN value of .10 and a POUT value of .11. While a PIN value of .10 was used for automated entry, an alpha level of .05 was used for selecting a model for this hypothesis. When all 11 scales were used in the stepwise process, the computer would only allow seven variables to be considered because tolerance limits were exceeded indicating high intercorrelations among the variables. When examining the correlations between the variables, 80 correlations were .600 and above. High multicollinearity was further indicated with 20 correlations being .800 and above. (Please see Table 49 with descriptions of the variables names provided immediately after.) After eliminating the four variables with the highest mean intercorrelations, tolerance limits were within range. Results indicate the loneliness score was significantly associated with one significant predictor, preference for Internet over face-to-face interaction when communicating to family members or friends about personal matters, which predicted approximately 4% of the variance. No other variables were significant in addition to the one predictor. All seven variables together predicted only 6% of the variance. Therefore, no combinations of predictors were needed.

To determine if other combinations of variables would be found using another procedure, a backward stepwise procedure was also performed using a PIN value of .01 and POUT value of .011. Identical results were found. Thus, further correlational analyses and ANOVA tests were conducted on the one significant predictor found in both the forward and backward procedures, which was the increased preference for Internet over face-to-face interaction when communicating to family members or friends about

Table 49

Intercorrelations for Variables Analyzed for Hypothesis 5 With Correlations Between the Variables and Loneliness (N = 443)

	PERPHNET	PERNETF2	PEIMPNFF	PEIMNFFF	PERIMFAM[a]	PERIMFRD	ALLFAMIL	ALLFRIEN	ALLFAMFR[a]	PERIMFF[a]	ALLPERSO[a]	LONELY
PERPHNET		.354	.865	.286	.643	.800	.528	.465	.558	.697	.818	.114
PERNETF2			.313	.867	.656	.606	.519	.469	.555	.708	.828	.194
PEIMPNFF				.376	.744	.744	.687	.656	.753	.833	.711	.096
PEIMNFFF					.753	.720	.679	.628	.733	.826	.705	.151
PERIMFAM[a]						.594	.910	.512	.807	.902	.789	.146
PERIMFRD							.544	.887	.793	.883	.733	.118
ALLFAMIL								.592	.902	.823	.636	.095
ALLFRIEN									.881	.774	.567	.121
ALLFAMFR[a]										.896	.676	.120
PERIMFF[a]											.854	.149
ALLPERSO[a]												.188

Note. All correlations are significant at the .05 level. PERPHNET = Preference for the phone or Internet when talking about personal matters with a friends or family members; PERNETF2 = Preference for the Internet over face-to-face interaction when talking about personal matters with friends or family members; PERIMPNFF = Preference for the phone or the Internet when talking about personal and important matters with friends or family members; PEIMNFFF = Preference for the Internet over face-to-face interaction when talking with friends or family members when talking about personal and important matters; PERIMFAM = Sum of personal and important matters when talking with family members; PERIMFRD = Sum of personal and important matters when talking with friends; ALLFAMIL = Sum of personal, important and trivial matters when talking with family members; ALLFRIEN = Sum of personal, important, and trivial matters when talking with friends; ALLFAMFR = Sum of personal, important, and trivial matters when talking with friends or family members; PERIMFF = Sum of personal and important matters when talking to friends and family members; ALLPERSO = Sum of all personal matters; LONELY = Loneliness score on the UCLA Loneliness Scale

[a]Variable names that are bold indicate those removed from analysis because of tolerance limits.

personal matters. This predictor also had the lowest intercorrelations between the other variables analyzed. Table 50 summarizes the results of the regression analyses.

Table 50

Results of Stepwise-Regression Analyses Conducted on Hypothesis 5

Variable	β	t	p
Preference for Internet over face-to-face interaction when communicating to a family or friend about personal matters.	.194	4.15	.000**

Note. $R^2 = .038, F(1, 441) = 17.23, p = .000$.
**$p < .01$.

Analyses on Subgroups

When specific subgroups were selected for analyses, 14 significant positive personal matters. This predictor also had the lowest intercorrelations between the other correlations ranging from .151 to .451 resulted. Only two negative correlations were found; however, one was not significant. Higher correlations were found among subgroups with smaller sample sizes, which limits the generalizability of the relationships. Results indicate that most subgroups that prefer the Internet over face-to-face interaction when discussing personal matters with family and friends are more likely to be lonely. Contrary to other subgroups, those who use the Internet for more than 40 hours per week are less likely to be lonely if they prefer the Internet over face-to-face interaction when communicating with friends and family. Nonsignificant correlations

ranging from .032 to .184 were found. Larger nonsignificant correlations were in subgroups with smaller sample sizes. Results for correlational analyses performed on the subgroups for Hypothesis 5 are presented in Table 48.

ANOVA Findings

The relationship between loneliness and preference for Internet over face-to-face interaction when communicating to family members or friends about personal matters was analyzed using two-way ANOVA with five variables: age, class, gender, ethnicity, and housing. Although no significant interactions were found, five main effects resulted for preference for Internet over face-to-face interaction when communicating to family members or friends about personal matters and one main effect for ethnicity was found. Post-hoc analysis (Tukey HSD) revealed that increased preference for Internet over face-to-face interaction results in more loneliness. (Means ranged from 39.65 through 40.08 versus 43.74 through 45.05.) The ethnicity main effect is consistent with the one-way ANOVAs previously described in Table 11. Tables 51-55 summarize the results of the two-way ANOVAs conducted for Hypothesis 5.

Null Hypothesis 6

The sixth null hypothesis states there will not be a statistically significant relationship between a student's preference for type of Internet use and loneliness in undergraduate students. Preference for type of Internet use was determined by developing three scales. The scales included in the analyses were: (1) the sum of enjoyment the user has with socially oriented activities (ENJOSOCI); (2) the sum of enjoyment the user has with the World Wide Web, a nonsocially oriented activity

Table 51

Two–Way Analysis of Variance of Preference for the Internet Over Face to Face When Communicating to Family or Friends About Personal Matters (PERPHNETX) With Age

Variables	*M*	*F*
Age		$F(1, 454) = 1.29, p = .257$
22 years and under	42.45	
23 + years	41.13	
PERPHNETX		$F(2, 454) = 3.18, p = .043$*
Low through 2.0	40.08	
2.0 through 4.0	41.54	
4.01 through high	43.74	
Age x PERPHNETX		$F(2, 454) = 1.59, p = .206$

*$p < .05$.

Table 52

Two–Way Analysis of Variance of Preference for the Internet Over Face to Face When Communicating to Family or Friends About Personal Matters (PERPHNETX) With Class

Variables	*M*	*F*
Class		$F(3, 454) = .833, p = .476$
Freshman	42.62	
Sophomore	40.59	
Junior	42.49	
Senior	42.31	
PERPHNETX		$F(2, 454) = 7.68, p = .001$**
Low through 2.0	41.19	
2.0 through 4.0	41.44	
4.01 through high	40.13	
Class x PERPHNETX		$F(6, 454) = 1.15, p = .331$

**$p < .01$.

Table 53

Two–Way Analysis of Variance of Preference for the Internet Over Face to Face when Communicating to Family or Friends About Personal Matters (PERPHNETX) With Gender

Variables	*M*	*F*
Gender		$F(1, 458) = 3.10, p = .079$
Male	41.28	
Female	43.00	
PERPHNETX		$F(2, 458) = 9.56, p = .000$**
Low through 2.0	39.65	
2.0 through 4.0	41.71	
4.01 through high	45.05	
Gender x PERPHNETX		$F(2, 458) = 2.05, p = .130$

**$p < .01$.

Table 54

Two–Way Analysis of Variance of Preference for the Internet Over Face to Face When Communicating to Family or Friends About Personal Matters (PERPHNETX) With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 399) = 3.74, p = .011$*
African-American/Black	43.70	
Asian/Pacific Islander	43.92	
Hispanic	39.65	
Caucasian	40.75	
PERPHNETX		$F(2, 399) = 4.66, p = .010$*
Low through 2.0	39.93	
2.0 through 4.0	41.97	
4.01 through high	44.11	
Ethnicity x PERPHNETX		$F(6, 399) = 1.41, p = .209$

*$p < .05$.

Table 55

Two–Way Analysis of Variance of Preference for the Internet Over Face to Face When Communicating to Family or Friends About Personal Matters (PERPHNETX) With Housing

Variables	*M*	*F*
Housing		$F(1, 458) = .795, p = .373$
Residence Halls	42.31	
Uni Apt/Community	41.29	
PERPHNETX		$F(2, 458) = 5.15, p = .006$*
Low through 2.0	39.61	
2.0 through 4.0	41.58	
4.01 through high	44.21	
Housing x PERPHNETX		$F(2, 458) = .060, p = .942$

**$p < .01$.

(ENJONOSO); and (3) the sum of enjoyment the user has with the Internet overall (NETENJOY). The letters in parentheses following each description correspond to the variable name of the scale listed in the Appendix. The Appendix contains more detailed descriptions of the scales.

For this hypothesis, analyses were completed for each item and each scale. The level of enjoyment with each Internet activity (email, World Wide Web, newsgroups, chat rooms, Multi-User Dimensions, Bulletin Board Services, and instant messaging) was individually correlated with loneliness. For each of three scales (ENJOSOCI, ENJONOSO, AND NETENJOY), specific subgroups described in the previous section were selected. Additional subgroups included those using more than one of a socially oriented activity and those using more than one nonsocially oriented activity. Lastly, three sets of ANOVAs were conducted to determine if there were significant interactions

among each demographic variable and enjoyment with nonsocial activities (WWW), enjoyment with socially oriented activities, and enjoyment with the Internet overall. Twenty-seven analyses were conducted on amount of enjoyment with socially oriented activities, 27 analyses were conducted on amount of enjoyment with the World Wide Web (a nonsocial activity), 27 analyses were conducted on level of enjoyment with the Internet, five analyses were conducted on level of enjoyment with socially oriented activities grouped into high, medium, and low categories, five analyses were conducted on level of enjoyment with the World Wide Web grouped into high, medium, and low categories, and five analyses were conducted on level of enjoyment with the Internet grouped into high, medium, and low categories. For this hypothesis, 102 analyses were conducted resulting in 45 significant findings.

Analyses on Total Sample

When correlating the level of enjoyment for each Internet activity individually with loneliness, five significant correlations ranging from -.092 to -.274 were found. Results indicate those who enjoy instant messaging more are less likely to be lonely. In addition, more enjoyment of email, the World Wide Web, Bulletin Board Services, and the Internet overall is likely to be associated with less loneliness. Results for correlational analyses performed on the total sample for Hypothesis 6 are presented in Table 56.

Analyses on Subgroups

The level of enjoyment with social activities was correlated with loneliness for 26 analyses. Six significant negative correlations ranging from -.132 to -.238 were found.

Table 56

Correlational Analyses Performed for Hypothesis 6

Items/Scales	DV	Selected Groups	Result
Correlational analyses			
1) Enjoy email	lonely	Total Sample	r = -.119* N=418
2) Enjoy www	lonely	Total Sample	r = -.121* N=407
3) Enjoy newsgroups	lonely	Total Sample	r = -.080 N=117
4) Enjoy chat rooms	lonely	Total Sample	r = -.110 N=107
5) Enjoy MUDs	lonely	Total Sample	r = -.097 N= 60
6) Enjoy BBSs	lonely	Total Sample	r = -.274* N= 74
7) Enjoy instant messaging	lonely	Total Sample	r = -.194** N=345
8) Enjoy social activities	lonely	Total Sample	r = -.093 N=319
9) Enjoy the Internet	lonely	Total Sample	r = -.092* N=459
10) Enjoy social activities	lonely	Hist less than 3 yrs	r = -.031 N= 79
11) Enjoy social activities	lonely	History = 3 + years	r = -.132* N=239
12) Enjoy social activities	lonely	Tot amt of use > 40	r = .457* N= 19
13) Enjoy social activities	lonely	# of nonsoc act > 0	r = -.176 N= 99
14) Enjoy social activities	lonely	# of activities > 1	r = -.091 N=308
15) Enjoy social activities	lonely	# of activities > 3	r = -.159 N= 88
16) Enjoy social activities	lonely	# of activities > 5	r = -.571* N= 19
17) Enjoy social activities	lonely	# of activities = 1	r = -.288 N= 10
18) Enjoy social activities	lonely	# of soc act > 0	r = -.100 N=315
19) Enjoy social activities	lonely	Freq of soc act > 0	r = -.105 N=312
20) Enjoy social activities	lonely	22 years and under	r = -.131* N=254
21) Enjoy social activities	lonely	23 + years	r = -.050 N= 63
22) Enjoy social activities	lonely	Afr Amer/Blacks	r = -.140 N= 75
23) Enjoy social activities	lonely	Hispanics	r = -.036 N= 36
24) Enjoy social activities	lonely	Asian/Pac Islander	r = .088 N= 51
25) Enjoy social activities	lonely	Caucasian	r = -.085 N=120
26) Enjoy social activities	lonely	Residence Halls	r = -.090 N=257
27) Enjoy social activities	lonely	Uni Apt/Commun	r = -.238* N=113
28) Enjoy social activities	lonely	Freshman	r = -.183* N=141
29) Enjoy social activities	lonely	Sophomore	r = .162 N= 60
30) Enjoy social activities	lonely	Junior	r = -.110 N= 82
31) Enjoy social activities	lonely	Senior	r = -.051 N=119
32) Enjoy social activities	lonely	Fresh/Soph	r = -.096 N=156
33) Enjoy social activities	lonely	Junior/Senior	r = -.083 N=161
34) Enjoy social activities	lonely	Male	r = -.133 N=166
35) Enjoy social activities	lonely	Female	r = -.053 N=153
36) Enjoy nonsocial activities	lonely	Hist less than 3 yrs	r = -.245** N=133
37) Enjoy nonsocial activities	lonely	History = 3 + years	r = -.157** N=332

Table 56--*Continued.*

Items/Scales	DV	Selected Groups	Result
38) Enjoy nonsocial activities	lonely	Tot amt of use > 40	r = .474* N= 22
39) Enjoy nonsocial activities	lonely	# of nonsoc act > 0	r = -.128 N=142
40) Enjoy nonsocial activities	lonely	# of activities > 1	r = -.201** N=444
41) Enjoy nonsocial activities	lonely	# of activities > 3	r = -.049 N=121
42) Enjoy nonsocial activities	lonely	# of activities > 5	r = -.068 N= 20
43) Enjoy nonsocial activities	lonely	# of activities = 1	r = -.364 N= 18
44) Enjoy nonsocial activities	lonely	# of soc act > 0	r = -.213** N=459
45) Enjoy nonsocial activities	lonely	Freq of soc act > 0	r = -.222** N=458
46) Enjoy nonsocial activities	lonely	22 years and under	r = -.193** N=359
47) Enjoy nonsocial activities	lonely	23 + years	r = -.335** N=103
48) Enjoy nonsocial activities	lonely	Afr Amer/Blacks	r = -.291** N=113
49) Enjoy nonsocial activities	lonely	Hispanics	r = -.200 N= 43
50) Enjoy nonsocial activities	lonely	Asian/Pac Islander	r = -.087 N= 63
51) Enjoy nonsocial activities	lonely	Caucasian	r = -.204** N=187
52) Enjoy nonsocial activities	lonely	Residence Halls	r = -.227** N=353
53) Enjoy nonsocial activities	lonely	Uni Apt/Commun	r = -.113 N= 62
54) Enjoy nonsocial activities	lonely	Freshman	r = -.202* N= 96
55) Enjoy nonsocial activities	lonely	Sophomore	r = -.322** N= 84
56) Enjoy nonsocial activities	lonely	Junior	r = -.248** N=118
57) Enjoy nonsocial activities	lonely	Senior	r = -.187* N=119
58) Enjoy nonsocial activities	lonely	Fresh/Soph	r = -.078 N= 203
59) Enjoy nonsocial activities	lonely	Junior/Senior	r = -.219** N=237
60) Enjoy nonsocial activities	lonely	Male	r = -.201** N=222
61) Enjoy nonsocial activities	lonely	Female	r = -.233** N=244
62) Enjoy the Internet	lonely	Hist less than 3 yrs	r = .024 N=130
63) Enjoy the Internet	lonely	History = 3 + years	r = -.098 N=328
64) Enjoy the Internet	lonely	Tot amt of use > 40	r = .440* N= 22
65) Enjoy the Internet	lonely	# of nonsoc act > 0	r = -.038 N=139
66) Enjoy the Internet	lonely	# of activities > 1	r = -.082 N=441
67) Enjoy the Internet	lonely	# of activities > 3	r = .030 N=119
68) Enjoy the Internet	lonely	# of activities > 5	r = -.256 N= 19
69) Enjoy the Internet	lonely	# of activities = 1	r = -.280 N= 15
70) Enjoy the Internet	lonely	# of soc act > 0	r = -.094* N=453
71) Enjoy the Internet	lonely	Freq of soc act > 0	r = -.099* N=451
72) Enjoy the Internet	lonely	22 years and under	r = -.093 N=353
73) Enjoy the Internet	lonely	23 + years	r = -.109 N=102
74) Enjoy the Internet	lonely	Afr Amer/Blacks	r = -.125 N=110
75) Enjoy the Internet	lonely	Hispanics	r = -.018 N= 40
76) Enjoy the Internet	lonely	Asian/Pac Islander	r = .035 N= 63
77) Enjoy the Internet	lonely	Caucasian	r = -.073 N=187
78) Enjoy the Internet	lonely	Residence Halls	r = -.110* N=348

Table 56--*Continued.*

Items/Scales	DV	Selected Groups	Result	
79) Enjoy the Internet	lonely	Uni Apt/Commun	r = -.073	N=111
80) Enjoy the Internet	lonely	Freshman	r = -.091	N=138
81) Enjoy the Internet	lonely	Sophomore	r = -.139	N= 84
82) Enjoy the Internet	lonely	Junior	r = -.098	N=115
83) Enjoy the Internet	lonely	Senior	r = -.070	N=118
84) Enjoy the Internet	lonely	Fresh/Soph	r = -.103	N=222
85) Enjoy the Internet	lonely	Junior/Senior	r = -.082	N=233
86) Enjoy the Internet	lonely	Male	r = -.122	N=220
87) Enjoy the Internet	lonely	Female	r = -.057	N=239

Note. For this hypothesis, the pairwise procedure was used for all correlations because too much of the sample size was lost in the first nine analyses.
*$p < .05$. **$p < .01$.

Among these significant subgroups, results indicate those with higher levels of enjoyment of social activities are less likely to be lonely. One significant positive correlation was found among those who use the Internet more than 40 hours per week. Contrary to the other significant subgroups, those who use the Internet for more than 40 hours per week, and enjoy social activities more, are more likely to be lonely.

The level of enjoyment with nonsocial activities (WWW) was correlated with loneliness in 26 analyses. Among the significant subgroups, results indicate those with a higher level of enjoyment of nonsocial activities are less likely to be lonely. However, for those who use the Internet more than 40 hours per week, loneliness is more likely in those who enjoy nonsocial activities more.

The level of enjoyment with the Internet overall was correlated with loneliness in 26 analyses. Among the significant subgroups, results indicate a higher level of enjoyment of the Internet results in a lower likelihood of loneliness. However, as with

the two previously described variables, with those who use the Internet for more than 40 hours per week, loneliness is more likely. Results for correlational analyses performed on the subgroups for Hypothesis 6 are presented in Table 56.

ANOVA Findings

The relationship between loneliness and the level of enjoyment with the Internet was also analyzed using two-way ANOVA with five variables: age, class, gender, ethnicity, and housing. A significant interaction revealed loneliness is influenced by the level of enjoyment with the Internet and housing. The effect of the level of enjoyment with the Internet was stronger for residence hall students that those living in university apartments or the community. Those who live in the residence halls, and enjoyed the Internet the least, were the loneliest (Mean= 44.12). Table 57 summarizes this interaction.

Table 57

Means for Interaction Between Housing and Enjoyment of the Internet

Enjoyment of the Internet	Housing	Mean
Low through 20.00	Residence Halls	44.12
	University Apartments/Community	40.16
20.01 through 27.00	Residence Halls	39.38
	University Apartments/Community	42.12
27.01 through high	Residence Halls	40.87
	University Apartments/Community	38.19

Three main effects were also found. Significant main effects with level of enjoyment with the Internet were found among the gender and class variables. Post-hoc analysis (Tukey's HSD) revealed those who enjoy the Internet the least are lonelier than those who enjoy it more. (Means ranged from 39.94 to 42.77.) A significant main effect with ethnicity also resulted, which is consistent with one-way ANOVAs previously presented in Table 11.

The level of enjoyment with socially oriented activities (email, Bulletin Board Services, Multi-User Dimensions, chat rooms, instant messaging, and newsgroups) was also analyzed using two-way ANOVA with five variables: age, class, gender, ethnicity, and housing. No significant interactions were found; however, three main effects were found in the level of enjoyment with social activities among the age, gender, and ethnicity variables. Post-hoc analysis (Tukey's HSD) revealed those who enjoy socially oriented activities the least are lonelier than those who enjoy them more. (Means range from 42.81 through 43.00 versus 39.67.) The ethnicity main effect is consistent with one-way ANOVAs previously presented in Table 11.

The level of enjoyment with the World Wide Web, a nonsocial activity, was also analyzed using two-way ANOVA with five variables (age, class, gender, ethnicity, and housing). No significant interactions were found; however, five main effects resulted with level of enjoyment with nonsocial activities among age, class, gender, ethnicity, and housing variables. Post-hoc analysis (Tukey's HSD) revealed those who enjoy the World Wide Web the least are lonelier than those who enjoy the World Wide Web more. (Means range from 44.50 through 44.71 versus 39.36 through 39.56.) The ethnicity main

effect is consistent with one-way ANOVAs previously presented in Table 11. Tables 58-72 summarize the results of the two-way ANOVAs conducted for Hypothesis 6.

Table 58

Two–Way Analysis of Variance of Enjoyment of Social Activities With Age

Variables	*M*	*F*
Age		$F(1, 317) = .002, p = .966$
22 years and under	41.15	
23 + years	41.08	
Enjoyment of Social Activities		$F(2, 317) = 5.52, p = .004$**
Low through 26.00	43.00	
26.01 through 30.00	38.32	
30.01 through high	42.03	
Age x Enjoyment of Social Activities		$F(2, 317) = 2.10, p = .124$

**$p < .01$.

Null Hypothesis 7

The seventh hypothesis states there will not be a statistically significant relationship between loneliness and the impact the Internet has had on the amount of time an undergraduate student spends face to face with family, friends, and others (besides family and friends), talking on the phone with family, friends, and others (besides family and friends), and communicating with family, friends, and others (besides family and friends). The impact of the Internet on face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends) was determined by developing four scales. The scales included in the analyses were: (1) the

Table 59

Two–Way Analysis of Variance of Enjoyment of Social Activities With Class

Variables	*M*	*F*
Class		$F(3, 317) = .742, p = .528$
Freshman	41.10	
Sophomore	39.39	
Junior	41.32	
Senior	41.86	
Enjoyment of Social Activities		$F(2, 317) = 2.85, p = .060$
Low through 26.00	42.49	
26.01 through 30.00	39.58	
30.01 through high	40.69	
Class x Enjoyment of Social Activities		$F(6, 317) = .586, p = .742$

Table 60

Two–Way Analysis of Variance of Enjoyment of Social Activities With Gender

Variables	*M*	*F*
Gender		$F(1, 319) = 3.80, p = .052$
Male	40.06	
Female	42.13	
Enjoyment of Social Activities		$F(2, 319) = 3.89, p = .021$*
Low through 26.00	42.90	
26.01 through 30.00	39.67	
30.01 through high	40.64	
Gender x Enjoyment of Social Activities		$F(2, 319) = 1.54, p = .217$

*$p < .05$.

Table 61

Two–Way Analysis of Variance of Enjoyment of Social Activities With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 282) = 1.98, p = .117$
African-American/Black	42.35	
Asian/Pacific Islander	42.67	
Hispanic	40.88	
Caucasian	39.38	
Enjoyment of Social Activities		$F(2, 282) = 3.54, p = .030$*
Low through 26.00	42.56	
26.01 through 30.00	39.24	
30.01 through high	42.16	
Ethnicity x Enjoyment of Social Activities		$F(6, 282) = 1.06, p = .389$

*$p < .05$.

Table 62

Two–Way Analysis of Variance of Enjoyment of Social Activities With Housing

Variables	*M*	*F*
Housing		$F(1, 319) = .030, p = .863$
Residence Halls	41.11	
Uni Apt/Community	40.88	
Enjoyment of Social Activities		$F(2, 319) = 2.22, p = .111$
Low through 26.00	42.86	
26.01 through 30.00	39.89	
30.01 through high	40.22	
Housing x Enjoyment of Social Activities		$F(2, 319) = .224, p = .800$

Table 63

Two–Way Analysis of Variance of Enjoyment of the World Wide Web With Age

Variables	*M*	*F*
Age		$F(1, 462) = .434, p = .510$
22 years and under	41.56	
23 + years	40.86	
Enjoyment of the World Wide Web		$F(2, 462) = 10.4, p = .000$**
Low through 5.00	44.72	
5.01 through 6.00	39.92	
6.01 through high	38.99	
Age x Enjoyment of the World Wide Web		$F(2, 462) = .224, p = .799$

**$p < .01$.

Table 64

Two–Way Analysis of Variance of Enjoyment of the World Wide Web With Class

Variables	*M*	*F*
Class		$F(3, 462) = .193, p = .901$
Freshman	41.47	
Sophomore	40.73	
Junior	41.48	
Senior	41.74	
Enjoyment of the World Wide Web		$F(2, 462) = 13.2, p = .000$**
Low through 5.00	44.73	
5.01 through 6.00	39.94	
6.01 through high	39.40	
Class x Enjoyment of the World Wide Web		$F(6, 462) = .717, p = .636$

**$p < .01$.

Table 65

Two-Way Analysis of Variance of Enjoyment of the World Wide Web With Gender

Variables	*M*	*F*
Gender		$F(1, 466) = .588, p = .443$
Male	41.05	
Female	41.71	
Enjoyment of the World Wide Web		$F(2, 466) = 12.8, p = .000$**
Low through 5.00	44.60	
5.01 through 6.00	40.00	
6.01 through high	39.56	
Gender x Enjoyment of the World Wide Web		$F(2, 466) = .399, p = .671$

**$p < .01$.

Table 66

Two–Way Analysis of Variance of Enjoyment of the World Wide Web With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 406) = 4.05, p = .007$*
African-American/Black	42.96	
Asian/Pacific Islander	43.35	
Hispanic	40.25	
Caucasian	39.81	
Enjoyment of the World Wide Web		$F(2, 406) = 8.77, p = .000$**
Low through 5.00	44.55	
5.01 through 6.00	39.33	
6.01 through high	40.90	
Ethnicity x Enjoyment of the World Wide Web		$F(6, 406) = 2.06, p = .057$

*$p < .05$. **$p < .01$.

Table 67

Two–Way Analysis of Variance of Enjoyment of the World Wide Web With Housing

Variables	*M*	*F*
Housing		$F(1, 466) = 3.47, p = .063$
Residence Halls	41.94	
Uni Apt/Community	40.08	
Enjoyment of the World Wide Web		$F(2, 466) = 9.25, p = .000$**
Low through 5.00	43.96	
5.01 through 6.00	40.25	
6.01 through high	38.83	
Housing x Enjoyment of the World Wide Web		$F(2, 466) = 2.18, p = .115$

**$p < .01$.

Table 68

Two–Way Analysis of Variance of Enjoyment of the Internet With Age

Variables	*M*	*F*
Age		$F(1, 455) = .332, p = .565$
22 years and under	41.23	
23 + years	40.60	
Enjoyment of the Internet		$F(2, 455) = 2.85, p = .059$
Low through 20.00	42.52	
20.01 through 27.00	39.70	
27.01 through high	40.52	
Age x Enjoyment of the Internet		$F(2, 455) = .110, p = .896$

Table 69

Two–Way Analysis of Variance of Enjoyment of the Internet With Class

Variables	*M*	*F*
Class		$F(3, 454) = .377, p = .770$
Freshman	41.31	
Sophomore	40.23	
Junior	40.86	
Senior	41.56	
Enjoyment of the Internet		$F(2, 454) = 4.33, p = .014$*
Low through 20.00	42.80	
20.01 through 27.00	39.77	
27.01 through high	40.39	
Class x Enjoyment of the Internet		$F(6, 454) = .291, p = .941$

*$p < .05$.

Table 70

Two–Way Analysis of Variance of Enjoyment of the Internet With Gender

Variables	*M*	*F*
Gender		$F(1, 459) = 1.66, p = .198$
Male	40.43	
Female	41.56	
Enjoyment of the Internet		$F(2, 459) = 4.16, p = .016$*
Low through 20.00	42.71	
20.01 through 27.00	39.80	
27.01 through high	40.49	
Gender x Enjoyment of the Internet		$F(2, 459) = .091, p = .913$

*$p < .05$.

Table 71

Two–Way Analysis of Variance of Enjoyment of the Internet With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 400) = 3.79, p = .011$*
African-American/Black	42.86	
Asian/Pacific Islander	42.14	
Hispanic	39.55	
Caucasian	39.50	
Enjoyment of the Internet		$F(2, 400) = 1.57, p = .209$
Low through 20.00	42.01	
20.01 through 27.00	39.70	
27.01 through high	41.30	
Ethnicity x Enjoyment of the Internet		$F(6, 400) = 1.90, p = .080$

*$p < .05$.

Table 72

Two–Way Analysis of Variance of Enjoyment of the Internet With Housing

Variables	*M*	*F*
Housing		$F(1, 459) = 1.47, p = .226$
Residence Halls	41.46	
Uni Apt/Community	40.16	
Enjoyment of the Internet		$F(2, 459) = 2.02, p = .134$
Low through 20.00	42.14	
20.01 through 27.00	40.75	
27.01 through high	39.53	
Housing x Enjoyment of the Internet		$F(2, 459) = 4.20, p = .016$*

*$p < .05$.

sum of the change in face-to-face interaction among family, friends, and others (besides family and friends) since using the Internet (FACE2FAC); (2) the sum of the change in talking on the phone use among family, friends, and others (besides family and friends) since using the Internet (PHONE); (3) the sum of the change in communication with family, friends, and others (besides family and friends) since using the Internet (COMMUNIC); and (4) the change in face-to-face interaction, talking on the phone, and overall communication with family, friends, and others (besides family and friends) since using the Internet (NETCHANG). The letters in parentheses following each description correspond to the variable name of the scale listed in the Appendix. The Appendix contains more detailed descriptions of the scales.

For this hypothesis, analyses were completed for each item and each scale. Each item included in the Internet Use Survey inquiring about changes in face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends) was individually correlated with loneliness. For the scale assessing how much the Internet has changed face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends), specific subgroups described in the previous section were selected. Additional subgroups selected for this hypothesis included a decrease in face-to-face interaction with family, an increase in face-to-face interaction with family, a decrease in face-to-face interaction with friends, an increase in face-to-face interaction with friends, an increase in communication with family members, a decrease in communication with family members, a decrease in communication with friends, and an increase in communication with friends. Lastly, ANOVAs were conducted to determine if there was a significant interaction among each

demographic variable and the change in face-to-face interaction, talking on the phone, and overall communication with family, friends, and others (besides family and friends). Thirty-three analyses were conducted on the scale reflecting change in face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends) since using the Internet, five were conducted on the change in face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends) grouped into high, medium, and low categories, and all other scales were individually correlated with loneliness. Of the 51 analyses conducted, eight significant findings were found.

Analyses on Total Sample

Analyses conducted on the total sample resulted in two significant findings. A significant positive correlation was found indicating the more the user talks on the phone with others (besides family and friends) since using the Internet, the more loneliness is likely. Results also indicate that loneliness increases as time spent face to face with friends decreases. Results for correlational analyses performed on the total sample for Hypothesis 7 are presented in Table 73.

Analyses on Subgroups

Analyses performed on the subgroups resulted in significant correlations ranging from -.111 to -.232. The most meaningful relationships found to be significant for some of the subgroups indicate the more the face-to-face interaction, talking on the phone, and overall communication with family, friends, and others (besides family and friends) has increased since using the Internet, the less loneliness is likely. Nonsignificant findings

Table 73

Correlational Analyses Performed for Hypothesis 7

	Items/Scales	DV	Selected Groups	Result	
Correlational analyses					
1)	Overall net change	lonely	Total Sample	r = -.069	N=444
2)	Internet change face 2 face	lonely	Total Sample	r = -.084	N=444
3)	Internet change phone	lonely	Total Sample	r = -.014	N=444
4)	Internet change commun	lonely	Total Sample	r = -.091	N=444
5)	Net change phone w/ fam	lonely	Total Sample	r = -.079	N=444
6)	Net change phone w/ frds	lonely	Total Sample	r = -.025	N=444
7)	Net change phone w/oth	lonely	Total Sample	r = .128**	N=444
8)	Net change comm w/ fam	lonely	Total Sample	r = -.078	N=444
9)	Net change comm w/ frd	lonely	Total Sample	r = -.092	N=444
10)	Net change comm w/ othr	lonely	Total Sample	r = -.060	N=444
11)	Net change fac2fac w/fam	lonely	Total Sample	r = -.015	N=444
12)	Net change fac2fac w/frd	lonely	Total Sample	r = -.096*	N=444
13)	Net change fac2fac w/othr	lonely	Total Sample	r = -.078	N=444
14)	Overall net change	lonely	Total amount > 40	r = -.182	N= 21
15)	Overall net change	lonely	History < 3+ years	r = .012	N=125
16)	Overall net change	lonely	History = 3+ years	r = -.111*	N=318
17)	Overall net change	lonely	# of activities > 1	r = -.080	N=428
18)	Overall net change	lonely	# of activities > 3	r = .084	N=114
19)	Overall net change	lonely	# of activities > 5	r = .188	N= 18
20)	Overall net change	lonely	# of activities =1	r = .028	N= 14
21)	Overall net change	lonely	# of soc act > 0	r = -.071	N=441
22)	Overall net change	lonely	Freq of soc act >0	r = -.072	N=439
23)	Overall net change	lonely	22 years and under	r = -.203*	N= 99
24)	Overall net change	lonely	23+ years	r = -.031	N=343
25)	Overall net change	lonely	Afr. Amer/Blacks	r = .023	N=106
26)	Overall net change	lonely	Asian/Pacific Islander	r = -.133	N= 40
27)	Overall net change	lonely	Hispanic	r = -.117	N= 62
28)	Overall net change	lonely	Caucasian	r = -.149*	N=182
29)	Overall net change	lonely	Residence Halls	r = -.052	N=336
30)	Overall net change	lonely	Uni Apt./Commun	r = -.120	N=108
31)	Overall net change	lonely	Freshman	r = -.096	N=134
32)	Overall net change	lonely	Sophomore	r = -.209	N= 78
33)	Overall net change	lonely	Junior	r = -.002	N=111
34)	Overall net change	lonely	Senior	r = -.031	N=117
35)	Overall net change	lonely	Freshman/Sophomore	r = -.140*	N=212
36)	Overall net change	lonely	Junior/Senior	r = -.014	N=228
37)	Overall net change	lonely	Male	r = -.055	N=210

Table 73--*Continued.*

Items/Scales	DV	Selected Groups	Result	
38) Overall net change	lonely	Female	r = -.086	N=234
39) Overall net change	lonely	Fac2fac w/ fam lower	r = -.232*	N= 74
40) Overall net change	lonely	Fac2fac w/ fam higher	r = .090	N= 26
41) Overall net change	lonely	Fac2fac w/ frd higher	r = -.042	N=118
42) Overall net change	lonely	Fac2fac w/ frd lower	r = -.098	N= 47
43) Overall net change	lonely	Comm w/ fam is higher	r = .135	N= 49
44) Overall net change	lonely	Comm w/ fam is lower	r = .003	N=136
45) Overall net change	lonely	Comm w/ frds is higher	r = .010	N=182
46) Overall net change	lonely	Comm w/ frds is lower	r = .163	N= 54

*$p < .05$. **$p < .01$.

ranging from -.002 to .188 were found. Larger nonsignificant correlations were in subgroups with smaller sample sizes. Results for correlations analyses performed on the subgroups for Hypothesis 7 are presented in Table 73.

ANOVA findings

The relationship between loneliness and the total amount of change in face-to-face interaction, talking on the phone, and overall communication with family, friends, and others (besides family and friends) was also analyzed using two-way ANOVA with five variables (age, class, gender, ethnicity, and housing). No significant interactions were found. Consistent with one-way ANOVAs previously conducted (see Table 11), a main effect with ethnicity was found. Tables 74-78 summarize the results of two-way ANOVAs conducted for Hypothesis 7.

Table 74

Two–Way Analysis of Variance of the Change in Face-to-Face Interaction, Talking on the Phone, and Overall Communication With Family, Friends, and Others (Besides Family and Friends) Since Using the Internet (NETCHANG) With Age

Variables	*M*	*F*
Age		$F(1, 442) = .107, p = .744$
22 years and under	41.23	
23 + years	40.88	
Netchange		$F(2, 442) = 1.84, p = .161$
Low through 25.0	42.30	
25.01 through 27.0	41.16	
27.01 through high	39.71	
Age x Netchange		$F(2, 442) = 1.94, p = .145$

Table 75

Two–Way Analysis of Variance of the Change in Face-to-Face Interaction, Talking on the Phone, and Overall Communication With Family, Friends, and Others (Besides Family and Friends) Since Using the Internet (NETCHANG) With Class

Variables	*M*	*F*
Class		$F(3, 440) = .600, p = .616$
Freshman	40.94	
Sophomore	39.83	
Junior	41.51	
Senior	41.52	
Netchange		$F(2, 440) = 1.60, p = .204$
Low through 25.0	42.12	
25.01 through 27.0	40.56	
27.01 through high	40.18	
Class x Netchange		$F(6, 440) = 1.20, p = .307$

Table 76

Two–Way Analysis of Variance of the Change in Face-to-Face Interaction, Talking on the Phone, and Overall Communication With Family, Friends, and Others (Besides Family and Friends) Since Using the Internet (NETCHANG) With Gender

Variables	*M*	*F*
Gender		$F(1, 444) = 1.01, p = .316$
Male	40.66	
Female	41.57	
Netchange		$F(2, 444) = 1.68, p = .187$
Low through 25.0	42.28	
25.01 through 27.0	40.52	
27.01 through high	40.56	
Gender x Netchange		$F(2, 444) = .194, p = .824$

Table 77

Two–Way Analysis of Variance of the Change in Face-to-Face Interaction, Talking on the Phone, and Overall Communication With Family, Friends, and Others (Besides Family and Friends) Since Using the Internet (NETCHANG) With Ethnicity

Variables	*M*	*F*
Ethnicity		$F(3, 390) = 4.22, p = .006$**
African-American/Black	43.15	
Asian/Pacific Islander	42.89	
Hispanic	39.48	
Caucasian	39.70	
Netchange		$F(2, 390) = .433, p = .649$
Low through 25.0	42.02	
25.01 through 27.0	41.11	
27.01 through high	40.78	
Ethnicity x Netchange		$F(6, 390) = .545, p = .774$

**$p < .01$.

Table 78

Two–Way Analysis of Variance of the Change in Face-to-Face Interaction, Talking on the Phone, and Overall Communication With Family, Friends, and Others (Besides Family and Friends) Since Using the Internet (NETCHANG) With Housing

Variables	*M*	*F*
Housing		$F(1, 444) = .597, p = .440$
Residence Halls	41.37	
Uni Apt/Community	40.56	
Netchange		$F(2, 444) = 2.91, p = .056$
Low through 25.0	42.67	
25.01 through 27.0	39.74	
27.01 through high	40.48	
Housing x Netchange		$F(2, 444) = 2.10, p = .124$

Null Hypothesis 8

To determine if a combination of variables predicted loneliness well, a combination of seven predictors (one from each hypothesis) was analyzed using forward and backward stepwise procedures. The eighth null hypothesis states there will not be a statistically significant relationship between loneliness and the time spent weekly on the Internet, history of Internet use, reasons for Internet use, preference for Internet use as a mode of communication, preference for type of Internet use, and the amount of time a student spends face to face with family, friends, and others (besides family and friends), talking on the phone with family, friends, and others (besides family and friends), and communicating with family, friends, and others (besides family and friends) since using the Internet in undergraduate students.

Regression Findings

In a forward stepwise procedure, seven variables were considered in relationship with the total loneliness score. Criteria for automated entry/removal included a PIN value of .10 and POUT value of .11. While a PIN value of .10 was used for automated entry, an alpha level of .05 was used for selecting a model for this hypothesis. Results indicate the loneliness score was significantly associated with a combination of four predictors: a lower level of enjoyment with instant messaging, a shorter history of Internet use, a lower amount of use of nonsocial activities (newsgroups, Multi-User Dimensions, Bulletin Board Services, chat rooms, and World Wide Web), and an increased preference for Internet over face-to-face interaction when communicating to family members or friends about personal matters. The four variables accounted for 10.5% of the variance. Betas of -.138 to -.178 indicate all variables contributed similarly to the model.

To determine if other combinations of variables would be found using another procedure, a backward stepwise procedure was also performed using a PIN value of .01 and POUT value of .011. Identical results were found.

When all variables were entered together, all variables together predicted 10.9% of the variance. Adding three variables to the four found in the forward stepwise procedure added only .4% to the variance. Therefore, the four-variable model seemed most appropriate. Tables 79-80 present a summary of the regression analyses performed for Hypothesis 8.

Table 79

Results of Stepwise-Regression Analyses Conducted on Hypothesis 8

Variables	β	t	p
Enjoyment of Instant Messaging	-.178	-3.28	.001
Preference for the Internet over Face-to-face Interaction When Communicating to Family or Friends About Personal Matters	.178	3.27	.001
Sum of Nonsocial Activities	-.150	-2.72	.007
History of Internet Use	-.138	-2.52	.012

Note. $R^2 = .105, F(4, 306) = 8.97, p = .000$.

Summary of Research Questions

1. How does the amount of time undergraduate students spend on the Internet relate to their loneliness?

A very weak relationship suggests higher levels of Internet use are associated with lower levels of loneliness. Additional significant relationships were also found among various subgroups; however, differences were not substantial enough to make meaningful interpretations. It was concluded that amount of Internet use does not seem to be a major factor relating to loneliness.

2. Does the type of Internet use relate to loneliness in undergraduate students? While all are weak relationships, analysis of the total sample suggests more time spent using the World Wide Web and nonsocially oriented activities (newsgroups, Multi-User Dimensions, Bulletin Board Services, and the World Wide Web) is likely to be associated

Table 80

Intercorrelations for Variables Analyzed for Hypothesis 8 With Correlations Between the Variables and Loneliness

	TOTALAMT	LONEACT	HISTORYX	ACADEMIC	PERNETF2	PHONEOTH	ENJOYIM	LONELY
TOTALAMT		.831**	.150**	.080	.131*	-.012	.076	-.111
LONEACT			.156**	.080	.120*	.021	-.033	-.144*
HISTORYX				.057	.054	-.005	.028	-.157**
ACADEMIC					-.074	-.073	.189**	-.098
PERNETF2						.163**	-.049	.162**
PHONEOTH							.010	.052
ENJOYIM								-.185**

Note. TOTALAMT = Amount of weekly Internet use; LONEACT = Total amount of activities that are more nonsocially oriented (newsgroups, Multi-User Dimensions, Bulletin Board Services, chat rooms, and the World Wide Web); HISTORYX = Length of time been using the Internet weekly; ACADEMIC = Using the Internet for academic reasons; PERNETF2 = Preference for the Internet over face-to-face interaction when discussing personal matters with friend and family members; PHONEOTH = The amount talking on the phone with others has changed since using the Internet; ENJOYIM = Level of enjoyment of instant messaging.
$^{**}p < .01$. $^{*}p < .05$.

with less loneliness. In addition, more time spent on the World Wide Web and email is associated with lower levels of loneliness. Although significant findings resulted among some subgroups, differences were not substantial enough to make meaningful interpretations. Therefore, it appears that the type of Internet use has a minimal effect on loneliness.

3. Are undergraduate students who have a longer history of Internet use more or less lonely?

Consistent with recent findings (Kraut et al., 2002), results indicate that for the total sample and a number of the subgroups, the longer the undergraduate has used the Internet, the less lonely he or she is likely to be.

4. Are individual reasons for using the Internet related to loneliness in undergraduate students?

Although all relationships were weak, results indicate using the Internet more for academic use, business use, and activities in which the user is likely to know others (i.e., using the Internet to maintain relationships and for instant messaging) is likely to be associated with less loneliness. Among Asians/Pacific Islanders, higher use of activities in which they are likely to know the other person they are corresponding with (i.e., using the Internet to maintain relationships and for instant messaging) is likely to be associated with less loneliness.

It was also found that loneliness is influenced by interactions between those who use the Internet for social reasons and housing. The effect of using the Internet for social reasons was stronger for those living in university apartments or the community than for those living in the residence halls. Those who use social activities the most and live in

university apartments or the community were the loneliest.

5. Does a student's preference for the Internet as a mode of communication relate to loneliness?

Overall, there seems to be a weak relationship suggesting those who prefer the Internet over face-to-face interaction when discussing personal matters with friends and/or family are more likely to be lonely.

6. Does a student's preference for type of Internet use relate to loneliness?

Analysis of the total sample indicates those who enjoy instant messaging more are less likely to be lonely. In addition, a higher level of enjoyment of email, the World Wide Web, Bulletin Board Services, and the Internet overall is likely to be associated with less loneliness. While all relationships were weak, significant correlations among various subgroups also indicate the higher level of enjoyment of social activities, the lower likelihood of loneliness. Contrary to other findings, those who use the Internet more than 40 hours per week are more likely to be lonely the more they enjoy social activities.

While all relationships were weak, results also indicate that among the significant subgroups, a higher level of enjoyment of nonsocial activities results in a lower likelihood of loneliness. However, consistent with level of enjoyment of social activities, those who use the Internet more than 40 hours per week are more likely to be lonely the more they enjoy nonsocial activities.

While all relationships were weak, results also indicate that among the significant subgroups, a higher level of enjoyment of the Internet results in a lower likelihood of loneliness. However, as with the two previously described variables, those who use the

Internet for more than 40 hours per week are more likely to be lonely the more they enjoy the Internet overall.

A significant interaction revealed loneliness is influenced by the level of enjoyment with the Internet and housing. The effect of the level of enjoyment with the Internet was stronger for residence hall students that those living in university apartments or the community. Those who live in the residence halls and enjoyed the Internet the least, were the loneliest.

7. Does the Internet impact the amount of time a student spends face to face with family, friends, and others (besides family and friends), talking on the phone with family, friends, and others (besides family and friends), and communicating with family, friends, and others (besides family and friends), and how does this relate to loneliness?

Analysis of the total sample indicates that loneliness increases as time spent face to face with friends decreases since using the Internet. In addition, the more the Internet has changed talking on the phone with others (besides family and friends), the more loneliness is likely. Among the significant subgroups, the more time spent in face-to-face interaction, talking on the phone, and overall communication with family, friends, and others (besides family and friends) since using the Internet, the less loneliness is likely. However, while these findings were significant, it was difficult to find patterns that could be interpreted due to small sample sizes.

8. Does the amount of Internet use, type of Internet use, history of Internet use, reasons for Internet use, preference for Internet use, preference for type of Internet use, and change in face-to-face interaction, talking on the phone, and communicating with

family, friends, and others (besides family and friends) since using the Internet relate to loneliness in undergraduate students?

Results indicate loneliness is significantly associated with four predictors: a lower level of enjoyment with instant messaging, a shorter history of Internet use, a lower amount of use of nonsocial activities (newsgroups, Multi-User Dimensions, Bulletin Board Services, chat rooms, and World Wide Web), and an increased preference for the Internet over face-to-face interaction when communicating to family members or friends about personal matters.

9. Do the demographic characteristics of the Internet user relate to loneliness in undergraduate students?

Most of the demographics did not affect loneliness in the undergraduate students studied. Significant findings within subgroups throughout the hypothesis were not interpreted because differences between the subgroups were not large enough for meaningful interpretation. However, several main effects indicated ethnicity seemed to be a factor in loneliness throughout the study as Blacks were consistently lonelier than Whites. It is important to note Asians and Blacks had similar mean loneliness scores and Hispanics and Caucasians had similar mean loneliness scores; however, due to small sample sizes for Asians and Hispanics, no significant differences resulted. In addition, housing interacted separately with use of social activities and level of enjoyment with the Internet.

Two interactions were found with housing: (a) Loneliness is influenced by the level of enjoyment with the Internet and housing; (b) Loneliness is influenced by interactions between those who use the Internet for social reasons and housing. The

effect of the level of enjoyment with the Internet was stronger for residence hall students than those living in university apartments or the community. The effect of using the Internet for social reasons was stronger for those living in university apartments or the community than those living in the residence halls.

Table 81 summarizes the significant correlations found in this study.

Table 81

Summary of Significant Correlational Findings by Hypothesis

Items/Scales	DV	Selected Groups	Results	
Hypothesis 1				
1) Time per week of net use	lonely	Total Sample	r = -.099*	N=437
2) Time per week of net use	lonely	22 years and under	r = -.115*	N=354
3) Time per week of net use	lonely	Junior/Senior	r = -.132*	N=235
4) Time per week of net use	lonely	Residence Halls	r = -.115*	N=347
5) Time per week of net use	lonely	Enjoy bbs a lot	r = -.373*	N= 34
6) Time per week of net use	lonely	Afr Amer/Black	r = -.192*	N=110
7) Frequency of net use	lonely	Don't enjoy nwsg	r = -.308*	N= 55
Hypothesis 2				
8) Amount of WWW use	lonely	Total Sample	r = -.104*	N=405
9) Nonsocial activities	lonely	Total Sample	r = -.113*	N=405
10) Nondependent activities	lonely	Total Sample	r = -.104*	N=405
11) Nonsocial activities	lonely	22 years and under	r = -.142*	N=328
12) Nonsocial activities	lonely	Junior	r = -.197*	N=110
13) Nonsocial activities	lonely	Junior/Senior	r = -.138*	N=218
14) Nonsocial activities	lonely	Residence Halls	r = -.153**	N=323
15) Nonsocial activities	lonely	# of activities >1	r = -.111*	N=424
16) Nonsocial activities	lonely	History = 3+ years	r = -.139*	N=306
Hypothesis 3				
17) History of weekly net use	lonely	Total Sample	r = -.184**	N=465
18) History of weekly net use	lonely	22 years and under	r = -.197**	N=359
19) History of weekly net use	lonely	Freshman	r = -.261**	N=141
20) History of weekly net use	lonely	Junior	r = -.188*	N=118
21) History of weekly net use	lonely	Fresh/Soph	r = -.224**	N=225
22) History of weekly net use	lonely	Junior/Senior	r = -.153*	N=236
23) History of weekly net use	lonely	Male	r = -.202**	N=222
24) History of weekly net use	lonely	Female	r = -.165**	N=243
25) History of weekly net use	lonely	Residence Halls	r = -.193**	N=353
26) History of weekly net use	lonely	Enjoy bbs a lot	r = -.376*	N= 34
27) History of weekly net use	lonely	Enjoy email a lot	r = -.154**	N=348
28) History of weekly net use	lonely	Enjoy www a lot	r = -.128*	N=335
29) History of weekly net use	lonely	Enjoy mud a lot	r = -.431*	N= 33
30) History of weekly net use	lonely	Enjoy chat rooms a lot	r = -.379**	N= 50
31) History of weekly net use	lonely	Enjoy newsgrps a lot	r = -.247*	N= 68
32) History of weekly net use	lonely	Enjoy im a lot	r = -.162**	N=299
33) History of weekly net use	lonely	# of activities >1	r = -.174**	N=443
34) History of weekly net use	lonely	# of activities >3	r = -.259**	N=121
35) History of weekly net use	lonely	Caucasian	r = -.223**	N=187
36) History of weekly net use	lonely	# of soc act > 0	r = -.179*	N=458
37) History of weekly net use	lonely	Freq of soc act > 0	r = -.187**	N=457
38) History of weekly net use	lonely	Tot amt of use >40	r = -.477*	N= 22

Table 81--*Continued.*

Items/Scales	DV	Selected Groups	Results
Hypothesis 4			
39) Academic use	lonely	Total Sample	r = -.132** N=443
40) Business use	lonely	Total Sample	r = -.099* N=443
41) Activities know others	lonely	Total Sample	r = -.098* N=443
42) Social activities	lonely	Asian/Pacific Islander	r = -.365* N= 43
Hypothesis 5			
43) Phone/Net pers mat frd/fam	lonely	Total Sample	r = .114* N=443
44) Net/Face pers mat frd/fam	lonely	Total Sample	r = .194** N=443
45) Phone/Net pers/impt frd	lonely	Total Sample	r = .096* N=443
46) Net/Face, pers/impt matters	lonely	Total Sample	r = .151** N=443
47) All matters, all commun, fam	lonely	Total Sample	r = .146** N=443
48) All matters, all commun, frd	lonely	Total Sample	r = .118* N=443
49) Phone/Net all matters fam	lonely	Total Sample	r = .095* N=443
50) Phone/Net all matters frd	lonely	Total Sample	r = .121* N=443
51) Phone/Net all matter fam/frd	lonely	Total Sample	r = .120* N=443
52) All matters, all commun	lonely	Total Sample	r = .149** N=443
53) Phone/Net personal	lonely	Total Sample	r = .188** N=443
54) Net/Face pers mat frd/fam	lonely	History = 3+ years	r = .154* N=326
55) Net/Face pers mat frd/fam	lonely	History < 3 years	r = .239* N=132
56) Net/Face pers mat frd/fam	lonely	22 years and under	r = .247* N=354
57) Net/Face pers mat frd/fam	lonely	Asian/Pac Islander	r = .414* N= 43
58) Net/Face pers mat frd/fam	lonely	Caucasian	r = .275* N=183
59) Net/Face pers mat frd/fam	lonely	Residence Halls	r = .190* N=347
60) Net/Face pers mat frd/fam	lonely	Freshman	r = .295* N=139
61) Net/Face pers mat frd/fam	lonely	Junior	r = .198* N=115
62) Net/Face pers mat frd/fam	lonely	Male	r = .206* N=220
63) Net/Face pers mat frd/fam	lonely	Junior/Senior	r = .221* N=223
64) Net/Face pers mat frd/fam	lonely	Fresh/Soph	r = .151* N=231
65) Net/Face pers mat frd/fam	lonely	# of activities > 1	r = .186* N=437
66) Net/Face pers mat frd/fam	lonely	# of activities > 3	r = .262* N=120
67) Net/Face pers mat frd/fam	lonely	# of activities > 5	r = .451* N= 20
Hypothesis 6			
68) Enjoy email	lonely	Total Sample	r = -.119* N=418
69) Enjoy www	lonely	Total Sample	r = -.121* N=407
70) Enjoy BBSs	lonely	Total Sample	r = -.274* N= 74
71) Enjoy instant messaging	lonely	Total Sample	r = -.194** N=345
72) Enjoy internet	lonely	Total Sample	r = -.092* N=459
73) Enjoy nonsocial activities	lonely	22 years and under	r = -.193** N=359
74) Enjoy nonsocial activities	lonely	23 + years	r = -.335** N=103
75) Enjoy nonsocial activities	lonely	Freshman	r = -.202* N= 96
76) Enjoy nonsocial activities	lonely	Sophomore	r = -.322** N= 84
77) Enjoy nonsocial activities	lonely	Junior	r = -.248** N=118
78) Enjoy nonsocial activities	lonely	Senior	r = -.187* N=119

Table 81--*Continued.*

Items/Scales	DV	Selected Groups	Results
Hypothesis 6--continued.			
79) Enjoy nonsocial activities	lonely	Fresh/Soph	r = -.224** N=223
80) Enjoy nonsocial activities	lonely	Junior/Senior	r = -.219** N=237
81) Enjoy nonsocial activities	lonely	Male	r = -.201** N=222
82) Enjoy nonsocial activities	lonely	Female	r = -.233** N=244
83) Enjoy nonsocial activities	lonely	Afr Amer/Black	r = -.291** N=113
84) Enjoy nonsocial activities	lonely	Caucasian	r = -.204** N=187
85) Enjoy nonsocial activities	lonely	Residence Halls	r = -.227** N=353
86) Enjoy nonsocial activities	lonely	# of activities > 1	r = -.201** N=444
87) Enjoy nonsocial activities	lonely	Hist less than 3 yrs	r = -.245** N=133
88) Enjoy nonsocial activities	lonely	History = 3 + years	r = -.157** N=332
89) Enjoy nonsocial activities	lonely	Tot amt of use > 40	r = .474* N= 22
90) Enjoy nonsocial activities	lonely	# of soc act > 0	r = -.213** N=459
91) Enjoy nonsocial activities	lonely	Freq of soc act > 0	r = -.222** N=458
92) Enjoy social activities	lonely	22 years and under	r = -.131* N=254
93) Enjoy social activities	lonely	Freshman	r = -.183* N=141
94) Enjoy social activities	lonely	Uni Apt/Commun	r = -.238* N=113
95) Enjoy social activities	lonely	History = 3 + years	r = -.132* N=239
96) Enjoy social activities	lonely	Tot amt of use > 40	r = .457* N= 19
97) Enjoy social activities	lonely	# of activities < 5	r = -.571* N= 19
98) Enjoy the Internet	lonely	Residence Halls	r = -.110* N=348
99) Enjoy the Internet	lonely	# of soc act > 0	r = -.094* N=453
100) Enjoy the Internet	lonely	Freq of soc act > 0	r = -.099* N=451
101) Enjoy the Internet	lonely	Tot amt of use > 40	r = .440* N= 22
Hypothesis 7			
102) Net change phone w/oth	lonely	Total Sample	r = .128** N=444
103) Net change fac2fac w/frd	lonely	Total Sample	r = -.096* N=444
104) Overall net change	lonely	22 years and under	r = -.203* N= 99
105) Overall net change	lonely	Fresh/Soph	r = -.140* N=212
106) Overall net change	lonely	Caucasian	r = -.149* N=182
107) Overall net change	lonely	History = 3+ years	r = -.111* N=318
108) Overall net change	lonely	Fac2fac w/ fam lower	r = -.232* N= 74

*p < .05. **p < .01.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents a summary of the research, discussion of the results and conclusions, implications of the findings, and recommendations for further research.

Summary

The summary of the research will consist of four sections: (1) Purpose of the Study, (2) Overview of Relevant Literature, (3) Methodology, and (4) Findings.

Purpose

The primary purpose of this study was to examine the relationship between loneliness and various aspects of Internet use in college students. It also attempted to clarify whether certain variables had an effect on the loneliness experienced by undergraduate students. These variables were: type of Internet use, history of Internet use, reasons for using the Internet, preference for the Internet as a mode of communication, preference for type of Internet activity, and the changes in face-to-face interaction, talking on the phone, and overall communication with family, friends, and others (besides family and friends) since using the Internet.

Overview of Relevant Literature

Loneliness has always been a perpetually common problem affecting all types of individuals regardless of race, gender, age, or cultural history (Rokach & Bacanli, 2001).

However, due to the absence of an adequate measure to assess the phenomena, little was known about loneliness until the 1970s. It was not until the publication of the UCLA Loneliness Scale (Russell et al., 1978) that loneliness research began to flourish.

Two approaches to conceptualizing loneliness emerged: the unidimensional and multidimensional perspectives. The unidimensional approach focuses on general themes of the loneliness experience. Most research endorses this perspective, as evidenced by the widespread use of the UCLA Loneliness Scale, a unidimensional measure. In contrast, the multidimensional perspective attempts to distinguish between various forms of loneliness and believes loneliness cannot be adequately measured in a global context.

However, no consensus currently exists on a definition of loneliness, possibly due to so many varying theoretical perspectives. While several theories exist, most theories have not been extensively researched. Perlman and Peplau (1982) categorized loneliness into eight different theories: psychodynamic, phenomenological, interactionist, existential, privacy, general systems theory, sociological explanations, and the cognitive approach. The cognitive theory, which emphasizes the normality of loneliness and describes loneliness as a state of mind produced by an individual's thoughts, remains the most heavily researched of all theoretical approaches to loneliness.

Research has linked a number of personality and attitude variables to loneliness. Specifically, Jones (1985) identified four groups of variables which classify various factors related to loneliness: inadequate social skills, emotional arousal and conflict, poor self-regard, and negativistic attitudes. In addition, variables such as social network characteristics, alcoholism, obesity, excessive drug use, and psychosomatic concerns have also been associated with loneliness.

Loneliness seems to be especially prevalent among college students. Late adolescence, a time of significant transition, is characterized by the disturbance in current attachment patterns and the nascent trends toward independence, autonomy, individuality, separateness, and responsibility. Mijuskovic (1986) described this period as an intense struggle to attain meaning and self-identity. More intense needs for emotional attachment can be created, as well as an increased susceptibility towards loneliness during this era (Brennan, 1982).

No consensus exists among the researchers on the prevalence among loneliness in males and females. While some studies described equal levels of loneliness between the sexes (Berg & Peplau, 1982; Hojat, 1982; Jones et al., 1981; Saklofske et al., 1986; Solano, 1980), others suggested higher levels for men (Roscoe & Skomski, 1989; Saklofske & Yackulic, 1989; Schmitt & Kurdek, 1985; Schultz & Moore, 1986; Solano, 1980; Upmanyu, Upmanyu, & Dhingra, 1992; Wheeler et al., 1983), with others reporting higher levels of loneliness in women (McWhirter, 1997; Medora & Woodward, 1986; Rokach, 2000).

The relationship between loneliness and various aspects of Internet use has recently gained widespread publicity. With origins dating back to 1969, the Internet emerged out of a project originally intended for the Advanced Research Projects Agency (ARPA) of the U.S. Department of Defense. Known as the "information highway," the Internet provides an unrivaled opportunity for exchanging communication, accessing information, and sharing resources. The major types of communication available on the Internet include: email, the World Wide Web, newsgroups, Internet Relay Chat (chat rooms), instant messaging, Bulletin Board Services, and Multi-User Dimensions.

As Kandell (1998) and Morahan-Martin and Schumacher (2000) stated, college students are at heightened risk for abusing the Internet. Kandell (1998) suggested that the increased susceptibility of Internet abuse in college students results from the ease with which students can access the Internet on college campuses and the particularly difficult developmental period they endure as they attempt to create a solid sense of self-identity and develop meaningful intimate relationships. Excessive Internet use has been associated with significant impairments in academic, relationship, financial, and occupational areas (Young, 1996).

While some studies support a relationship between loneliness and Internet use, others do not report a link. Specifically, Kraut et al.'s (1998) well-known study, in which 93 families were followed during their first 1 to 2 years on the Internet, suggested an association between higher levels of Internet use and increases in loneliness. While this study drew criticism due to its small sample size, failure to randomly select participants, and the absence of a control group, Morahan-Martin and Schumacher (2000) reached a similar conclusion, reporting a link between various aspects of Internet use and loneliness.

In a more recent study, Kraut et al. (2002) discredited the link between loneliness and various aspects of Internet use, reporting that most of the negative effects found in Kraut et al.'s (1998) earlier study dissipated after 3 years. Kraut et al. (2002) stated that a relationship between loneliness and various aspects of Internet use was no longer apparent in his subjects. Another study by McKenna et al. (in press) found 6% of 145 users felt lonelier as a result of using the Internet, while 47% actually reported that the Internet helped lessen individual feelings of loneliness.

Most researchers have agreed that the Internet influences individuals, whether it be positive or negative. Greenfield (1999) warned that excessive Internet use might negatively impact relationships and marriages. Hiebert and Gibbons (2000) cautioned that asocial behavior could be fostered in shy people who use the Internet heavily. Internet use has also been linked to academic dismissal and depressive symptoms (Anderson, 2001; Hamburger & Ben-Artzi, 2000). Further, some researchers suggested that more time on the Internet led to decreased social ties (Hamburger & Ben-Artzi, 2000; Nie & Erbring, 2000; Shotton, 1991). Greenfield (1999) predicted that technology had the ability to contribute to a more impersonal world. Nie and Erbring (2000) agreed, describing the Internet as possibly the "ultimate isolating technology."

On the other hand, according to others, computer-mediated communication was not all negative (Rice & Love, 1987; Walther & Burgoon, 1992). In fact, the Internet had been described by some as improving the lives of its users (Katz & Aspden, 1997), stimulating the intellect, changing mood, and allowing for improved communication with friends and family (Greenfield, 1999; UCLA Center for Communication Policy, 2000). Furthermore, it was suggested that the Internet could be an ideal place to meet peers with similar interests (McKenna & Bargh, 2000; ActivMedia Research, 1998). For those who are socially anxious, often a characteristic of the lonely, and who have difficulty in face-to-face interactions, the Internet was described as a tool to provide a safer, less threatening place to meet new people (Greenfield, 1999; McKenna & Bargh, 2000). Lonely individuals who had difficulty self-disclosing and often feel isolated in real life appeared to feel at ease due to the anonymity allowed by the Internet (Morahan-Martin & Schumacher, 2000).

Methodology

This research used a cross-sectional survey approach to gather data on loneliness, amount of Internet use, type of Internet use, history of Internet use, reasons for Internet use, student's preference for the Internet as a mode of communication, student's preference for type of Internet activity, changes in face-to-face interaction, talking on the phone, and overall communication with family, friends, and others (besides family and friends) since using the Internet, and specific demographic characteristics including age, class, gender, ethnicity, and housing.

Sample

The subjects in this study consisted of 466 undergraduate students enrolled at Andrews University during Spring Semester, 2002. During the months of February 2002 and March 2002, data were gathered from students living in the women's residence hall, men's residence halls, university apartments, and the community.

Instrumentation

Two instruments were utilized in this study: the UCLA Loneliness Scale (Version 3), developed by Russell (1996), and the Internet Use Survey, a measure developed by the researcher. The UCLA Loneliness Scale (Version 3) was used to assess loneliness, while the Internet Use Survey provided information about the participant's Internet use along with specific demographic information on age, class, gender, ethnicity, and housing. The UCLA Loneliness Scale (Version 3) has solid psychometric properties, making it suitable for research. The instrument is clear, brief, simple to administer, score, and complete, and has excellent reliability and good validity.

Findings

Each hypothesis was first analyzed using the total sample and then with specific subgroups. The following is a discussion of the results of each hypothesis.

The first research question, "How does the amount of time undergraduate students spend on the Internet affect their loneliness?" led to the testing of Hypothesis 1. Hypothesis 1 was analyzed using correlational analyses and two-way Analysis of Variance.

Hypothesis 1: There will not be a statistically significant relationship between the amount of time an undergraduate student spends regularly on the Internet and his or her loneliness.

Consistent with Kraut et al. (2002) and McKenna et al. (in press), this study found loneliness was not associated with increased levels of Internet use. In fact, while the relationship was very weak, results suggested higher levels of Internet use were associated with lower levels of loneliness. Additional significant relationships were also found among various subgroups; however, differences were not substantial enough to make meaningful interpretations.

The second research question, "Does the type of Internet use affect loneliness in undergraduate students?" led to the testing of Hypothesis 2. Hypothesis 2 was analyzed using correlational analyses and two-way Analysis of Variance.

Hypothesis 2: There will not be a statistically significant relationship between loneliness and type of Internet use in undergraduate students.

In the present study, World Wide Web, instant messaging, and email were the most frequently used Internet activities. Results suggested more time spent using the

World Wide Web and nonsocially oriented activities (newsgroups, Multi-User Dimensions, Bulletin Board Services, and the World Wide Web) was likely to be associated with less loneliness. In addition, more time spent on the World Wide Web and email was associated with lower levels of loneliness. This finding was contrary to Kraut et al.'s (1998) study which did not find type of Internet activity to be a factor in loneliness. Young (1996), however, reported similar results, finding that those not dependent on the Internet were more likely to use email and the World Wide Web. Users not dependent on the Internet were less likely to experience negative effects (i.e., impairments in relationship, financial, occupational, and academic pursuits). Although significant findings resulted among some subgroups, differences were not substantial enough to make meaningful interpretations.

The third research question, "Are undergraduate students, who have a longer history of Internet use, more or less lonely?" led to the testing of Hypothesis 3. Hypothesis 3 was analyzed using correlational analyses and two-way Analysis of Variance.

Hypothesis 3: There will not be a statistically significant relationship between history of Internet use and loneliness in undergraduate students.

Approximately 71% of the 466 sampled in this study reported using the Internet for 3 or more years. Along with a significant finding with the total sample, most relationships among subgroups were also significant, suggesting the longer the undergraduate has been regularly using the Internet, the less lonely he or she is likely to be. These findings are consistent with Kraut et al. (2002) who recently denounced the link between loneliness and Internet use. After 3 years, most of the negative effects

found in their earlier study (Kraut et al., 1998) lessened. They suggested that the uniqueness and novelty of the Internet lessen over time, and subjects decrease participation in unfulfilling Internet activities while increasing time engaged in more rewarding activities.

In addition, while Young (1996) reported that 58% of those dependent on the Internet had been using the Internet for 6-12 months, those not dependent on the Internet had used the Internet for more than 1 year. These findings support the present study which found that those who have used the Internet for a longer period of time are less likely to be affected by loneliness.

The fourth research question, "Are individual reasons for using the Internet related to loneliness in undergraduate students?" led to the testing of Hypothesis 4. Hypothesis 4 was analyzed using correlational analyses and Analysis of Variance.

Hypothesis 4: There will not be a statistically significant relationship between individual reasons for using the Internet and loneliness in undergraduate students.

In this study, similar to Scherer's (1997) study of college students, academic use was the most frequently used reason for Internet use, with instant messaging and maintaining relationships following close behind. It was found that those who used the Internet more for academic use were less likely to be lonely. Also, weaker statistical relationships suggested those who use the Internet for business use and activities in which they are likely to know others (i.e., using the Internet to maintain relationships and for instant messaging) are less likely to be lonely. Also, among the Asian/Pacific Islanders, increased use in activities in which they were likely to know the other person they were corresponding with (i.e., using the Internet to maintain relationships and for instant

messaging) likely resulted in less loneliness. However, no theoretical interpretation could be made because of the small sample sizes and the small differences between subgroups.

While some researchers found pathological users to use the Internet more for such reasons as meeting new people (Morahan-Martin & Schumacher, 2000; Scherer, 1997), talking to others who share similar interests, staying informed in areas of interests, and for recreational purposes (i.e., playing games) (Morahan-Martin & Schumacher, 2000), this study did not endorse any particular reason for using the Internet to be more troublesome than another.

The fifth research question, "Does a student's preference for the Internet as a mode of communication relate to loneliness?" led to the testing of Hypothesis 5. Hypothesis 5 was analyzed using correlational analyses, stepwise regression, and two-way Analysis of Variance.

Hypothesis 5: There will not be a statistically significant relationship between a student's preference for the Internet as a mode of communication and loneliness.

For most of the subgroups analyzed in this study, those who prefer the Internet over face-to-face interaction were more likely to be lonely when discussing personal matters with family members or friends. This was consistent with Morahan-Martin and Schumacher's (2000) study which stated that lonely individuals were more likely to prefer Internet communication over face-to-face interaction. In addition, contrary to other findings, those who use the Internet for more than 40 hours per week indicated those who prefer the Internet over face-to-face interaction (when discussing personal matters with friends and family) were actually less likely to be lonely. However,

meaningful interpretations could not be determined among subgroups because the differences between findings were too small.

The sixth research question, "Does a student's preference for type of Internet use relates to loneliness?" led to Hypothesis 6. Hypothesis 6 was analyzed using correlational analyses and two-way Analysis of Variance.

Hypothesis 6: There will not be a statistically significant relationship between a student's preference for type of Internet use and loneliness.

First, the individual's level of preference for each Internet activity was correlated with loneliness. Analysis of the total sample indicated that those who used instant messaging more were less likely to be lonely. In addition, a higher preference to use email, the World Wide Web, Bulletin Board Services, and the Internet overall was likely to be associated with less loneliness.

Then, level of preference with social activities, nonsocial activities, and the Internet overall were correlated with loneliness for the total sample and each subgroup. The highest number of significant findings among the subgroups found was with the level of preference with nonsocial activities. Results indicated that those who preferred the more nonsocial activities were less likely to be lonely. Contrary to other significant subgroups, those who used the Internet for more than 40 hours per week reportedly were more likely to be lonely, and enjoyed more social activities, nonsocial activities, and the Internet overall.

The seventh research question, "Does the Internet impact the amount of time a student spends with family, friends, and others (besides family and friends), talking on the phone with family, friends, and others (besides family and friends), and

communicating with family, friends, and others (besides family and friends), and how does this relate to loneliness?" led to Hypothesis 7. Hypothesis 7 was analyzed using correlational analyses and two-way Analysis of Variance.

Hypothesis 7: There will not be a significant relationship between loneliness and the impact the Internet has had on the amount of time a student spends face to face with family, friends, and others (besides family and friends), talking on the phone with family, friends, and others (besides family and friends), and communicating with family, friends, and others (besides family and friends).

In this study, when rating how much the Internet had changed overall communication, the majority of the sample reported no changes. Approximately 30% indicated increases in communication with family and others (besides family and friends) since using the Internet. Forty-percent of the sample specified increases in communication with friends. An examination of the results reveals that face-to-face interaction has decreased more with friends and others (besides family and friends) than with family. Only a small portion of the sample reported increases in face-to-face interaction since using the Internet. This is similar to Katz and Aspden (1997) who suggested time spent with family and friends remained relatively unaffected by Internet use. Others studies agreed, finding insignificant decreases in communication with family, friends, or professional colleagues (Robinson et al., 2000; UCLA Center for Communication Policy, 2000, 2001).

Analysis of the total sample indicated that loneliness increased as time spent face to face with friends decreased since using the Internet. In addition, the more Internet use had changed talking on the phone with others (besides family and friends), the more

loneliness one reported. The most meaningful relationships found to be significant for some of the subgroups suggested that when more time was spent in face-to-face interaction, talking on the phone, and overall communication with family, friends, and others (besides family and friends) since using the Internet, loneliness was less likely.

The eighth research question, "Does the amount of Internet use, type of Internet use, history of Internet use, reasons for Internet use, preference for Internet use, preference for type of Internet use, and change in face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends) since using the Internet affect loneliness in undergraduate students?" led to Hypothesis 8. Hypothesis 8 was analyzed using stepwise regression.

Hypothesis 8: There will not be a statistically significant relationship between loneliness and the amount of Internet use, history of Internet use, reasons for Internet use, preference for Internet use as a mode of communication, preference for type of Internet use, and the amount of time a student spends in face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends) since using the Internet in undergraduate students.

In a forward stepwise procedure, seven variables were considered in relationship with the total loneliness score. Results indicate the loneliness score was significantly associated with a combination of four predictors: a lower level of enjoyment with instant messaging, a shorter history of Internet use, a lower amount of use of nonsocial activities (newsgroups, Multi-User Dimensions, Bulletin Board Services, chat rooms, and World Wide Web), and an increased preference for Internet over face-to-face interaction when communicating to family members or friends about personal matters.

To determine if other combinations of variables would be found using another procedure, a backward stepwise procedure was also performed, which resulted in identical findings. Further, when all variables were entered together, all variables together predicted 10.9% of the variance. Adding three variables to the four found in the forward stepwise procedure added only .4% to the variance. Therefore, the four-variable model seemed most appropriate. However, stepwise regression capitalizes on chance in selecting variables and also may result in spurious combinations of variables. Therefore, these results should be regarded in a cautionary manner.

The ninth research question, "Do the demographic characteristics of the Internet user affect loneliness in undergraduate students?" led to several subhypotheses examined in the study that attempted to determine how the demographic variables affect variables analyzed in Hypotheses 1 through 7. The subhypotheses were analyzed using two-way Analysis of Variance. Following is a summary of this study's results:

Age

The means of total amount of Internet use and loneliness for the two age groups analyzed in this study (see Table 82) indicated that younger individuals used the Internet more than those older. Differences between loneliness scores for the two groups were very small. Upon analysis of each hypothesis, no significant differences were found among the two age groups.

Gender

The means for males and females for the total amount of Internet use and loneliness indicated males used the Internet slightly more than females. Loneliness

Table 82

Mean Weekly Hours of Internet Use and Loneliness Scores on the UCLA Loneliness Scale (Version 3) for Each Demographic Variable

Demographic Variables	*N*	Mean Loneliness Score	*N*	Mean Internet Use (Hrs/Week)
Age				
22 years and under	359	41.29	354	14.27
23+ years	103	40.75	102	9.19
Gender				
Males	222	40.66	219	14.67
Females	244	41.59	241	11.70
Class				
Freshman	141	41.20	140	15.01
Sophomore	84	40.23	81	11.59
Junior	118	41.37	117	12.79
Senior	119	41.61	118	12.37
Ethnicity				
African-American/ Black	113	43.08	110	16.37
Asian/Pacific Islander	43	42.74	42	13.42
Hispanic/ Latino(a)	63	39.79	63	15.07
White	187	39.61	185	10.07
Housing				
Residence Halls	353	41.40	347	14.16
University Apts/ Community	113	40.36	113	9.87

Note. Scores on the UCLA Loneliness Scale (Version 3) range from 20-80. Respondents rate the items according to a 4-point Likert scale: 1=Never; 2=Rarely, 3=Sometimes, 4=Always.

scores, however, were very similar. This was consistent with several studies which found no difference between males and females with regard to loneliness (Berg & Peplau, 1982; Hojat, 1982; Jones et al., 1981; Saklofske et al., 1986; Solano, 1980). Thus, no significant differences were found among males and females.

Class

The means for "class" for the total amount of Internet use and loneliness (see Table 82) indicated that freshmen used the Internet more than any other class; however, little difference between the groups resulted.

Ethnicity

The means for ethnicity for the total amount of Internet use and loneliness (see Table 82) indicated that Whites used the Internet the least and were the least lonely. African Americans/Blacks used the Internet the most and were the loneliest. Post-hoc analyses indicated Blacks were significantly lonelier than Whites in this study. It is important to note Asians and Blacks had similar mean loneliness scores and Hispanics and Caucasians had similar mean loneliness scores; however, due to small sample sizes for Asians and Hispanics, no significant differences resulted. There were no significant interactions between Internet use and ethnicity as they affect loneliness, which is consistent with Kraut et al. (1998) who found no racial differences in Internet use.

Housing

The means for "housing" for the total amount of Internet use and loneliness (see Table 82) indicated those in the residence halls used the Internet approximately 4.5 hours more than those living in university apartments or the community. Loneliness scores

were similar between the two groups. Upon analysis, two interactions were found with housing. It was found that those who lived in residence halls and enjoyed the Internet the least were the loneliest. The residence halls provided what appears to be unlimited access to relationships. If someone reported being lonely in the residence halls, where opportunities for friendships are in abundance, it was likely that they were social outcasts and may not have a lot of enjoyment with life.

In addition, it was also found that those who used social activities the most and lived in university apartments or the community were the loneliest. It appeared to be more common, when living in university apartments or the community, to avoid talking with neighbors as an individual comes and goes as opposed to residence halls. There was likely an increased chance for isolation and less of an opportunity to develop meaningful relationships in such places. Since it had also been shown that using social activities on the Internet (online communication) results in relationships that are not as close as those developed through face-to-face interaction (Cummings et al., in press; Kiesler & Kraut, 1999; Young, 1998), it was understandable that those who lived in university apartments or the community and preferred social activities on the Internet were the loneliest.

Subgroup findings

Among the subgroups, it was difficult to draw meaningful conclusions because the differences between the significant findings and nonsignificant findings were small. In addition, those who used the Internet for more than 40 hours per week often yielded differing findings compared to the other subgroups. For example, where other subgroups were less likely to be lonely, those who used the Internet for more than 40 hours per week were more likely to be lonely. For example, for those who used the Internet for more

than 40 hours per week and preferred the Internet over face-to-face interaction when discussing personal matters with family members or friends were less likely to be lonely compared to the rest of the subgroups in the sample who were more likely to be lonely. Also, as opposed to other subgroups analyzed, those who used the Internet more than 40 hours per week, the longer the user has used the Internet, the less lonely he or she is.

Discussion

The purpose of this study was to examine the relationship between loneliness and various aspects of Internet use in college students. It also attempted to clarify whether certain variables (type of Internet use, history of Internet use, reasons for using the Internet, preference for the Internet as a mode of communication, preference for type of Internet activity, and the changes in face-to-face interaction, talking on the phone, and overall communication with family, friends, and others [besides family and friends] since using the Internet) had an effect on the loneliness experienced by undergraduate students.

In this study, the most significant relationships between loneliness and the variables studied were negative, suggesting the higher the particular Internet variable analyzed, the less that loneliness was indicated. Therefore, the results of the study intimate that the Internet does not seem to adversely impact loneliness in undergraduate students. In other words, the data do not suggest that Internet use is a significant factor in the loneliness experienced by individuals in this sample. Instead, regarding loneliness, the Internet appears to be a relatively benign medium that undergraduate students are including as a normal part of their lives. In fact, in this study, the most frequent reason for using the Internet was for academic reasons. Therefore, concerns regarding loneliness and Internet use are not supported by this study.

While this study suggests the Internet is not a factor contributing to undergraduate loneliness, the small number of individuals using the Internet for more than 40 hours per week did report more loneliness than those who used the Internet less frequently. Therefore, the Internet may be an indicator of some underlying issues that could be studied contributing to undergraduate loneliness. For example, loneliness has been associated with lower levels of extroversion in several studies (Cutrona, 1982; Hojat, 1982; Levin & Stokes, 1986, Saklofske et al., 1986, Stokes, 1985). In a recent study, Kraut et al. (2002) concluded that extroverts who used the Internet were increasingly likely to have lower levels of loneliness and decreased negative affect and higher self-esteem and increased well-being. Results for introverts were opposite to those found in extroverts. The study also found that among those who initially had more social support, Internet use was related to more communication with family members. Perhaps these factors would have provided more understanding if considered in the present study.

Incorporating a question that explored the student's affect when using the Internet may have also been helpful in understanding those individuals who use the Internet for more than 40 hours per week. Would results be impacted if it were known that the subjects prior to Internet use were happy, sad, lonely, depressed, or anxious? Additionally, would students' affect change after using the Internet? If affect before and after use were found to diverge, it seems plausible that Internet use may be driving emotions in specific ways.

Another factor to consider regarding a procedural aspect of the study is the nature of the sample obtained. This study was comprised of 466 undergraduate students at a private Seventh-day Adventist institution. Homogeneity of beliefs may produce

uniformity in the responses. This would reduce the variability needed to separate subjects into distinct groups. This sample frequently used the Internet for academic reasons, had easy access to the Internet, and likely possessed time flexibility in their schedules. A sample lacking these characteristics may yield different results. Also, a more detailed breakdown of history of Internet use in subjects may provide additional information into the relationship between Internet use and loneliness (i.e., 3-4 years, more than 4 years to 5 years, more than 5 years to 6 years, etc.).

Recommendations

Based on the previously stated findings and conclusions of this study, the following recommendations for clinicians, parents, and school counselors are proposed.

1. This study emerged after I witnessed several "Internet junkies" lose almost complete contact with the "real world." Results found that the Internet does not seem to be influencing loneliness in undergraduates. Since undergraduates have easy access to the Internet and flexibility in schedules, they were considered to be at high risk for developing Internet-related problems. However, this study suggests that this technology is not related to loneliness in a manner previously considered by Kraut et al. (1998), who concluded that higher levels of Internet use were associated with increases in loneliness and depression. Additional research should focus in other areas.

2. The Internet does not seem to be a factor contributing to loneliness in undergraduate students using the Internet less than 40 hours per week. Therefore, clinicians evaluating client loneliness need not consider Internet use in initial assessments.

3. While most of the sample did not seem to be affected by the Internet, the

small number of individuals who used the Internet for more than 40 hours per week did report higher levels of loneliness. Perhaps some combination of preexisting problems is playing a role in the loneliness experienced by these individuals. Understanding underlying factors that cause or worsen the loneliness is important so treatment can be tailored accordingly. Determining activity profiles of each individual prior to heavy Internet use could provide clues as to the impact the Internet has had on their lives. For example, if these individuals were involved in social activities and meaningful friendships prior to heavy Internet use that diminished during use, it would seem logical to conclude that the Internet may have been a significant influence. However, if the users tended toward isolating activities and did not have meaningful relationships to begin with, it would seem the Internet did not initiate or worsen the problem.

Recommendations for Future Research

Based on the previously stated findings and conclusions of this study, the following recommendations for future research are proposed.

1. The results of this study indicate the Internet does not seem to be a concern in undergraduate students using the Internet less than 40 hours per week. In fact, individuals in the sample used the Internet mostly for academic reasons. To determine if the Internet is a factor in populations who do not have easy access to the Internet, flexible schedules, and the study requirements of undergraduate students, a similar study should be conducted on a non-student population. Furthermore, an individual's total amount of leisure time relative to the amount of time spent on the Internet may be a helpful factor in determining if Internet use contributes to loneliness.

2. A number of procedural aspects of the study may have suppressed results of the variables analyzed. The data for this study were collected during the spring semester, near spring break. If data had been collected during the fall, at the beginning of the school year, results may have been slightly different due to the subjects having more time to adjust to their environment. Also, the sample analyzed came from a private, Seventh-day Adventist institution. Homogeneity of beliefs may produce too much uniformity in the responses. This would reduce the variability needed to separate subjects into distinct groups.

3. While this study suggests that the Internet is a relatively benign tool for most individuals, future research should focus on longitudinal designs to gain an understanding of changes over time. Currently, there is no consensus in research establishing causal effect between Internet use and loneliness. Therefore, we are forced to turn to an over-determined constellation of tangled factors in hopes of unraveling some contributing variables.

4. While Internet use is continually expanding throughout the world, several countries still fall far behind the United States in Internet use and availability. For example, Internet access in Europe and Asia falls well behind the United States (Weil & Rosen, 1997). Also, only 5% of Swiss living in Switzerland access the Internet on a daily basis (Sears, Jacko, & Dubach, 2000). In Singapore only 11% of the Internet users are females (Teo & Lim, 2000). Research should be expanded to include different countries to study results across different national cultures.

Summary

In this study, Internet use does not contribute to loneliness among undergraduates

using the Internet less than 40 hours per week. For most, use of the Internet is both highly enjoyable and useful. Loneliness is more prevalent in the few who use the Internet more than 40 hours per week and in those who prefer the Internet over face-to-face interaction or talking on the phone. Results showed an inverse relationship between loneliness and the number of years a student had used the Internet. Newer users are at a slightly higher risk of experiencing loneliness than those with a longer history of Internet use. Previous research has questioned the importance of Internet use as a contributing factor in loneliness. In this study, the empirical findings regarding the overall relationships of loneliness and Internet use were weak.

APPENDIX

APPENDIX A

INTERNET USE SURVEY AND DEMOGRAPHIC INFORMATION

INTERNET USE SURVEY

Instructions: Please answer the following questions.

1) Have you used the Internet? (Internet use is defined as any time spent sending and receiving email, newsgroups[1], Bulletin Board Services [2], MUDs [3], instant messaging[4], chat rooms, "surfing" the net.)

_____YES _____NO (if no, go to #14)

2) Approximately how much time do you spend on the Internet **per week**?

_____hours

3) How long have you been using the Internet at least one time each week?

_____0-6 months _____1-2 years _____3 or more years

_____6-12 months _____2-3 years

4) For each of the following, please estimate in hours and minutes the amount of time you spend **per week** on these Internet activities (please give a number).

Email	_____hours	_____min.	World Wide Web	_____hours	_____min.
Newsgroups	_____hours	_____min.	Bulletin Board Services	_____hours	_____min.
MUDs	_____hours	_____min.	Instant Messaging	_____hours	_____min.
Chat rooms	_____hours	_____min.	Other (specify_____)	_____hours	_____min.

5) Please rate how much you enjoy the following Internet activities. *(Rate only those you have used.)*

	Severe Dislike	Dislike	Somewhat Dislike	Neutral	Somewhat Enjoyable	Enjoyable	Very Enjoyable
a) Email	1	2	3	4	5	6	7
b) World Wide Web	1	2	3	4	5	6	7
c) Newsgroups	1	2	3	4	5	6	7
d) Chat rooms	1	2	3	4	5	6	7
e) MUDs	1	2	3	4	5	6	7
f) Bulletin Board Services	1	2	3	4	5	6	7
g) Instant Messaging	1	2	3	4	5	6	7
h) Other (please specify)_____	1	2	3	4	5	6	7

[1]**Newsgroups** are discussion groups consisting of messages sent by other Internet users that are displayed publicly for everyone in the group (or under the particular topic) to read.

[2]**Bulletin Board Services** are electronic message centers where users can review messages by others and leave your own message if you want.

[3]**MUDs** are computer programs in which users can take on a computerized character/persona, walk around and chat with other characters, solve puzzles, create their own rooms, etc.

[4]**Instant messaging** allows users to exchange messages with another individual in a private chat room.

Instructions for questions 6-11: When communicating with a family member or friend who happens to be in your community, if you had a choice, please rate your preference for the phone, Internet, or face to face.

6) Would you choose the **phone or the Internet** when communicating to a **friend** about...

	Definitely the phone	Probably the phone	No preference	Probably the Internet	Definitely the Internet
a) Personal and important matters?	1	2	3	4	5
b) Important but not personal matters (i.e. business and academic related)?	1	2	3	4	5
c) Trivial matters?	1	2	3	4	5

7) Would you choose the **phone or face to face** when communicating to a **friend** about...

	Definitely the phone	Probably the phone	No preference	Probably face to face	Definitely face to face
a) Personal and important matters?	1	2	3	4	5
b) Important but not personal matters (i.e. business and academic related)?	1	2	3	4	5
c) Trivial matters?	1	2	3	4	5

8) Would you choose the **Internet or face to face** when communicating to a **friend** about...

	Definitely the Internet	Probably the Internet	No preference	Probably face to face	Definitely face to face
a) Personal and important matters?	1	2	3	4	5
b) Important but not personal matters (i.e. business and academic related)?	1	2	3	4	5
c) Trivial matters?	1	2	3	4	5

9) Would you choose the **phone or the Internet** when communicating to a **family member** about...

	Definitely the phone	Probably the phone	No preference	Probably the Internet	Definitely the Internet
a) Personal and important matters?	1	2	3	4	5
b) Important but not personal matters (i.e. business and academic related)?	1	2	3	4	5
c) Trivial matters?	1	2	3	4	5

10) Would you choose the **phone or face to face** when communicating to a **family member** about...

	Definitely the phone	Probably the phone	No preference	Probably face to face	Definitely face to face
a) Personal and important matters?	1	2	3	4	5
b) Important but not personal matters (i.e. business and academic related)?	1	2	3	4	5
c) Trivial matters?	1	2	3	4	5

11) Would you choose the **Internet or face to face** when communicating to a **family member** about...

	Definitely the Internet	Probably the Internet	No preference	Probably face to face	Definitely face to face
a) Personal and important matters?	1	2	3	4	5
b) Important but not personal matters (i.e. business and academic related)?	1	2	3	4	5
c) Trivial matters?	1	2	3	4	5

Instructions: For questions 12-13, please rate each statement by circling the appropriate number.

12) Has using the Internet changed the amount of time you spend…

	Significantly Decreased	Slightly Decreased	No Change	Slightly Increased	Significantly Increased
a) face to face with your family?	1	2	3	4	5
b) face to face with your friends?	1	2	3	4	5
c) face to face with others besides family and friends?	1	2	3	4	5
d) talking on the phone with your family?	1	2	3	4	5
e) talking on the phone with your friends?	1	2	3	4	5
f) talking on the phone with others besides family and friends?	1	2	3	4	5
g) communicating with your family?	1	2	3	4	5
h) communicating with your friends?	1	2	3	4	5
i) communicating with others besides family and friends?	1	2	3	4	5

13) I use the Internet…	Never	Rarely	Sometimes	Often	Very Frequently
a) For academic use	1	2	3	4	5
b) For business/work	1	2	3	4	5
c) To maintain relationships with family/friends	1	2	3	4	5
d) To meet new people	1	2	3	4	5
e) To talk to others who share my interests	1	2	3	4	5
f) To stay informed in areas of my interests (hobbies, culture)	1	2	3	4	5
g) For recreation/relaxation/playing games	1	2	3	4	5
h) To shop	1	2	3	4	5
i) To use instant messaging	1	2	3	4	5
j) To find travel information	1	2	3	4	5
k) To find medical/health information	1	2	3	4	5
l) To job search.	1	2	3	4	5
m) For banking	1	2	3	4	5
n) Other (please specify)_____	1	2	3	4	5

Age: _____

Gender: _____Male
_____Female

Grade: _____Freshman
_____Sophomore
_____Junior
_____Senior
_____Graduate Student

Ethnicity: _____African American/Black
_____American Indian/Alaskan Native
_____Asian/Pacific Islander
_____Hispanic/Latino(a)
_____White
_____Other (please specify)_____

Housing: _____Dorm
_____University Apartments
_____Community

Returning this survey in completed form means you have given your informed consent to participate in this study. **Thank you very much** for taking time out of your busy schedule.

APPENDIX B

UCLA LONELINESS SCALE (VERSION 3)

Instructions: The following statements describe how people sometimes feel. For each statement, please indicate how often you feel the way described by circling a number. Here is an example:

How often do you feel happy?

If you never feel happy, you would respond "never" and circle a "1." If you always feel happy, you would respond "always" and circle a "4."

		Never	Rarely	Sometimes	Always
1)	How often do you feel that you are "in tune" with the people around you?	1	2	3	4
2)	How often do you feel that you lack companionship?	1	2	3	4
3)	How often do you feel that there is no one you can turn to?	1	2	3	4
4)	How often do you feel alone?	1	2	3	4
5)	How often do you feel part of a group of friends?	1	2	3	4
6)	How often do you feel that you have a lot in common with the people around you?	1	2	3	4
7)	How often do you feel that you are no longer close to anyone?	1	2	3	4
8)	How often do you feel that your interests and ideas are not shared by those around you?	1	2	3	4
9)	How often do you feel outgoing and friendly?	1	2	3	4
10)	How often do you feel close to people?	1	2	3	4
11)	How often do you feel left out?	1	2	3	4
12)	How often do you feel that your relationships with others are not meaningful?	1	2	3	4
13)	How often do you feel that no one really knows you well?	1	2	3	4
14)	How often do you feel isolated from others?	1	2	3	4
15)	How often do you feel you can find companionship when you want it?	1	2	3	4
16)	How often do you feel that there are people who really understand you?	1	2	3	4
17)	How often do you feel shy?	1	2	3	4
18)	How often do you feel that people are around you but not with you?	1	2	3	4

	Never	Rarely	Sometimes	Always
19) How often do you feel that there are people you can talk to?	1	2	3	4
20) How often do you feel that there are people you can turn to?	1	2	3	4

APPENDIX C

CORRESPONDENCE
1-APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS
2-APPROVAL TO USE THE UCLA LONELINESS SCALE (VERSION 3)
3-INITIAL MAILING TO WOMEN'S RESIDENCE HALL
4-INIITAL MAILING TO UNIVERSITY APARTMENTS AND COMMUNITY
5-REMINDER TO RESIDENCE HALL STUDENTS

Andrews University

March 1, 2002

Katherine L. Dittmann

2600 Ravine Way
Stevensville
Michigan 49127

Dear Katherine

RE: APPLICATION FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS
HSRB Protocol #: 02-G-014 **Application Type:** Original **Dept:** Edu. & Counseling Psych.
Review Category: Exempt **Action Taken**: Approved
Protocol Title: A Study of the Relationship Between Loneliness and Internet Use Among University Students

On behalf of the Institutional Review Board (IRB) I want to advise you that your proposal has been reviewed and approved. You have been given clearance to proceed with your research plans.

All changes made to the study design and/or consent form, after initiation of the project, require prior approval from the HSRB before such changes can be implemented. Feel free to contact our office if you have any questions.

The duration of the present approval is for one year. If your research is going to take more than one year, you must apply for an extension of your approval in order to be authorized to continue with this project.

Some proposal and research design designs may be of such a nature that participation in the project may involve certain risks to human subjects. If your project is one of this nature and in the implementation of your project an incidence occurs which results in a research-related adverse reaction and/or physical injury, such an occurrence must be reported immediately in writing to the Human Subjects Review Board. Any project-related physical injury must also be reported immediately to the University physician, Dr. Loren Hamel, by calling (616) 473-2222.

We wish you success as you implement the research project as outlined in the approved protocol.

Sincerely,

Michael D Pearson
Graduate Assistant
Office of Scholarly Research

Subj: **Re: UCLA Loneliness Scale permission**
Date: 6/20/01 9:30:27 AM Eastern Daylight Time
From: drussell@iastate.edu (Daniel W. Russell)

Katherine:

You have my permission to use the scale in your research; my only request is that you send me a summary of your findings. I have attached a paper on the scale, in case you have not seen it.

Good luck with your research.

Dan

Internet Use Survey

DEAR FELLOW STUDENT:

Are you one of the 500 million people worldwide who use the Internet? Wouldn't it be neat to know how Internet usage can affect us?

There is much to be learned in this new area of research, and YOU can help!! All you have to do is kindly fill out the enclosed survey. It is a short survey, taking an average of 10-15 minutes to complete. I would like to assure you that all responses will remain **confidential.** *Your name does not go anywhere on the survey packet.* By returning the completed survey in the self-addressed envelope provided, it is implied you have given consent to participate in this research. Your prompt response will be greatly appreciated. **Please mail these forms by March 15, 2002.**

If you have any questions or would like results of the study, please feel free to contact me at (616) 422-1223 or my dissertation chair, Dr. Nancy Carbonell, at (616) 471-3472, Andrews University, Educational and Counseling Psychology Department. Included in your packet is a token of appreciation for taking time out of your busy schedule to help me. Thank you.

Sincerely,

Katherine Dittmann

Katherine Dittmann
Ph.D Candidate, Counseling Psychology
Andrews University

Nancy J. Carbonell

Dr. Nancy Carbonell
Dissertation Chair

Thank you for your participation ☺

Internet Use Survey

DEAR FELLOW STUDENT:

Are you one of the 500 million people worldwide who uses the Internet? Wouldn't it be neat to know how Internet usage can affect us?

There is much to be learned in this new area of research, and YOU can help!! All you have to do is kindly fill out the enclosed survey. It is a short survey, taking an average of 10-15 minutes to complete. I would like to assure you that all responses will remain **confidential.** *Your name does not go anywhere on the survey packet.* By returning the completed survey in the box provided in the mailroom, it is implied you have given consent to participate in this research. Your prompt response will be greatly appreciated. **Please return these forms by March 14, 2002.**

If you have any questions or would like results of the study, please feel free to contact me at (616) 422-1223 or my dissertation chair, Dr. Nancy Carbonell, at (616) 471-3472, Andrews University, Educational and Counseling Psychology Department. Included in your packet is a token of appreciation for taking time out of your busy schedule to help me. Thank you.

Sincerely,

Katherine Dittmann

Katherine Dittmann
Ph.D Candidate, Counseling Psychology
Andrews University

Nancy J. Carbonell

Dr. Nancy Carbonell
Dissertation Chair

Thank you for your participation ☺

Monday, March 11, 2002

Dear Fellow Student:

I NEED HELP!!! Last week, you received an Internet Use Survey in your mailbox. If you haven't returned it, could you **please, please** return it before you leave for Spring Break? If you don't have a copy of the survey, there are extras on the table behind your mailbox.

I know you are very busy. If you would kindly take 10-15 minutes out of your day, I would be very appreciative.

The completion of my project depends on
YOU!!

Thank you SO much!
Sincerely,

Katherine Dittmann

Katherine Dittmann
PhD Candidate, Counseling Psychology

P.S. If you have already filled out the survey, please disregard this note. **Thank you** for making my study possible!

APPENDIX D

DESCRIPTION OF SCALES

Descriptions of the Scales Developed to Analyze Hypotheses

Scale Name	Included Variable Names	Description
ALLFAMIL	PFFAMPER+PFFAMIMP+ PFFAMTRI+IFFAMPER+ IFFAMIMP+IFFAMTRI	This scale is the sum of personal, important, and trivial matters when communicating to a family member face to face, on the phone, or on the Internet.
ALLFAMFR	PFFAMPER+PFFAMIMP+ PFFAMTRI+IFFAMPER+ IFFAMIMP+IFFAMTRI+ PIFRDPER+PIFRDIMP+ PIFRDTRI+IFFRDPER+ IFFRDIMP+IFFRDTRI	This scale is the sum of personal, important, and trivial matters when communicating to a family member or a friend face to face, on the phone, or on the Internet.
ALLFRIEN	PIFRDPER+PIFRDIMP+ PIFRDTRI+IFFRDPER+ IFFRDIMP+IFFRDTRI	This scale is the sum of personal, important, and trivial matters when communicating to a friend face to face, on the phone, or on the Internet.
ALLPERSO	PIFRDPER+IFFRDPER+ PIFAMPER+IFFAMPER	This scale is the sum of personal matters when communicating to a family member or friend face to face, on the phone, or on the Internet.
COMMUNIC	COMMFAM+COMMFRD COMMOTHR	This scale is the sum of how the Internet has changed communication with family, friends, and others besides family and friends.
DEPEND	AMTCHAT+AMTMUD	This scale includes the sum of how much the user engages in chat rooms and Multi-User Dimensions. These are activities Young (1996) reports as prominent among Internet dependents.
DOKNOW	MAINTNFF+IM	This scale includes the sum of how often the user engages in instant messaging and maintaining relationships with family and friends, which are activities in which the user is likely to know the person he or she is communicating with.
ENJOSOCI	ENJOYEMA+ENJOYNEW+ ENJOYCHA+ENJOYMUD+ ENJOYBBS+ENJOYIM	This scale is the sum of how much the user enjoys each Internet activity in which it is possible to interact with another person "live" or "not live."

Scale Name	Included Variable Names	Description
FACE2FAC	FTOFFAM+FTOFFRD+ FTOFOTHR	This scale is the sum of how the Internet has changed face-to-face interaction with family, friends, and others (besides family and friends).
HISTORYX	HISTORY	This scale groups history of Internet use into four categories: those who have used less than 1 year, those who have used 1-2 years, those who have used 2-3 years, and those who have used 3+ years.
INTERACT	AMTNWSGR+AMTMUD+ AMTCHAT+AMTBBS+ AMTIM+AMTEMAIL	This scale groups all the activities in which it is possible to interact with another person including newsgroups, Multi-User Dimensions, chat rooms, Bulletin Board Services, instant messaging, and email.
LIVE	AMTIM+AMTCHAT+ AMTBBS+AMTNWSGR+ AMTMUD	This scale includes the sum of each activity that is "live" including instant messaging, chat rooms, Bulletin Board Services, newsgroups, and Multi-User Dimensions.
LIVE13	TALKINT+IM	This scale includes the frequency of use of each activity that is "live" including talking with others about interests and instant messaging.
LONEACT	AMTNWSGR+AMTMUD+ AMTBBS+AMTWWW+ AMTCHAT	This scale includes the sum of all time spent weekly on Internet activities in which the user is not likely to interact with a person or the user is not likely to know the other person directly if there is interaction including newsgroups, Multi-User Dimensions, Bulletin Board Services, World Wide Web, and chat rooms.
LONENET	BANKING+JOBSEEK+ MEDICAL+TRAVEL+SHOP+ INFOINT+ACADEMIC	This scale includes the sum of how often the user engages in activities that are not socially oriented including: banking, job searching, finding medical and health information, finding travel information, shopping, staying informed of areas of interests, and academic use.

Scale Name	Included Variable Names	Description
NETCHANG	FTOFFAM+FTOFFRD+ FTOFOTHR+PHONEFAM+ PHONEFRD+PHONEOTH+ COMMFAM+COMMFRD+ COMMOTHR	This scale includes the sum of how the Internet has changed face-to-face interaction, talking on the phone, and communicating with family, friends, and others (besides family and friends).
NETENJOY	ENJOYEMA+ENJOYWWW+ ENJOYNEW+ENJOYCHA+ ENJOYMUD+ENJOYBBS+ ENJOYIM	This scale is the sum of how much the user enjoys each Internet activity including email, World Wide Web, newsgroups, chat rooms, Multi-User Domains, Bulletin Board Services, and instant messaging.
NOKNOW	MEETNEW+TALKINT	This scale is the sum of how often the user engages in activities including meeting new people and talking with others in areas of interests in which he or she is not likely to know the person directly.
NOLIVE13	ACADEMIC+BUSINESS+ INFOINT+RELAX+SHOP+ TRAVEL+BANKING	This scale includes the sum of how often the user engages in activities that are not live or socially oriented including: academic use, business use, staying informed of in areas of interests, recreation, relaxation, and playing games, shopping, traveling, and banking.
NOLONEAC	AMTIM+AMTEMAIL	This scale includes the sum of instant messaging, and email, activities believed to be more socially oriented.
NOLONENE	MAINTNFF+MEETNEW+ TALKINT+IM	This scale includes the sum of how often the user engages in activities that are socially oriented including: maintaining relationships, meeting new people, talking with others who share similar interests, and instant messaging.
NONDEP	AMT EMAIL + AMTWWW	This scale includes the sum of how much the user engages in email and WWW. These are activities Young (1996) reports as prominent among Internet nondependents.

Scale Name	Included Variable Names	Description
NOTPOPUL	AMTBBS+AMTMUD	This scale is the sum of the two least popular Internet activities of the obtained sample: Bulletin Board Services and Multi-User Dimensions.
PEIMNFFF	IFFRDPER+IFFRDIMP+ IFFAMPER+IFFAMIMP	This scale is the sum of all personal and important matters when communicating to a friend or family member on the Internet or face to face.
PEIMPNFF	PIFRDPER+PIFRDIMP+ IFFAMPER+IFFAMIMP	This scale is the sum of all personal and important matters when communicating to a friend or family member on the phone or the Internet.
PERIMFAM	PIFAMPER+PIFAMIMP+ IFFAMPER+IFFAMIMP	This scale is the sum of all personal and important matters when communicating to a family member face to face, on the phone, or on the Internet.
PERIMFF	PIFAMPER+PIFAMIMP+ IFFAMPER+IFFAMIMP+ PIFRDPER+PIFRDIMP+ IFFRDPER+IFFRDIMP	This scale is the sum of all personal and important matters when communicating to a family member or friend face to face, on the phone, or on the Internet.
PERIMFRD	PIFRDPER+PIFRDIMP+ IFFRDPER+IFFRDIMP	This scale is the sum of all personal and important matters when communicating to a friend face to face, on the phone, or on the Internet.
PERPHNET	PIFRDPER+PIFAMPER	This scale is the sum of all personal matters when communicating to a friend or family member on the phone or on the Internet.
PERNETF2	IFFRDPER+IFFAMPER	This scale is the sum of all personal matters when communicating to a friend or family member on the Internet or face to face.
PHONE	PHONEFAM+PHONEFRD+ PHONEOTH	This scale is the sum of how the Internet has changed communication with family, friends, and others (besides family and friends).

Scale Name	Included Variable Names	Description
POPULAR	AMTWWW+AMTIM	This scale is the sum of the two most popular Internet activities of the obtained sample: World Wide Web and instant messaging.
SOCIALAC	AMTEMAIL+AMTIM+ AMTCHAT	This scale is the sum of activities including email, instant messaging, and chat rooms in which the user is communicating with a person either live or not live.
SOCIAL13	IM+MAINTNFF+TALKINT+ MEETNEW	This scale is the sum of how often the user engages in activities in which the user is communicating with a person either live or not live including instant messaging, maintaining relationships with family and/or friends, talking with others who share similar interests, and meeting new people.
TOTALAMT	AMTEMAIL+AMTNWSGR+ AMTMUD+AMTCHAT+ AMTWWW+AMTBBS+AMTIM	This scale includes the sum of all time spent weekly on the Internet including: email, newsgroups, Multi-User Dimensions, chat rooms, World Wide Web, Bulletin Board Services, and instant messaging.
TOTALNET	ACADEMIC+BUSINESS+ MAINTNFF+MEETNEW+ TALKINT+INFOINT+RELAX+ SHOP+IM+TRAVEL+MEDICAL+ JOBSEEK+BANKING	This scale includes the sum of how often the Internet is used for the following reasons: for academic use, for business and work, to maintain relationships, to meet new people, to talk with others with similar interests, to stay informed in areas of interests, for relaxation, recreation, and games, to shop, for instant messaging, to find travel information, to find medical and health information, for job searching, and for banking.

REFERENCE LIST

REFERENCE LIST

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