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Heavy Internet use: A proxy for social interaction.

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HEAVY INTERNET USE: A PROXY FOR SOCIAL INTERACTION?

by

Helen B. Ofosu, M.A.

A Dissertation
Submitted to the College of Graduate Studies and Research
through the Department of Psychology
in Partial Fulfilment of the Requirements for
the Degree of Doctor of Philosophy at the
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1999

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ABSTRACT

In this study Internet dependent and non-Internet dependent university students were compared in terms of their levels of perceived social support, self-esteem, shyness, loneliness, gender, and level of dissociation. Two hundred and eleven undergraduate students enrolled in a first year Communications Studies course offered at a university in Southwestern Ontario agreed to participate in a study about their Internet use and their leisure and social habits. Students responded to a survey consisting of the following measures: an Internet and Personal Computer (PC) Use Scale, an Internet Dependence Scale, an abbreviated Perceived Social Support Scale, the Texas Social Behaviour Inventory, the Revised Shyness Scale, an abbreviated Social and Emotional Loneliness Scale, a Dissociation Screen, and demographic items. On the basis of the Internet Dependence Scale, 20% of the participants were classified as Internet dependent and 80% were classified as non-Internet dependent. As hypothesized, Internet dependent students were more likely to be male than female, perceived less social support from their friends and family, but perceived more social support from their Internet friends than did non-Internet dependent students. Also as predicted, Internet dependents demonstrated more shyness, more social loneliness, and more dissociation than did non-Internet dependents. The implications of the findings of this preliminary study are discussed and future research directions are identified.
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Heavy Internet Use: A Proxy for Social Interaction?

INTRODUCTION

The popular media, the computer industry, scholars, and researchers note that there have been dramatic changes to the economic, educational, and social aspects of our lives as a result of computerization. It is possible, however, that beyond the convenience and speed that computers provide, the impact of these changes has been overstated. In the final analysis, we still do many of the same things (e.g., reading, writing, playing sports, interacting with friends, family, and colleagues) that we did prior to the introduction of the personal computer (PC) -- we simply do them with the aid of computers (Stoll, 1995). For some people, however, evidence suggests that their lives have indeed been dramatically altered by computers and, more recently, by the Internet.

Technically, the Internet is a global collection of networks and routers (special computers that attach two or more networks together) that functions as a single, large network (Comer, 1995). The Internet was designed to facilitate research among academic and military agencies (Young, 1998); it makes various communication, information transfer, and entertainment software applications available to individuals and organizations and connects government, commercial, and educational organizations around the world. The World Wide Web (WWW) is an Internet application that serves as a means of organizing information using embedded (also referred to as hyper-linked) references to images, other documents, and/or sound. People using the Internet can choose to access or connect (almost instantly) to images, documents, or audiovisual materials on a topic. The Internet also serves as a means of inexpensive and efficient communication, providing a forum for sharing news and ideas, and facilitating the development
and/or maintenance of personal relationships. For most of its users, the benefits of Internet use far outweigh any negative consequences. Unfortunately, however, preliminary research suggests that a minority of the people who use the Internet develop an extreme and debilitating attachment to the Internet, which has been characterized as an addiction or dependency (e.g., Dunn, 1998; Egger & Rauterberg, 1996; Young, 1996a; 1996b).

Internet Dependence

Definition and Measurement of Internet Dependence

Although there is much agreement regarding some of the features associated with Internet dependence, at this point there is no single definition of Internet dependence nor is there consensus on the validity of the construct. Given this lack of agreement, it is prudent to evaluate Internet dependence in the same way that other dependencies (both behavioural and substance-based) have been evaluated. If a case can be made for the validity of Internet dependence as a disorder, based on these criteria, then the confidence with which the Internet dependence construct is used will be enhanced. Suitable criteria against which Internet dependence can be evaluated as a psychological condition can be found in the American Psychiatric Association’s most recent edition of the Diagnostic and Statistical Manual (DSM-IV; American Psychiatric Association, 1994). The DSM-IV defines dependence as a cluster of symptoms occurring at any time during a 12 month period. Of the diagnoses listed in the DSM-IV, Walters (1996) notes that substance dependence “may come closest to capturing the essence of what has traditionally been labelled addiction” (p. 9). In order to make a diagnosis of substance dependence, a maladaptive pattern of substance use must be observed in which three or more of seven symptoms are observed during a 12 month period. These seven symptoms include: withdrawal,
tolerance, preoccupation with the substance (or in the context of behavioural dependence, the activity), heavier or more frequent ingestion (use) of the substance (activity) than intended, involvement in activities designed to procure the substance, reduction in important social, occupational, and recreational activities, and disregard for persistent physical or psychological problems caused by the use of the substance (American Psychiatric Association, 1994).

Walters (1996) conceptualizes addiction as "the persistent and repetitive enactment of a behavioral pattern the person recurrently fails to resist and that consequently leads to significant physical, psychological, social, legal, or other major life problems" (p. 10). Although Walters' criteria differ from the DSM-IV definition, most of the consequences (in fact, all except physical problems) apply to the construct of Internet dependence (e.g., Young, 1996b & 1998; Young & Rodgers, 1998). Not all researchers agree with Walters' (1996) conceptualization. In fact, some (e.g., Rachlin, 1990; Walker, 1989) believe that the terms addiction and dependence should be restricted to cases involving chemical substances. There is, however, a precedent for the use of the terms addiction and dependence for other problem behaviours including pathological gambling (Griffiths, 1990; Mobilia, 1993; Walters, 1996), sexual addictions (Goodman, 1993) and generic technological addictions (Griffiths, 1995).

There is another precedent for an alternative use of the dependence construct. Britain's Royal College of Psychiatrists (1987 as cited in Oppenheimer, 1991) defines drug misuse as "any taking of a drug which harms or threatens to harm the physical or mental health or social well being of an individual, or other individuals, or of society at large, or which is illegal" (Oppenheimer, 1991, p. 37). It is helpful to align Internet dependence with this definition by defining Internet misuse as the use of Internet applications which harm or threaten to harm the
physical or mental health or social well being of an individual, or other individuals, or of society at large. The harm caused by Internet use might be attributable to the neglect of responsibilities that ultimately leads to harmful outcomes (e.g., failure to monitor a child’s activity, missed deadlines at work or school due to distraction or preoccupation by the Internet).

The Royal [British] College of General Practitioners (1986 as cited in Oppenheimer, 1991) defines the problem drinker as “someone who experiences physical, psychological, social, family, occupational, financial, or legal problems attributable to drinking” (Oppenheimer, 1991, p. 37) and this definition also applies to people with problematic Internet habits. Despite the fact that Internet dependence is a new ‘syndrome’, marital/relationship discord (Quittner, 1997; Young, 1996b), family and occupational problems (Young, 1998), academic failure (Murphey, 1996; Young, 1998), and financial problems (Young, 1996b) have all been attributed to excessive Internet use. The Royal [British] College of General Practitioners’ definition simply provides additional support for the notion that Internet dependence, a behavioural rather than substance-based dependence, shares much in common with the recognized substance-based dependencies of alcoholism and drug abuse. Clearly, there is a difference between drug and alcohol misuse and Internet dependence, but some of the consequences of all three conditions are very similar. In summary, despite the fact that there are many ways to define addictions and dependence (e.g., APA, 1994; Griffiths, 1990, 1995; Oppenheimer, 1991; Walters, 1996; Young, 1996b, 1998; Young & Rodgers, 1998), all of these definitions apply to the excessive and maladaptive use of the Internet, and this type of definitional convergence provides support for the validity of Internet dependence as a construct.

Currently, the most comprehensive measure of Internet dependence is Young’s (1996b)
scale which is based directly on the DSM-IV criteria for the identification of pathological gambling (American Psychiatric Association, 1994). Young (1996b) provides a list of warning signs and symptoms of Internet dependence which is presented in the form of a Diagnostic Questionnaire (DQ). Respondents who endorse five or more items on this measure are classified as dependent Internet users. Those who respond affirmatively to four or fewer of the eight items are classified as normal Internet users, or for consistency, non-dependent Internet users.

Other researchers have measured Internet dependence in similar ways. For example, Egger and Rauterberg (1996) conducted an on-line examination of regular and pathological Internet behaviour and reported that common warning signs for Internet dependence include: (1) compulsively checking one's email; (2) always anticipating the next Internet session; and others complaining that the Internet user is (3) spending too much time on-line, and (4) spending too much money on-line (spending too much time and/or money on-line were operationalized as subjective and qualitative perceptions rather than as objective measures). Although the definitions of Internet dependence differ somewhat, they all include the two dimensions of behavioural changes that affect (1) the individual (e.g., preoccupation with the Internet and a change in one's personal priorities) and therefore impact on (2) other people and other areas of the individual's life (e.g., relationship/marital discord and difficulties at work and/or school).

Peele (1985) believes that before a behavioural dependence like Internet dependence can be recognized as a true disorder, evidence of withdrawal, tolerance, and craving by users is necessary. Given that Young's (1996b) eight item Diagnostic Questionnaire (DQ) has identified some Internet users as dependent, and that the defining features of Internet dependence include withdrawal, tolerance, and cravings, one can argue that there is some indirect evidence that these
three elements are being experienced by Internet dependents. Anecdotal evidence that is consistent with the construct of withdrawal is provided by a case study of a young man who “feels restless if he goes more than a day without signing onto the [World Wide Web] WWW” (Grumman, 1996, p. 1). Additional indirect evidence of withdrawal is provided by Young (1996b) who found that the majority of Internet dependents endorsed the item “Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?”

Young (1996b) provides clear evidence of Internet tolerance. Dependents in her study “gradually developed a daily Internet habit of up to ten times their initial use.” A case study of a middle aged, female Internet dependent provides a good example of tolerance. Initially, this woman was satisfied by using the Internet for a few hours per week. Ultimately, in order to feel comfortable, this woman needed to spend 50 to 60 hours per week on-line. The fact that Internet dependents spend an average of almost 40 hours per week on-line suggests that they find using the Internet intensely pleasurable, and one might reasonably infer that they ‘crave’ indulging in this pleasant pastime (Young, 1996b).

Researchers studying Internet dependence have compared the disorder with alcoholism and pathological gambling (Young, 1996b; 1997), both of which are recognized disorders in the DSM-IV. Although these conditions have important differences (e.g., alcoholism is an example of substance dependence whereas pathological gambling is classified as an impulse control disorder), they have been conceptualized as being analogous because they share similar symptoms and consequences. For example, Young (1996b) surveyed 396 Internet users: participants who met Young’s criteria for Internet dependence by endorsing five out of eight Diagnostic Questionnaire (DQ) items showed:
moderate to severe problems in their real lives due to their inability to moderate and control [their Internet] use. Their unsuccessful attempts to gain control may be paralleled to alcoholics who are unable to regulate or stop their excessive drinking despite relationship or occupational problems caused by drinking; or compared to compulsive gamblers who are unable to stop betting despite their excessive financial debts.

Although these comparisons highlight similarities in patterns of abuse and the negative outcomes associated with the disorders, there are significant differences in the perceptions of these disorders. Alcohol and drug consumption and pathological gambling are socially undesirable practices within certain circles due to conservative/orthodox religious and moral arguments (e.g., those present within Islam and certain Christian sects). As a result, pathological gamblers and those who are dependent upon alcohol or other drugs are sometimes stigmatized in ways that Internet dependents are not. Internet use is closely associated with computer use and consequently it is often viewed as a socially desirable activity; therefore, it does not carry the same negative connotation as other substance or behavioural addictions.

There is another condition with many of the same negative outcomes as gambling and substance dependence but without the negative morally and religiously based stigma – work addiction. Like Internet dependence, work addiction has been recognized as having harmful effects yet it carries relatively little social stigma. Additionally, work addiction, like Internet dependence, is not included in the DSM-IV, perhaps in part because excessive indulgence in Internet activities or compulsive work habits are quite acceptable within certain social circles. Work addiction has been defined as a progressive and potentially fatal disorder in which a person is addicted to the process of working (Robinson, 1989; 1996). Potential consequences associated

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1 This article was printed off the World Wide Web, page numbers differ according to printer settings and fonts chosen by the computer user.
with these excessive work habits are family disintegration and increased unmanageability of work habits and all other areas of life (Robinson, 1989). Work addiction is also known as Workaholism to reflect the fact that the disorder has been conceptualized as being analogous to alcoholism (Robinson & Post, 1994). The symptoms associated with work addiction are similar to those of alcoholism: denial, reality distortion, a need to control, and emotional and energy level highs and lows. The comparison between Internet dependence and work addiction is particularly appealing because being addicted to work and being addicted to the Internet are conceptually similar since both are socially acceptable or even desirable within many circles whereas substance abuse and pathological gambling are more stigmatized (at least within the majority of social circles). Moreover, the comparison is useful because both conditions are behaviourally based and critics would argue that neither is a real disorder since they are not found in the DSM-IV.

Characteristics and Consequences of Internet Dependence

Internet dependents surveyed by Young (1996b) were likely to spend 20 to 80 hours per week on the Internet, sometimes spending up to 15 hours in a single Internet session. The dependents in Young's (1996b) study reported staying up until 2:00, 3:00, or 4:00 in the morning despite the fact that some of them needed to be awake by 5:00 am for school or work. Excessive fatigue led to impairment in academic and/or occupational functioning. Although physical impairments associated with Internet use were relatively rare, other problems were reported. In addition to the evidence suggesting that heavy Internet use led to changes in individual behaviour (due in part to sleep deprivation), there is also evidence of consequences associated with these changes. For example, severe relationship and/or familial problems were reported in Young's
(1996b, 1998) studies. Forty-five percent of the participants reported moderate familial problems, a finding that was replicated by Young and Rodgers (1998). In their survey of 259 Internet users, Young and Rodgers found that dependents spent less time with their spouses, girlfriends/boyfriends, children, and/or friends in order to make more time for their Internet use. Like alcoholics who deny or minimize their consumption of alcohol, according to Young (1998), Internet dependents sometimes lie about the amount of time that they spend on-line and/or minimize the cost of their Internet-related fees. Over time, this dishonesty can create distrust and hurt the quality of once stable relationships.

In terms of academic impairment, 40% of Young's (1996b) dependent respondents experienced moderate problems and 58% reported severe academic problems. Although the Internet provides software applications that give it the potential to be an excellent research tool, Young (1998) suggests that rather than using the Internet to maximize their academic efficiency, some students get distracted by irrelevant web sites, engage in Chat Room gossip and other types of socializing, communicate with Internet pen pals, and play interactive games at the expense of engaging in productive academic activities. Brady (1997) reported that a University Provost conducted an investigation to find out why students with high Scholastic Aptitude Test (SAT) scores who were expected to excel in University had recently been dismissed from school on academic grounds. The Provost found that 43% of these normally high achieving students had failed out of school due to excessive late night Internet use.

Costs and Benefits of Computer Dependence

Internet dependence is somewhat different from personal computer (PC) dependence. Non-Internet PC use is overwhelmingly solitary (Shotton, 1991), whereas many Internet
applications (e.g., email, Multi User Domains [MUDs], Newsgroups, etc.) provide a greater probability for social interaction (Kraut et al., 1998). For example, although Dunn (1998) found that 71% of the participants spent their on-line time alone, in a practical sense, given the immense popularity of interactive Internet applications it is likely that these participants were using the Internet as a virtual meeting place for interpersonal interaction.

Shotton (1991) conducted a study designed to determine (1) how a seemingly innocuous interest in computers develops into dependency; (2) who is affected by this propensity toward computer dependence, and to determine (3) what, if any, consequences arise from such a dependence. Research participants were contacted through nationwide publicity seeking computer dependent participants. Family members of computer dependents were also asked to refer their computer dependent relatives to the study. One hundred of the 106 people who agreed to participate in the study and described themselves as computer dependent were male. In addition to the computer dependents, Shotton formed two control groups comprised of people who were not computer dependent: (1) a group of computer owners (Owners), and (2) a group of non-computer owners (Non-Owners). These control groups were established based on the assumption that computer ownership might distinguish between personalities, aptitudes, and interests that in turn might be related to computer dependence.

Although the computer dependents were less likely to be married than were members of the general population, dependents did not differ significantly from members of either of the control groups in their likelihood of being married. Shotton’s (1991) analysis showed that the proportions of divorces and separations reported by the computer dependents did not differ from that of the control groups or the general population. Shotton’s finding that computer dependence
is not associated with higher rates of relationship discord or with lower rates of marriage runs
counter to the prevailing stereotype of Internet dependents. In line with the stereotype, however,
is the fact that computer dependents also reported very little interest in social activities and
sports.

As expected, computer dependents spent more time using computers than the non-
dependent computer owners. Interestingly, in their work environments where two-thirds of the
dependents and two-thirds of the Owners used computers, the computer dependents managed to
spend almost twice the amount of time with computers as did the Owners. As has been found
more recently in the Internet dependence (in contrast to computer dependence) research,
computer dependents reported experiencing problems terminating their computer sessions and
losing track of time when using their computers.

Shotton (1991) found that computer dependence rarely developed among participants who
reported having full, well-established social lives, rather, the pre-existence of poorly established
social lives was associated with computer addiction. Computer addicts reported that social
interaction with others offered them very little satisfaction and that they had a more positive view
of computers than they had of people. Dependents had “stated that they were content with this
and showed little desire to mix or to develop their social skills” (p. 225). Contrary to the
prevailing stereotypes and negative connotation typically associated with dependency, Shotton
(1991) found no evidence that “computer dependency ... [has] deleterious consequences, by
changing gregarious individuals into recluses, perverting psychological development and
destroying marriages” (p. 227). For example, although dependents tended to have hobbies
outside of computing that required communication equipment (e.g., amateur and CB radios, and
electronics), the purpose of most of their communication was for the enhancement and exchange of knowledge rather than for socialization. Based on Shotton’s findings it seems that dependents actually benefited rather than suffered as a result of their intensive computer use. This finding is not particularly surprising given Shotton’s (1991) interviews indicating that dependents viewed computers more favourably than they viewed people. Attitude scales that were used to measure differences between computer dependents and Controls showed that dependents saw computers as significantly more fulfilling, comprehensible, controllable, and relaxing than did either of the two control groups. Knowledge of computers apparently increased computer dependents’ self-confidence and self-esteem. Moreover, some dependents increased the size of their social networks, experienced enhanced prestige because of their specialized knowledge of computers and were able to diminish the stress, boredom, and depression associated with their pre-computer lifestyles. Although the positive outcomes attributable to computer dependence have not been investigated or subsequently demonstrated among Internet dependents, some of the negative outcomes concomitant with computer dependence have been associated with Internet dependence. For example, some of the spouses of computer dependents have felt neglected and/or rejected by their addicted husbands and two of these wives even admitted that they have experienced extreme jealousy of the computer, an entity with which they simply could not compete.

In the literature on Internet dependence, much of the research has been conducted through surveys available on the WWW (e.g., Brenner, 1997; Dunn, 1998; Egger & Rauterberg, 1996; Young & Rodgers, 1998). As a result, there is likely a selection bias (i.e., an over-representation of students, working people, and higher SES people) that influences the types of results
generated. Moreover, the manner in which on-line participants are recruited to take part in research on Internet dependence makes it likely that demand characteristics influence the results that are obtained. Regardless of these limitations, these preliminary studies provide rich insights into people's experiences with the Internet and the phenomenon known as Internet dependence.

**Exploratory Investigations of Internet Use and Dependence**

Young (1996b) conducted an exploratory survey in which she contacted participants by telephone (45% of the participants) or electronically via computer (55% of the participants). In both situations the same questions were posed. Respondents answered the Diagnostic Questionnaire (DQ) and were also asked: (1) how long they had been using the Internet, (2) how many hours per week they estimated spending on-line, (3) what types of Internet applications they utilized the most, (4) what made these particular Internet applications attractive, (5) what problems, if any, their Internet use caused in their lives, and (6) to rate any noted problems in terms of mild, moderate, or severe impairment. Demographic information, including age, gender, highest level of education completed, and vocational background, was also requested from the participants. Respondents who answered affirmatively to five or more items on the DQ were classified as Internet dependents (n=396), and those who answered affirmatively to four or fewer items were classified as non-dependents (n=100).

Young's (1996b) sample of 396 dependents included 157 males (mean age 29) and 239 females (mean age 43). The fact that the majority of Internet dependents were older females is surprising given the assumption that computer use is associated with young men (Dunn, 1998; Shotton, 1991) rather than older women and the fact that generally speaking, addictions are more common among men than among women. The sex ratio was almost reversed for the sample of
non-dependents; 64 males (mean age 25) and 36 females (mean age 28). As expected, the dependents spent more time using the Internet ($M=38.5$ hours per week) than did the non-dependents ($M=4.9$ hours per week). Non-dependents and dependents apparently favoured different Internet applications. Non-dependents tended to use Internet applications that facilitated information gathering (e.g., the WWW and information protocols like file transfer protocol [ftp]) whereas dependents used applications that facilitated real-time two-way communication (e.g., Chat Rooms and MUDs).

Although Young's (1996b) study provides considerable information about the nature of Internet dependence there are limitations that deserve mention. For example, on-line participants were recruited through newspaper ads, flyers posted on college campuses, postings on electronic support groups who offer help to those suffering from Internet addiction, and those who searched using the keywords “Internet addiction” on popular Web search engines (e.g., Yahoo.com, or AltaVista.com) whereas the other participants were contacted by telephone. Due to the way in which the results were described, it is not clear which participants were drawn from the telephone versus the WWW samples, and whether these sub-groups differed in any respects. Moreover, the Internet sample is essentially a self-selected group of Internet users, who may differ in important ways from other Internet users who chose not to participate in the study. The Internet users who participated in this study may have experienced more dramatic negative consequences as a result of their Internet use than other non-participating Internet dependents and these adverse effects might have compelled them to respond to the advertising material. If this is the case, then the moderate and severe outcomes associated with Internet use may be an artifact of the methodology that exaggerates the effects of Internet dependence. Despite the fact that
Young was able to solicit responses from approximately 500 people, the sample size is still small (and possibly unrepresentative) relative to the estimated 47 million Internet users (Snider, 1997 as cited in Young, 1996b). Young (1996a) presents a profile of the Internet dependent as a young computer-savvy male, yet her later study (Young, 1996b) suggests that more Internet dependents were older women rather than younger men. It is possible that the original stereotype of the Internet addict as young, male, and computer savvy is still valid and that the volume of responses from women is simply a reflection of women’s greater tendency toward self-disclosure (Weissman & Payle, 1974; Young, 1996b) or an artifact attributable to recruitment procedures. As Young (1996b) suggests, future research efforts should attempt to select research participants more randomly in order to eliminate these methodological limitations.

Brenner (1997) developed an Internet Usage Survey to investigate Internet use, abuse, and the possibility of the development of a behavioural addiction. Brenner’s 32-item true-false survey was administered on-line through a WWW page and it assessed experiences that are similar to those associated with substance abuse as defined in the DSM-IV, ranging from failing to limit time spent on the Internet to computer-related social isolation. Questions included in the survey include “I have gotten into hot water with my employer / school for net-related activities” and “If it weren’t for my computer I wouldn’t have any fun at all” (p. 880).

In the first 90 days of data collection, Brenner’s (1997) web page questionnaire was viewed by 1885 people from over 25 countries. Thirty five percent (n = 654) of the people who found the web site took the survey (62 were invalid due to incomplete responses, and 29 were blank due to incompatibility between the Internet browsers) which left a total of 563 valid responses. Psychometric analysis of the survey demonstrated that the scale was reliable; α = .87,
and all 32 items were somewhat correlated to each other (item-total correlations ranged from .22 to .55 with an average correlation of .44).

Naturally, without information available about the people who found the survey but chose not to participate in the study it is difficult to know how these people differed, if at all, from those who did participate. Seventy percent of the valid surveys were completed by males; the average respondent was 34 years old, used the Internet for 19 hours per week, had 15 years of formal education, and had been using the Internet for two years. Brenner (1997) noted a statistically significant trend for older Internet users to suffer from fewer problems than younger users who spent equal amounts of time on-line ($\text{E}[1, 562] = 29.57, p<.0001$). Men and women did not differ in terms of the amount of time spent on-line or the number of problems experienced as a result of their Internet use.

The typical respondent acknowledged a number of signs of impairment in their general functioning that occurred as a result of their Internet use. Examples of impairment included difficulties in managing their time effectively, losing sleep because of their Internet use, and skipping meals in order to make time for additional Internet use. Some participants claimed that they had experienced work-related problems and had become socially isolated except for their Internet friends. Eighty percent of the participants reported experiencing at least five of the ten signs of impairment. Brenner (1997) interpreted these findings to mean that Internet usage patterns that some might consider excessive are, in fact, the norm (at least for the 563 participants in this study). As is the case with other empirical research conducted on Internet dependence (e.g., Dunn, 1998; Egger & Rauterberg, 1996; Young, 1996b), the sample on which these findings are based is potentially very biased because of self-selection. Moreover, given the
self-selected nature of the sample, it cannot be assumed that Internet dependence occurs more frequently among men than it occurs among women. It is possible that more men than women responded because the survey was on the WWW rather than accessible through another Internet application that might be (but has yet to be determined empirically) used more frequently by women, for example, Internet Relay Chat [IRC], an Internet application that allows people to have text-based conversations on-line, or Chat Rooms.

**Internet Dependence: Is There a Common Stereotype?**

The stereotype that has been advanced by researchers and the media (e.g., Grumman, 1996; Shotton, 1991) has included the notion that Internet addicts are typically young, introverted, computer-oriented males. Young (1996a), however, reported on the case of a 43-year old woman who did not match the stereotype of the prototypical Internet addict. The subject of the case study was a non-technologically oriented woman who claimed to be content with her home life and who had no previous addictions and no history of psychiatric problems. As a result of her Internet addiction, her family life deteriorated rapidly and dramatically. The only purpose for which this woman used her computer was an on-line Internet service that allowed her to scan various Chat Rooms. Initially, this woman spent a few hours per week visiting the Chat Rooms, but within three months her time spent on-line reached a peak of 50-60 hours per week. She claimed that when she became established within a particular Chat Room where she felt comfortable and experienced a sense of community she often stayed on-line for longer than she expected. On a typical day, she logged onto the Internet first thing in the morning, checked her email regularly throughout the day, and stayed up late at night -- sometimes until sunrise -- using the Internet.
After passing several months in this manner, she became depressed, anxious, and irritable whenever she was away from her PC. In order to avoid what she called ‘withdrawal from the Internet’ she participated in activities that enabled her to stay on-line for as long as possible. For example, in order to create sufficient time for her Internet use, she cancelled appointments, stopped associating with her ‘real world’ friends in favour of interacting with her virtual, on-line friends, reduced her involvement with her family (teenage daughters and her husband), and stopped fulfilling her household responsibilities. Ultimately, her habitual overuse of the Internet led to estrangement from her daughters and separation from her husband.

Between December 1997 and March 1998 Dunn (1998) conducted research on Internet dependence using a WWW page designed to collect participants’ responses. Dunn (1998) developed a questionnaire designed to elicit responses required to test the (somewhat anecdotally derived) stereotype of Internet dependents as being male, young, introverted, and depressed. Dunn received 445 usable responses from 219 men (49.2% of the sample) and 226 women (50.8% of the sample) whose average age was 28 years. The majority of the participants were relatively young; 27.9% were 19 years old or younger, and 36.4% were in their twenties. Given the relative youth of these participants it is not surprising that the majority of the respondents (60.7%) were single. Most of the participants reported living in the United States (68.1%), the United Kingdom (19.6%), or Canada (5.6%). In terms of occupational status, 37.8% of the participants were students, and 39.6% were employed full-time (the occupational status of the other 22.6% is unknown).

Dunn (1998) asked participants a series of questions related to their past and present Internet use (e.g., amount of time spent on-line, time spent on-line for leisure versus work
purposes, and Internet applications used), whether or not the respondent felt addicted to the Internet, a series of questions based on Young’s (1996b) Diagnostic Questionnaire, a depression inventory, a measure of Introversion/Extroversion, and demographics. The participants in Dunn’s (1998) study had been using the Internet for an average of 2.4 years but most participants (59.8%) stated that they had been using it for less than two years. Almost half of the participants (46.1%) declared themselves as addicted to the Internet. Most of the participants used the Internet six or seven days per week; 65.4% claimed to use the Internet daily while they were alone.

An even balance of male and female participants self-identified as being addicted to the Internet. Women, however, scored higher on the Internet addiction symptom scale than did men (average scores not reported). Based on Dunn’s (1998) findings, the stereotype that Internet dependence is associated with maleness was not supported. As a result of the differential rates of the identification of Internet addiction via self-identification versus the Internet addiction symptom scale, further research should verify the equivalence of these two measures of Internet addiction. Symptoms associated with Internet dependence decreased with age; thus, the stereotype of the Internet dependent being young was supported. The majority (68.3%) of participants were not classified as introverted or extroverted according to the Introversion/Extroversion measure. However, the group of introverts did have a significantly higher number of symptoms associated with Internet dependence than did the extroverts. There were no significant interactions between the Introversion/Extroversion classifications, self-identified Internet dependence status, participants’ gender, or age.

Participants’ scores on the depression scale were positively correlated with scores on the
Internet symptom scale and also associated with self-identification as Internet dependent.

Although Dunn’s (1998) study had an adequate sample size and generated a rich set of responses that describe various types of Internet use, demographic information, and insights into the relationship between Internet addiction, depression, introversion/extroversion, and age, there are still several unanswered questions. For example, although we know the psychometric properties of the depression and the introversion/extroversion scales, the psychometric properties of the Internet addiction symptom scale that was used to identify addicts are unknown. Moreover, we do not know whether self-identification is a reliable and valid way to identify Internet dependence. Future studies should be able to use Dunn’s scale and report such details as the scale’s internal consistency coefficient, test-retest reliability, item-total correlations, and correlations between the scale and other measures of Internet dependence to provide construct validity. Replication of this study with a more heterogeneous, randomly selected sample would also be beneficial and provide answers to some questions regarding the generalizability of these findings and address the issue of self-selection. Moreover, by obtaining a sample that is more representative of full-time students and full-time employees it should be possible to derive preliminary estimates of the prevalence of Internet dependence among these two groups.

There are relatively few empirical studies about Internet use or Internet dependence so to a certain extent we must rely on anecdotal and testimonial information provided by those suffering from Internet addiction. For example, an 18 year old man was quoted by Grumman (1996) as saying “I once went two days without being online. I didn’t like it ... talking to real people just wasn’t as exciting” (p. 2). The same young man connects to the WWW every day and:
spends hours telling people he has never met about his life and dreams. He tells them things that he wouldn’t dare tell his high school friends. It’s the combination of anonymity and intimacy that draws [him]...into the chat rooms...and, increasingly away from his friends and family. His grades have suffered...and he starts feeling restless if he goes more than a day without signing on to the World Wide Web (p.1).

Preliminary research corroborates Grumman’s (1996) anecdotal evidence which suggests that part of the allure of the WWW might be its anonymity (Young, 1997; Young & Rodgers, 1998). Other components of the WWW’s allure might be the feeling of security and comfort that people might experience while sitting in a private place (e.g., bedroom or home office) while interacting with people and/or on-line information.

Internet Dependence and Related Behaviours

Egger and Rauterberg (1996) posted a questionnaire designed to measure Internet dependence and related behaviours on the WWW. The authors were based in Switzerland and advertised the study locally in addition to advertising it through related WWW pages. Most of the 450 valid responses came from Switzerland (60.8%), the United States (21.7%), Denmark (6%), and Canada (2.9%). Their sample was 16% female and 84% male, participants’ average age was ‘around 30 years’, and 55% of the participants had at least one college degree.

Egger and Rauterberg (1996) did not report any psychometric properties associated with their measures nor did they provide a list of references from which additional questionnaire items might have originated, so the validity of their measures is uncertain. The authors reported that 10% of their research participants consider themselves to be addicted to or dependent upon the Internet. In this study, participants self-identified as being Internet dependent by responding to the following question: “Do you consider for yourself the usage of the Internet as an addiction or
dependency?"

Sixty two percent of Egger and Rauterberg’s (1996) participants indicated that the Internet did not have a positive influence on their family lives. Interestingly, however, 70% indicated that the Internet did not have a negative influence upon their social lives, and 61% indicated that the Internet did not have a negative influence upon their work/school lives. Thus, at least in terms of family life, social life, and work/school life, the Internet appears to have neutral effects, at least based on this predominantly Swiss and American sample (most of whom did not identify themselves as Internet dependent) who provided self-reports on the effects of their Internet use on aspects of their lives. When asked how their Internet use had changed over the last year, 17% indicated that their Internet use had remained constant and 73% indicated an increase in their Internet use over time (27% noted a slight increase, 28% reported a strong increase, and 19% reported a very strong increase but it is difficult to know what these increases mean in terms of hours of Internet use per day or per week).

Egger and Rauterberg’s (1996) respondents spent more than twice as much time using their computers for work ($M = 24.2$ hours) as for leisure ($M = 10.5$ hours). This finding is not surprising given that the majority of the respondents were employed in a computer related field (27%), were students (27%), or were professionals employed in scientific fields (29%). This finding of Internet use being associated with school and/or work makes sense given that only 10% of the participants self-identified as Internet addicts.

Parks and Floyd (1996) used the Internet to investigate the validity of two opposing beliefs about on-line relationships -- the perspective that on-line relationships are superficial, impersonal, sometimes hostile, and that one can only create a poor substitute for a real
community on the Internet, or that computer-based communication liberates interpersonal relations from the restrictions of geography and creates opportunities for new, but genuine, interpersonal relationships and communities.

Twenty four Internet Newsgroups were randomly selected from published lists of Newsgroups in each of four categories: computing-related issues (.comp), sciences (.sci), recreation (.rec), and an alternative (.alt) category for miscellaneous topics not covered by other categories. After selecting the Newsgroups, Parks and Floyd randomly selected 22 people from each of the lists of people who had recently posted (i.e., sent) a message to the Newsgroup. Surveys were sent to these potential research participants by email. The response rate was 33% (176 out of a possible 528) and the average respondent was 32 years old, male, single, and had been involved with Newsgroups for two years.

Most of the respondents (61%) reported that they had formed a personal relationship, defined as "any new acquaintances, friendships, or other personal relationships" (Parks & Floyd, 1996, p. 85), with someone they had met on the Internet Newsgroup. This is consistent with Hellerstein's (1985) finding that heavy users of a university email system established friendships with people whom they had "met" on-line. There was no difference in the proportion of respondents who had developed on-line relationships across the four types of Newsgroup (e.g., relationships were formed on .comp groups as frequently as they were formed on .alt groups); however, very few (8%) of the on-line relationships were romantic in nature. Women (72%) were more likely than men (55%) to have developed an on-line personal relationship but age and marital status were unrelated to the tendency to develop an Internet-based relationship. People who formed Internet relationships posted to the Newsgroup(s) more often and had been reading
the Newsgroup(s) for longer than those who did not form Internet relationships.

In their review of the relevant research, Parks and Floyd (1996) noted that although many meaningful relationships are marked by high levels of predictability and understanding and intimate ways of communicating, these features were not characteristic of the on-line relationships identified in this study. Participants' scores on measures of predictability and understanding, and intimate ways of communicating fell below the theoretical midpoints of the relevant scales. Commitment is also characteristic of highly developed personal relationships (Johnson, 1991; Levinger, 1991). Forty nine percent of the participants reported levels of commitment that were at or above the theoretical midpoint of a scale designed to measure commitment in relationships. Researchers predict that as relationships develop, the partners involved in the relationship introduce each other to their friends and families and establish a common circle of friends in a process called relationship convergence (e.g., Parks & Eggert, 1991). Participants in this study demonstrated on-line relationship convergence (i.e., partners were introduced to one another's on-line contacts) but this convergence did not generalize into "real-world" off-line relationship convergence. It is unknown how feasible off-line convergence would have been for these participants since the participants' geographic locations were not always known. As a result, it is impossible to know whether relationship convergence did not occur because of the nature of the relationships or if it was due to limitations attributable to geography.

Of the entire sample of Newsgroup members, approximately 40% did not have any on-line relationships, approximately 30% had at least one relatively underdeveloped one, and the remaining 30% had at least one highly developed on-line relationship. Parks and Floyd (1996)
conceptualized highly developed, in contrast to less developed relationships, as those that had:
(1) greater interdependence, (2) greater breadth and depth of interaction, (3) greater interpersonal predictability and understanding, (4) more personalized ways of communicating, (5) greater commitment, and (6) convergence of the partners' social networks. Kraut et al. (1998) found that 22% of respondents in a longitudinal study of Internet use made a new friend on-line but they did not comment on the depth of these relationships. Since some participants scored high on most of the seven dimensions related to highly developed relationships, Parks and Floyd concluded that, for a small subset of computer Newsgroup members, computer-based communication releases interpersonal relations from the limits of physical location and creates opportunities for new, authentic, and meaningful personal relationships. This perspective is far more positive and optimistic than the belief that on-line relationships are empty, impersonal, and sometimes antagonistic, but it must be qualified by the fact that it is based on 30% of a biased sample of computer Newsgroup members.

Participants were asked if and how they communicated with people whom they knew from Internet Newsgroups in non-computer-mediated ways. Thirty five percent of the respondents indicated that they had used the telephone to interact with their on-line friends, and 33% had communicated in person. Almost two-thirds of the respondents who had personal relationships with people whom they had met through Internet Newsgroups communicated through non-computerized methods. Thus, it appears that relationships that began in computer Newsgroups seldom remained exclusively on-line, at least for a subset of these Newsgroup members.

Although this information is informative in and of itself, it is impossible to know whether
these findings on Internet Newsgroups are generalizable to other computer-based environments such as Chat Rooms and interactive Internet games. Many Newsgroups are monitored by on-line editors (known as moderators) who decide what will and will not be posted, and typically these Newsgroups are geared toward a specific content area or hobby. It might be more difficult to move off-topic and into the personal realm within the context of this moderated environment than it would be in informal Chat Rooms or game environments (Kraut et al., 1998). As a result, there might be a higher incidence of on-line friendships that originated in Chat Rooms and game environments and subsequently moved off-line.

In contrast to Newsgroups in which the interactions between members are not instantaneous, there are many Chat Rooms in which the interactions occur in ‘real-time.’ In these Chat Rooms there is often a higher level of privacy, attributable to anonymity and the relative absence of moderators. Moreover, given the inherently more social environment, it is plausible that a greater number of personal relationships develop in Chat Rooms than in Newsgroups and that they are qualitatively different from relationships that develop in Newsgroups. Additionally, without any way of monitoring the precise composition of the Internet, it is impossible to know how many people participate in Newsgroups relative to the numbers who participate in Chat Rooms. As a result, we do not know which form of computer interaction is more prevalent or representative, Chat Room based, email, or Newsgroup. Thus, knowing about relationships that originated in Newsgroups might not tell us much about other computer-mediated relationships which may or may not be more prevalent and, therefore, more characteristic of computer-based social interaction. Moreover, previous conceptualizations of human social relationships have focussed, almost by necessity, on face-to-face interactions and
could not always account for situations in which visual and/or auditory senses could not be used. Future research on Internet-based social relationships might clarify how these relationships compare to relationships that originated in traditional contexts.

**Other Factors Contributing to Internet Dependence**

The majority of the research conducted on Internet use and dependence suggests that men are more likely than women to use email (McCormick & McCormick, 1992) and Newsgroups (Parks & Floyd, 1996) and subsequently participate in studies about their use of these Internet applications. Men are also more likely to experience computer addiction (Shotton, 1991) but there is conflicting evidence regarding Internet use and dependence (Egger & Rauterberg, 1996; Griffiths, 1997; Young, 1996b). Egger and Rauterberg (1996) and Brenner (1997) suggest that Internet use and dependence is more common among men whereas Young (1996b) suggests the opposite. In addition to their greater likelihood of experiencing computer and Internet dependence, males are more likely to experience alcoholism (Dawson, 1996) and drug dependence (Oppenheimer, 1991) than are women.

When the scope of possible factors contributing to Internet dependence is expanded to include the types of Internet activities that Internet dependents seem to get addicted to, then the story becomes more interesting. For instance, Young (1997) examined case studies of 396 dependent Internet users to develop a preliminary explanation for what makes Internet-mediated communication addictive for some people. When dependents were asked “What applications do you most utilize on the Internet?,” 35% indicated Chat Rooms, 28% Multi-User Domains (MUDs), 15% Newsgroups, 13% Email, 7% World Wide Web (WWW), and 2% stated that they used information protocols. Over 90% of the participants who became dependent on the Internet
"became addicted to the two-way communication functions: Chat Rooms, MUDs, Newsgroups, or email." Although all of these communication functions are two-way, there is an important distinction between these applications. When using the Chat Rooms and/or the MUDs, Internet users do not experience indefinite delays or time lags because, much like telephone calls, these applications occur in 'real time.' With Newsgroups and email, however, the communication is asynchronous. Rather than allowing 'real time' communication, asynchronous communication requires that a self-contained and complete message be delivered to a recipient who then has the option of viewing and perhaps responding to the message at their convenience (Comer, 1995). Consequently, asynchronous applications are inherently less interactive than synchronous applications. Before proceeding into a discussion of what makes these Internet applications addictive, relevant research on the use of these applications will be presented.

Turkle (1995) tried to understand the social lives and cultural meanings that people associate with their on-line social interactions within the context of Internet game environments. For several months Turkle held pizza parties in the Boston area for people who participated in MUDs to discuss their on-line experiences. MUDs are Multi-User Domains, or, to give reference to the history of these game environments, Multi-Domain Dungeons, that grew out of Dungeons and Dragons, a fantasy role playing game that was popular in the 1970s and 1980s. MUDs are an electronic analogue to Dungeons and Dragons in which players assume the roles of characters in the game. There are hundreds (or possibly thousands) of MUDs that differ in theme and characters. In MUDs, participants inhabit a virtual environment in which they can navigate, communicate, and build. Participants connect to a MUD through a command that connects their computer to the computer that operates the MUD through the Internet. While participating in a
MUD a participant plays the role of a self-developed character; thus, their participation is entirely anonymous (unless they choose to make their real life identity known).

In MUD environments two or more people can participate in a text-based conversation. Hundreds or potentially thousands of people can "congregate" in a virtual MUD where the text scrolls across the screen with questions, answers, comments, etc. Private messages can also be sent to a single Internet user. Many people participate in several MUDs simultaneously. Thus, they play several MUD characters and assume different identities simultaneously. Through the use of Windows® (i.e., a graphical / icon-filled computer interface in which several computer programs can run simultaneously, each application in its own 'window'), one can be a participant in several MUDs at the same time, although due to the limits of selective attention (e.g., Hawkins & Presson, 1986), relatively few characters might be actively engaged in an activity while the others are playing more passive roles. A different computer activity can occur in each window that is open on a computer screen so that users can have a MUD in one window, a term paper in another window, another MUD in another window, and so on. Turkle contends that in a sense, "your identity on the computer is the sum of your distributed presence" (Turkle, 1995, p.13). One man who played computer games regularly commented that to him, "real life is just one more window...and it's not usually my best one" (p. 13). Turkle argues that as a result of the ability to experience separate realities simultaneously, each reality represented by its own window, computer users have been able to experience several identities simultaneously. Alternatively stated, Turkle argues that for many computer users, "windows have become a powerful metaphor for thinking about the self as a multiple, distributed system" (p.14).

Turkle (1995) notes that traditionally we have played different roles in different
environments at different times. For example, a woman may “wake up as a lover, make breakfast as a mother, and drive to work as a lawyer” (p.14) and thereby play three different roles in three different environments and times. According to Turkle, when we participate in multiple MUDs simultaneously (using a windows-like environment) we can experience multiple identities in multiple environments simultaneously. When we play in many MUDs we are ourselves at the same time that we are playing several other MUD roles. To a certain extent, Turkle argues that this is qualitatively different from role playing in traditional theatre or ‘real life’ games because when acting or participating in real life games, physically we can only be in one place at a time, playing one role at a time. Critics of this line of thought might suggest that Turkle is overstating her case because due to the limits of selective attention, we can only actively play one MUD role at a time; others are “minimized windows” that we are not attending to. This allows several processes to occur at once while not requiring that we control them all simultaneously.

Although this is a provocative conceptualization of human identity, it is hard to believe that computer users’ identities change as a result of their ability to ‘multi-task’ and cycle through a series of windows. It is easy to argue that multi-tasking using several computer applications simultaneously is analogous to multi-tasking without a computer. For example, while reading a book one can also wash a load of laundry, bake something in the oven, and record a television program or movie using a VCR. In either context, I would rather argue that the person in control of the various applications, computer-based or not, is merely maximizing their use of time and resources.

Although many people derive great pleasure from playing on the MUDs, the depth of this activity is called into question when one considers the following comment. One male
interviewee shared his thoughts about a relationship that he developed with a MUD character. He had saved every word ever exchanged between his MUD character and this other character as a text file. After reading his transcript of the correspondence between the characters he found that his relationship seemed cold and simplistic. His memories of the on-line relationship were much richer than the text-based replica or transcript of his relationship. The same argument could also apply to a transcript of an intimate conversation that took place over the telephone or in person because words alone cannot always capture all of the nuances of meaning and emotion. Perhaps what is most important, however, is that the real experience is rich and meaningful; the transcript of an experience should, at least in some respects, be secondary. The question remains: are the ‘virtual’ lives that are experienced in text through the Internet only substitutes, in some cases poor substitutes, for ‘real life’ or ‘off-line’ experiences and memories?

Several of Turkle’s (1995) interviewees claim that participating in MUDs allows for anonymous social interaction in which one can play a character as similar to or as different from one’s real self as one chooses. Although this might be a liberating experience, especially initially, the fact that participants are not necessarily being ‘themselves’ might make it difficult to develop or maintain honest and meaningful relationships on the Internet. For many game participants, playing their character(s) and ‘living’ in the MUD(s) becomes an important part of their daily routine. Since much of the thrill of the game depends on having personal relationships and being part of a MUD community’s politics and activities, it is hard to participate “just a little” (p.184). Rather, in order to be a member of the MUD community participants visit the MUD site frequently. Turkle observed that:

MUDs blur the boundaries between self and game, self and role, self and
simulation. One player says, ‘You are what you pretend to be... you are what you play.’ But people don’t just become who they play, they play who they are or who they want to be or who they don’t want to be. Players sometimes talk about their real selves as a composite of their characters and sometimes talk about their screen personae as means for working on their real life lives (p. 192).

Given the popularity of email (Young, 1997), and its potentially important role in facilitating social interaction, it is worth reviewing what is known about Internet users’ use of this Internet application. McCormick and McCormick (1992) were also interested in personal relationships that exist on-line. Specifically, they were interested in determining the content of university students’ email to gain a clearer understanding of how computer-mediated communication differs from traditional communication (Kiesler, Siegel, & McGuire, 1984; Zimmerman, 1987). Email was collected from a university computer system at the beginning of every consecutive three-hour time interval by a computer program that printed all non-deleted email. Users of the computer system were informed by a warning displayed on their computer screens that “Electronic mail can be read by anyone” (McCormick & McCormick, 1992, p. 382) and that they should feel free to delete their email messages at any time. Despite the fact that these warnings had questionable salience, they constituted informed consent for participation in this study. In an effort to protect students’ privacy, “all identifying information from the header and body of each piece of email” (McCormick & McCormick, 1992, p. 382) was deleted prior to coding and analysis.

Printed email messages were coded by independent raters who had received training on the use of a 12 category coding system. The coding system yielded inter-rater reliability of between 83% and 90% and the statistical analyses were only conducted on messages on which
both raters agreed. The coding system is summarized by the following categories: (1) work related (e.g., computer centre operations, sending computer programs for academic assignments, work comments), (2) less intimate social categories (e.g., salutations, threats, and putdowns), (3) more intimate social categories (e.g., news and sharing, and love messages), (4) other coding categories (e.g., nonsense/gibberish that was impossible to interpret, and foreign language material).

McCormick and McCormick (1992) found that 41.1% of the email was work-related; 6.7% of the email was related to the management of the computer centre, school-work related comments constituted 26.4% of the email, and sending of computer programs represented 8.0% of the email sent. Less intimate social categories (e.g., salutations, humour and symbolic/cryptic messages, threats and putdowns, and crude flirtations) accounted for 24.1% of the email sent. An additional 27.6% of the email sent was categorized as more intimate social messages including “social plans, news and sharing, refined flirtation and relationship establishment, and work on relationships and love messages” (McCormick & McCormick, 1992, p. 388). Over half of the email (51.7%) was purely social in content; over 25% of the correspondence contained intimate material of which very little was hostile or socially inappropriate. Often, the email messages were meant to encourage the recipient personally and academically. In terms of message length, there was no difference between the length of work-related mail and personal/social mail (M=21.5 words). McCormick and McCormick’s (1992) content analysis of undergraduates’ (undeleted) email corroborates Hellerstein’s (1985) findings by suggesting that computer-based communication serves a positive social function. It is possible, however, that the email that undergraduates deleted contained socially inappropriate and/or hostile messages. It is also
possible that the deleted mail was more representative than the pro-social mail that was captured by the automated computer program and subsequently analysed.

McCormick and McCormick (1992) conducted a conventional, written, questionnaire-based investigation of students' email use at the same time as the observational study. The participants in the self-report study included 212 undergraduate students (152 male, 54 female, and 6 unspecified sex) from computer science courses. The questionnaire measured demographics (major and minor subject area, and sex), students' estimated cumulative grade point average, frequency of email use (sending and receiving), and the type of recipient who was most likely to exchange email with them. Students were also asked, in the form of an open-ended question, why they did or did not use email.

Relatively similar percentages of students who participated in the self-report and the observational study cited work comments and humour as their reasons for using email. Specifically, in the self report study 20.8% of the participants cited work comments and 15.0% cited humour and in the observational study 26.4% of the participants cited work comments and 13.2% cited humour. Likewise, similar percentages of students in the self-report and observational studies said that they generally use email to socialize. In both samples, very few people used email to communicate with close friends and/or romantic partners (2.5% in the observational study and 2.1% in the self-report study).

Chat Rooms and MUDs both allow several on-line participants to communicate simultaneously in real time. When Young (1997) asked Internet dependents what they perceived as the main attraction of using these real time, direct dialogue features, 86% of dependents stated anonymity and 63% indicated easy accessibility. This finding is consistent with Young’s (1996b)
finding that dependents use Internet applications that allow them to meet, interact with, and exchange ideas with new people using interactive mediums. Young (1997) conducted a content analysis of dependents’ responses and concluded that there were three major areas that reinforced their Internet-mediated communication: social support, sexual fulfilment, and creating a persona.

Young (1997) contends that social support can be developed within a group of people who communicate regularly -- in this context via computers and the Internet -- over an extended period of time. After establishing a routine that includes visiting a particular site on the Internet (i.e., a specific Chat Room, MUD, or Newsgroup) often, one gains a sense of familiarity with other group members and a community is formed. Young goes on to suggest that, as is the case within other communities and cultures, the on-line culture has its own values, standards, language, signs, and artifacts and that people who are part of the community adapt to the community's norms.

For example, Young (1997) observed that computer mediated communication appears to give people the opportunity to disregard typical conventions about privacy (e.g., by posting private email messages to public electronic bulletin boards). Moreover, Kiesler et al. (1984) suggest that the removal of time and space distinctions between work and leisure, office and home, reinforces the norms associated with this computerized subculture beyond these loosely defined boundaries. Kiesler et al. also contend that the ability to communicate via computer with other people under an assumed identity provides computer communicators with a cover of anonymity that helps them to overcome certain interpersonal difficulties (e.g., severe shyness and/or low self-esteem) that they might experience in real life. The absence of nonverbal
behaviour including facial expression, voice intonation and inflection, and eye contact makes computerized communication less threatening than meeting and communicating with others in person. In addition to being able to control how much is revealed about their true identity, Internet users can spend time planning, contemplating, and editing their electronic comments prior to sending them more readily than they would be able to during most face-to-face or even telephone interactions (Young & Rodgers, 1998).

Young (1997) suggests that as they establish themselves as part of an on-line group, Internet dependents may come to rely upon the other group members for companionship, advice, understanding, and in some cases, even romance. Despite the fact that these interactions are text-based, Young concluded that the “exchange of words empowers a deep psychological meaning as intimate bonds are quickly formed among on-line users.” This intimacy is encouraged by the sense of community, familiarity, and the sharing of personally meaningful information. The participants in Young’s study explained that the social conventions of rules and politeness are much more relaxed on-line than they are in real life. This more informal environment makes it possible for someone to ask another person personal questions about their marital status, age, appearance, or weight during an initial visit. This exchange of words and private information facilitates the development of intimate bonds among on-line users. The immediacy of this type of interpersonal interaction combined with the highly personal nature of the communication can lead Internet users to feel close. Young’s Internet dependent respondents claimed that as they became more involved in the virtual group they were able to take more emotional risks by

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2 Printed off the World Wide Web, therefore, page numbers depend on size and type of font chosen and the printer used.
sharing controversial opinions on issues related to abortion, religion, and other value laden topics. These dependents felt unable to express these opinions to their closest friends or even spouses in the real world. Internet dependents reported feeling freer to express themselves without fear of confrontation, rejection, or judgment because the presence of others was not very salient (i.e., others were only present in a virtual, rather than a physical sense), and perhaps more importantly, the dependents’ true identities were masked.

The fact that dependents listed social support as a major benefit of using the Internet makes one wonder: "Does the Internet fulfill a need for social support in people whose interpersonal lives are impoverished?" If the Internet is fulfilling this need, then one would expect that people whose lifestyles restrict their opportunities for meaningful social interaction and support (e.g., lonely students, homemakers, retired people) or those with limited social skills should be more likely to use the Internet as an alternative to developing meaningful relationships in real life.

Sexual fulfilment was another benefit of Internet use cited by Internet dependents. Young (1997) notes that "erotic fantasies can be played out such that people can engage in novel sex acts commonly known as Cybersex ... Chat [Room] areas with titles, such as 'MarriedM4Affair' or 'Swingers' are designed to encourage on-line users to engage explicitly in erotic chat." With hundreds (or more likely, thousands) of sexually explicit Chat Rooms available, computer-mediated communication for Internet sex provides a means of satisfying sexual impulses without the risk of rejection, contracting a sexually transmitted disease, or pregnancy. Dependents also noted that unlike 1-900 telephone numbers that can be called for telephone-based sex and subsequently traced, the use of the Internet for Cybersex cannot be traced if the Internet user
chooses to hide their identity. Another reason provided for engaging in Cybersex was the fact that for dependents who felt unattractive or experienced relatively few opportunities for dating, it was perceived to be easier than meeting potential sexual partners in real life.

The third major area of positive reinforcement of Internet use cited by Young’s (1997) dependents was creating a persona. Internet users have the ability to ignore the constraints associated with their real life characteristics (e.g., gender, age, occupation, and physical appearance) and experiment on-line with alternative perceptions of themselves. Young’s (1997) respondents corroborate Turkle’s (1995) notion of identity reconstruction in the sense that Internet users act out new roles by creating fictitious handles or identities which alter the Internet users’ physical characteristics (e.g., gender, age, and/or race) and cultivate a distorted image of themselves. The development of an on-line persona allows one to recreate him/herself mentally into a new person on-line. For starters, the on-line persona is a purely text-based existence that is qualitatively different from the real world. In the real world, characteristics such as socioeconomic status (SES), age, gender, and race and/or ethnicity are salient and contribute to the development of our identity and influence our interpersonal interactions. In Cyberspace, these characteristics are irrelevant because “all virtual inhabitants are created equal” (Young, 1998) and also because these characteristics need not be revealed on-line. This level of equality works to the advantage of people who have lower status in the real world, and it can be helpful in fostering confidence when interacting socially via computer. Young (1997) conjectures, however, that this social confidence on-line might not generalize into confidence in the real world because:

once real world inequalities enter into the picture - it becomes difficult to transfer
this virtually acquired [social equality/egalitarian] behaviour without reinforcement. Therefore, such text-based identities appear to be firmly planted inside the computer screen, leaving these obtained attributes lost in Cyberspace (p. 5).

Young (1997) argues that beyond providing entertainment, recreating oneself on the Internet is also a way to satisfy an unmet psychological need. The absence of a social identity on the Internet allows one to construct an ‘ideal self’ to replace a poor self-concept. Young continues by claiming that “those who suffer from low self-esteem, feelings of inadequacy or frequent disapproval from others are at the highest risk for developing a secret on-line identity” (p. 6) Negative self-concepts can lead to emotional problems including depression (Young & Rodgers, 1998) and anxiety which Young (1997) argues may also be intertwined with heavy or excessive Internet use and manipulated self-presentations.

The Disease Model and General Theory of Addictions.

Although the predominant model of health and sickness for over 100 years has been the biomedical model or disease model (e.g., Brannon & Feist, 1997), it does not adequately account for the behavioural addictions (Blaszczynski & McConaghy, 1989), particularly Internet dependence, in which the consequences are similar to the consequences associated with substance dependence but do not involve the invasion of pathogens into the body. Another limitation associated with the biomedical model is the fact that this model has difficulty developing a solution for people who are addicted to something that they cannot live without. For example, people who suffer from problems associated with substance dependence or pathological gambling could conceivably give up these habits and continue to have successful careers or programs of study. This analogy does not necessarily apply within the context of
Internet dependence. A high proportion of people who are Internet dependent need to use computers and the Internet during the course of their employment or education.

The biopsychosocial model of illness provides a broader and alternative framework within which the behavioural addictions, particularly Internet dependence, can be discussed (Sheridan & Radmacher, 1992). As the name suggests, the biopsychosocial model of illness includes biological, psychological, and social factors in the development of disease. Despite some disagreement on what constitutes an addiction (e.g., Oppenheimer, 1991; Walker, 1989; Walters, 1996; Rachlin, 1990) or dependence, one thing is generally agreed upon: the resultant behaviour is maladaptive. Jacobs (1986, 1993) proposed a General Theory of Addictions which can be classified as a biopsychosocial model because it contains elements that are biological and psycho-social in nature. The General Theory of Addictions suggests that two interdependent predisposing factors must exist in order for an individual to be at-risk for developing and maintaining an addictive behaviour. The first factor is a unipolar physiological resting state that is chronically and excessively either suppressed or excited. The experience of having either an excessively excited or an excessively depressed physiological resting state is thought to be aversive. Consequently, individuals suffering from either of these two extreme physiological states are motivated to engage in activities or consume substances that will make them feel more comfortable by 'normalizing' their physiological resting state. For example, it is believed that a person with a chronically depressed physiological resting state will experience relief by participating in an exciting, and therefore stimulating, activity such as gambling or perhaps an action filled Internet-based game. A person with a chronically excited physiological resting state might experience relief by participating in a relaxing activity (e.g., browsing the World Wide
Web) or consuming a substance that works as a depressant (e.g., alcohol). In these two examples, activities and/or substances essentially regulate and 'normalize' aberrant physiological resting states. This persistent state of hypo- or hyper-arousal is thought to predispose the individual to respond differentially to stress reducing and potentially addictive activities and/or behaviours (e.g., Jacobs, 1986).

The second predisposing factor that is required in order for a person to be at risk for developing and maintaining an addiction is a childhood or adolescence marked by feelings of inadequacy, inferiority, shame, guilt, and low self-esteem, combined with feeling rejected by one's parents or significant others. Support for this part of the theory of addiction is provided by Martinez-Pina et al. (1991) who found that adult pathological gamblers reported feelings of inferiority and rejection in their childhood and also reported experiencing dissociative states while gambling. Jacobs (1986) classifies addictive behaviours as a form of self-treatment that allows the individual to escape from, and at least temporarily, correct a chronic stress condition. The physical and psychological relief from stress that is gained through engaging in the addictive behaviour or using the desired substance is believed to maintain the addiction.

Jacobs (1986) postulates that an addictive preoccupation, such as gambling or Internet use, allows the individual to escape from painful realities and act out fantasies of being wanted, successful, admired, and recognized. These dissociative states are thought to be common to all forms of addiction and allow the individual to escape into denial from psychological distress. This 'altered state of identity' which is believed to be the goal of addictive behaviour is positively reinforcing, and therefore is instrumental in maintaining the addiction.

Jacobs operationalizes dissociative reactions in four ways: (1) feeling as if in a trance, (2)
feeling like a different person, (3) being outside oneself, and (4) blacking out (i.e., having no memory of all or part of the event). As the number and intensity of these four attributes increases, the likelihood that an individual will move into a dissociative state increases. People who have been classified as addicted to gambling, alcohol, and/or overeating demonstrate more dissociation than those who were not classified as addicted (e.g., Gupta, 1997; Martinez-Pina et al., 1991).

Jacobs (1986) claims that a conducive environment must accompany the two predisposing factors in order for an addictive pattern of behaviour to develop. The individual with the two predisposing factors must have a chance encounter with an activity (e.g., participating in gambling, consuming drugs, or experiencing something compelling on the Internet) that helps to regulate their abnormal physiological resting state while also ameliorating their psychological stress. The ‘triggering event’ that the person experiences by chance must impress the person with sufficient intensity and novelty in order for him/her to seek a similar activity in the future (e.g., the experience must be a sufficiently strong positive reinforcer).

The extent to which a specific addictive behaviour will develop over some other behaviour depends on the extent to which it possesses the following three attributes: (1) it blurs reality testing; (2) it lowers self-criticism and self-consciousness; and (3) it permits complimentary daydreams about oneself. Characteristics associated with the Internet make its addictive use quite plausible. The fact that it can be difficult if not impossible to evaluate an objective reality on-line means that one’s ability to test reality is impaired. The relative absence of social cues makes it difficult for Internet users to make accurate comparisons between themselves and others, therefore, the Internet environment decreases the number of opportunities
for self-criticism and self-consciousness. The ability to participate in role playing activities in Multi User Domains (MUDs) and possibly Chat Rooms permits complimentary daydreams about oneself. The fact that the Internet environment possesses all three of these attributes provides a convincing argument that the Internet has characteristics that makes it inherently addictive to people who have the predisposing factors and are therefore at risk for developing an addiction.

Possible Correlates of Internet Dependence

In keeping with the notion that the biopsychosocial model is more relevant to Internet dependence than is the biomedical model, it is important to consider which individual and social factors are implicated in Internet dependence. Jacobs’ General Theory of Addictions (1986; 1993) provides two clear predictions: (1) poor self-esteem stemming from a childhood or adolescence marked by negative emotions (e.g., rejection or feelings of inferiority) is a predisposing factor for the development of an addiction or dependence, and (2) individuals who are addicted to one or more substances and/or behaviours will demonstrate more dissociation while engaging in their favoured behaviour or using their substance(s) of choice than will non-addicted people. The fact that the most popular Internet applications (e.g., Chat Rooms, MUDs, email, and Newsgroups), particularly among Internet dependents, facilitate interpersonal communication suggests that if one is interested in understanding why the Internet is addictive one should also examine factors that are relevant to interpersonal interaction. In a similar line of research, Shotton (1991) noted that computer addicts reported very little interest in social activities and that computer addiction rarely developed among those with full, well-established social lives. McCormick and McCormick’s (1992) study of students’ use of email also points to the highly social nature of Internet use as does Parks and Floyd’s (1996) study of Newsgroup
A careful examination of the social psychological research on interpersonal interaction has also identified several individual difference variables that are important to the quality and quantity of one's interpersonal relationships and communication. Social support is a contextual inter-individual variable that has received attention within the context of human interpersonal interaction; therefore, in theory, social support should be relevant in the context of Internet-based communication, and by extension, Internet dependence. The intra-individual variables of self-esteem, shyness, and loneliness have been studied at great length within the context of traditional forms of communication and should therefore, at least theoretically, be relevant contributors to the quality and quantity of communication and social interaction on the Internet. Consequently, these variables might be implicated in the development of Internet dependence.

Social Support

Common sense suggests that in many important respects, having a well-developed social life is essential for having adequate social support since social support refers to the resources provided by one's interpersonal relationships (Cohen & Hoberman, 1983). Although social support has been conceptualized in different ways, in the present context social embeddedness and perceived social support are the two most relevant conceptualizations. Social embeddedness refers to the connections or relationships that people have to significant others within their social environment (Barrera, 1986). Typically, social embeddedness is operationalized in terms of broad social indicators such as participation in community organizations or dating/marital status. These social indicators serve as somewhat indirect measures of social support but the underlying assumption is that these available social relationships could serve as social support resources in
times of need (Barrera, 1986).

A number of researchers suggest that perceived social support is more important than more objective measures (i.e., number of people in one’s social network) of social support (Cohen & Hoberman, 1983; Cohen, Merlstein, Kamarck, & Hoberman, 1985; Procidano & Heller, 1983) and perceived social support appears to be the most frequently used social support construct in the literature. Perceived social support includes both, the availability and the adequacy of one's supportive ties to others (Barrera, 1986; Cohen & Hoberman, 1983; Cohen et al., 1985; Procidano & Heller, 1983). This conceptualization of social support is different from measures of social embeddedness in the sense that perceived social support is not based on the actual number of supporters or the precise amount of social contact. Rather, perceived social support refers to a person's confidence that sufficient support would be accessible and forthcoming if it were needed. Perceived social support is negatively related to psychological distress and positively related to well-being (Barrera, 1986; Sarason, Shearin, Pierce, & Sarason, 1987). When two measures of perceived social support (Cohen et al., 1985; Procidano & Heller, 1983) were compared, both scales were negatively related to psychological symptoms including anxiety and depression.

In his review of the literature on social support and its relationship to personality variables, Jones (1985) noted that people differ in the skill and confidence required to effectively interact with and therefore gain social support from, others. Given the importance of perceived social support to psychological well-being, it is possible that people who would like the benefits associated with increased social support might gravitate to the Internet community where they might experience the social support that they do not receive from the traditional sources of
family, friends, and other associates off-line.

**Self-Esteem**

Rosenberg (1965) has described self-esteem, an important part of one’s self-concept, as an attitude toward the self with both cognitive and affective components. The cognitive component includes the person’s beliefs about his or her own self-worth; high self-esteem is associated with positive affect and low self-esteem is associated with negative affect. Two types of self-esteem have been identified: trait and state (Baumeister, 1993). Trait self esteem refers to the individual’s characteristic or typical level of self-esteem, and as such, it is a stable characteristic; state self-esteem refers to a person’s feelings toward themselves in a particular situation at a particular time, and it is a transitory characteristic. Baumeister (1993) reviewed studies of self-esteem that demonstrate that people who score low versus high on scales designed to measure trait self-esteem differ in several ways. High self-esteem is associated with positive outcomes, but people with low self-esteem tend to be more anxious, depressed, jealous, and lonely than those with high self-esteem and these characteristics are likely to impede pleasant social interactions with others.

Leary and Downs (1995) believe that much of human behaviour can be explained as attempts to develop social ties and minimize the likelihood of falling into disfavour with people whom we consider important. Baumeister and Leary (1995) reviewed the empirical findings on the formation of social bonds, cognitive and emotional factors, and the consequences associated with the feeling that one does not belong (i.e., deprivation of belongingness) and concluded that people are fundamentally and pervasively motivated by a need to belong and therefore have a strong desire to develop and maintain long lasting personal attachments. Baumeister and Leary
(1995) present a strong case for the argument that "people seek frequent, affectively positive interactions within the context of long-term, caring relationships" (p. 522). Moreover, Leary and Downs (1995) argue that many behaviours that have been attributed to the need to maintain high self-esteem may be explained in terms of the motive to avoid social exclusion.

Spivey (1990, cited in Leary and Downs, 1995) asked participants how they would feel about themselves in various hypothetical social situations and asked them to provide ratings of their feelings. All participants indicated that they would feel worse following an episode of social exclusion than they would feel after experiencing social inclusion. On the basis of these findings Spivey concluded that there was a strong, positive relationship between social inclusion and high self-esteem and a strong positive relationship between social exclusion and low self-esteem.

As if the problems associated with low self-esteem are not bad enough, Nurmi, Toivonen, Salmela-Aro, and Eronen (1997) recently found that people with low self-esteem are less successful at initiating meaningful relationships than are those with high self-esteem and this tendency is subsequently reflected in their experience of loneliness. Undergraduate university students who were pessimistic about the probability of engaging in successful social interactions and who therefore avoided these interactions (i.e., used a pessimistic avoidance strategy in social situations) experienced more loneliness than students who were not pessimistic, and this finding was maintained even after controlling for students' level of self-esteem. Participants who habitually used this strategy usually expected failure in social situations. Their subsequent reliance on dysfunctional patterns of behaviour, such as social withdrawal or pessimistic avoidance is almost guaranteed to further limit their opportunities for developing a sufficient
number of meaningful relationships and results in increasing loneliness. Nurmi et al.'s (1997) findings highlight the potential importance of pessimism as a factor in one's interpersonal interactions but do not rule out the relevance of self-esteem within the context of interpersonal interaction (e.g., Leary & Downs, 1995; Spivey, 1990 as cited in Leary & Downs, 1995).

It is possible that people with low self-esteem, particularly those who also experience anxiety, depression, jealousy, and loneliness (Baumeister, 1993) in their traditional face-to-face and/or telephone interactions could improve the quality of their social interactions by interacting with others over the Internet. While socializing with people on-line, it may be easier for people with low self-esteem to assume or impersonate the skills and personal characteristics that they lack in their real lives. Perhaps these people can re-invent themselves as “better versions” of themselves during the course of their Internet interactions so that the negative emotions that they experience in real life interactions are minimized or absent in their on-line interactions. This strategy may make their on-line social contact more pleasant and frequent than their off-line interactions and might even diminish their experience of loneliness.

There is evidence that some people with low self-esteem do not have what it takes to develop well-developed social lives or social support networks (e.g., Baumeister, 1993; Nurmi et al., 1997). Consequently, it is possible that some of these people with low self-esteem who probably also lack adequate social networks and who have Internet access will gravitate to the Internet where characteristics that they might feel insecure about are concealed. It is, therefore, easy to predict that some people gravitate toward Internet-based social interactions because while they are on-line they can experience social inclusion and thereby increase their self-esteem. It is also possible that these people might be able to avoid some of the negative emotions (e.g.,
anxiety, depression, and jealousy) that they experience while interacting on-line.

**Shyness**

Shyness can be defined as "discomfort and inhibition in the presence of others" (Jones, Briggs, & Smith, 1986, p. 629). Shyness concerns the inhibition and discomfort that result from the interpersonal nature of the social situation rather than from other sources of threat and/or discomfort that may occur in the presence of others (e.g., threats of harm). Shyness is usually conceptualized as an enduring personal characteristic or trait. Consequently, shyness is seen as a general tendency or predisposition rather than a reaction to a temporary and/or specific feature of a situation. Browne and Howarth (1977) conducted a factor analytic study in which they reduced the items from several different personality inventories down to 15 dimensions. Social shyness emerged as the factor that accounted for the largest proportion of common variance which suggests that shyness is an important component of personality structure and organization. Other research has established the construct validity of shyness. For example, individuals who score high on a shyness scale report greater emotional arousal and greater discomfort (Jones & Russell, 1982), especially while interacting with strangers, in novel or unfamiliar situations, or with people of high status. Additionally, people with high scores on shyness scales tend to lack self-confidence. The relationship between shyness and low self-confidence is substantiated by negative correlations between shyness and self-esteem and the fact that shy people seem to doubt their ability to manage their social interactions (Crozier, 1981).

Strangers and friends describe shy people as less attractive, less friendly, less open, and less warm (Jones & Briggs, 1983 as cited in Jones, 1985). It is important to note, however, that these observations about shy people are based on the perceptions of strangers and friends and do
not necessarily apply to relatives and close friends. In addition to being readily perceived by observers as shy, shy people are also seen as being snobbish, unfriendly, and untalented (Briggs, Snider, and Smith, 1983 as cited in Jones, 1985). Given this constellation of somewhat unflattering characteristics it is easy to see how these qualities are likely to impair the development of relationships. Although it is difficult to find empirical evidence to support the notion that snobbish, unfriendly, and untalented people are less likely candidates for friendship, common sense suggests that many people do not actively seek these qualities in others. It is possible that people who experience difficulties interacting socially with others (as a result of their shyness) might have an easier time socializing on-line than they do during their traditional off-line lives. On-line interactions are not likely to elicit the same level of emotional arousal and discomfort that off-line interactions generate. This is due in part to the fact that characteristics such as social status, attractiveness, and warmth are somewhat less relevant on-line than they are off-line so the obstacles impeding social interactions are lower on the Internet than they are in real life environments.

Loneliness

By definition, lonely people desire more social interaction than they currently have. For example, Jones (1985) states that “loneliness occurs when one’s network of casual and intimate relationships is either smaller or less satisfying than one desires” (p. 226). Similarly, Rook (1985) defines loneliness as “the subjective experience that occurs when one’s existing relationships are judged to be deficient in either quality or quantity” (p. 246). Likewise, Peplau (1985) observed that lonely people report having fewer friends and less contact with other people. Weiss (1973, 1974) developed a classification system for loneliness. The first type of loneliness
was described as social loneliness which occurs when a person lacks a sense of social connectedness or integration into a community that might be provided by having a network of friends and colleagues at work and/or school. The second type was described as emotional loneliness which is based on the absence of an intimate figure, for example, a spouse or a close friend. Results from more recent studies provide empirical support for the notion that social and emotional loneliness are distinct states (Cramer & Barry, in press; DiTommaso & Spinner, 1993; 1997). Moreover, this evidence indicates that emotional loneliness can be subdivided into two types: romantic and family emotional loneliness (DiTommaso & Spinner, 1993; 1997).

Jones (1985) observed that the highest rates of loneliness are found among adolescents and young adults. It is somewhat ironic, however, that college students as a group are particularly lonely despite the fact that, at least potentially, they have access to a large pool of friends, companions, and lovers on the college campus. Cutrona (1982) found that among college students the most common precipitators of loneliness were (1) leaving family and friends to attend University, (2) the breakup of a dating relationship, and (3) problems with a friend or relative. Essentially, a decrease in the quality or quantity of social ties precipitated loneliness.

Loneliness has been associated with inadequate social skills (e.g., shyness), and poor self-regard (e.g., low self-esteem; Jones & Briggs, 1983). For example, Jones, Freemon, and Goswick (1981) examined differences between lonely and non-lonely students in the skills necessary to develop and maintain friendships. Two hundred and ten unmarried undergraduate university students completed the UCLA Loneliness scale (Russell, Peplau, & Ferguson, 1978) and other questionnaires that were designed to measure psychological constructs that are relevant to interpersonal behaviours (e.g., assertiveness, self-esteem, self-consciousness, and shyness).
Jones et al., hypothesized that loneliness would be associated with characteristics that are counterproductive to the development of meaningful relationships with others and for the most part their expectations were supported. Loneliness was positively correlated with shyness, self-consciousness and social anxiety, and negatively correlated with self-esteem.

Loneliness is more closely related to subjective rather than objective indices of social relationships. For example, in a sample of University students, Cutrona (1982) found that self-reported satisfaction with one's friendships, romantic relationships, and family relationships were better predictors of loneliness than were more objective measures such as distance from home or frequency of contact with loved ones who live far away. Jones, Hobbs, and Hockenbury (1982) found that in interpersonal situations, lonely people behave in ways that are likely to decrease the probability of developing, maintaining, or restoring mutually satisfying relationships. The researchers examined verbal behaviour within the context of heterosexual one-on-one conversations between strangers. Participants who were classified as lonely were more self-focused and less responsive toward their partners in the dyad. Specifically, lonely people talked more about themselves than did people who were classified as non-lonely, changed the topic of discussion more often, and asked fewer questions of their partners. Jones et al. also noted that lonely students reported that they dated less often, spent more time alone, and engaged in fewer social and extracurricular activities. Jones' (1985) findings corroborate those of Jones et al. (1982). Jones characterized lonely people as "apprehensive, negativistic and ineffective in their interactions with others, in short, they lack[ed] social skills and poise" when compared to their non-lonely counterparts (p. 229).

Based on his review of the research on loneliness, Jones (1985) concluded that lonely
people's vulnerability to unsatisfactory interpersonal relationships is often attributable to some form of social skill deficit or lack of self-confidence. For example, the most common problem cited by lonely participants in Horowitz and de Sales French (1979) was inhibited sociability which can be characterized as a social skill deficit. Horowitz and de Sales French (1979) hypothesized that people who self-identify as lonely would report more interpersonal problems related to socializing than those who self-identify as non-lonely. In order to test their hypothesis, the UCLA Loneliness Scale (Russell, Peplau, & Ferguson, 1978) was administered to a sample of 479 university students. On the basis of their scores on the scale, 25 lonely and 45 non-lonely students were identified. These lonely and non-lonely students used the Q-sort technique to arrange 100 cards, each one labelled with a different interpersonal problem. The Q-sort technique required participants to classify cards into 9 categories from 1 (least familiar as a problem) to 9 (most familiar as a problem). The most common type of problem identified by the lonely students was inhibited sociability. The fact that lonely participants consistently classified inhibited sociability as problematic suggests that they wish that they were better at socializing and presumably that they desire additional social interaction. Clearly, if one can not socialize with others to the extent necessary to develop and maintain relationships, it is not surprising that loneliness often develops.

In the late 1960s Bradburn conducted a survey to estimate the prevalence of loneliness in the general population and found that approximately 25% of the Americans surveyed had experienced loneliness in recent weeks (Bradburn, 1969). Arguably, the experience of loneliness has become more normative over the last 30 years (Putnam, 1995), in part because of the increased rate of divorce, and changes in the ways that people work (i.e., more frequent travel,
increased urbanization, etc.) which often decrease one’s opportunities for frequent and meaningful socialization. Given that, by definition lonely people desire more social interaction than they currently have, and given the large number of opportunities for socialization that are available on the Internet, it may be predicted that lonely people might seek companionship on-line to a greater extent than do non-lonely people who already experience sufficient companionship off-line.

Rationale for Current Research

Sproull and Faraj (1997) suggest that people who use the Internet are sociable beings who are on-line to find affiliation, support, and affirmation from others. It is unclear, however, whether these people are sociable primarily on-line or whether their social interactions for the purposes of affiliation, support, and affirmation also occur in traditional off-line social contexts. Some of the ‘places’ that people visit on-line are based on very specific social metaphors and might be perceived as suitable substitutes for their real world equivalents. For example, Internet users will sometimes ‘gather’ in virtual cafes and bars with names like Larry’s Bar on the Sierra Net or the Electronic Café where people congregate to socialize in ways that might mirror these types of social interaction in real life. It is plausible that these on-line locations are most appealing to people who do not feel comfortable meeting in these social venues in their real lives.

The fact that the most widely used and the most popular Internet applications (e.g., Chat Rooms, MUDs, email, and Newsgroups) are all inherently social in nature also suggests that people use the Internet primarily for social purposes. Moreover, Internet dependents report that they find social support and the ability to create a persona, presumably to enhance their self-esteem, to be positively reinforcing effects of using the Internet (Young, 1997). Recognition of
the fact that Internet dependents found social support and the opportunity to improve their self-esteem rewarding leads one to wonder whether people who lack social support and also want to feel better about themselves gravitate toward the Internet to fulfil these needs.

Another recent study supports the notion that there is a relationship between Internet use and social support and also suggests a relationship between Internet use and psychological well-being. At the outset of the study (before participants had access to the Internet) and then again 12 to 24 months later participants responded to questions designed to measure their social involvement and psychological well-being. One aspect of social involvement was social support and one aspect of psychological well-being was loneliness. Kraut et al. conceptualized psychological well-being as being comprised of loneliness, stress, and depression. Greater Internet use was associated with higher levels of loneliness and less social support.

People who are shy might be unwilling or unable to engage in behaviour that leads to the development of meaningful relationships (e.g., Horowitz & de Sales French, 1979; Jones, 1985). Internet-based social interactions might be easier for shy people to manage because they might find that this more egalitarian, more comfortable environment provides a forum in which they can establish meaningful relationships to a greater extent than they can accomplish this task off-line. Shy people might have an easier time developing relationships on the Internet because in many respects computerized communication is less threatening than meeting and communicating with others in person (Kiesler et al., 1984). As these authors note, the ability to communicate via computer with other people under an assumed identity provides Internet communicators with a cover of anonymity that helps them to overcome interpersonal difficulties (e.g., severe shyness and/or low self-esteem) that they might experience in real life. The absence of nonverbal
behaviour including facial expression, voice intonation and inflection, and eye contact might make communication easier for some people. If people experience interpersonal difficulties that stem from shyness (e.g., Horowitz & de Sales French, 1979; Jones, 1985), insufficient social support (Jones, 1985; Shotton, 1991; Young, 1997), low self-esteem (Baumeister, 1993; Nurmi et al., 1997) and/or loneliness in their day-to-day lives, they might engage in Internet-based communication to compensate for these difficulties.

Jacobs’ (1986; 1993) General Theory of Addictions clearly predicts that dissociation is more common among dependents than non-dependents and during the course of this study it should be possible to determine whether Internet dependents demonstrate more dissociation than do non-Internet dependents. It should be possible to determine whether the General Theory of Addictions applies within the context of Internet dependence while also providing additional construct validity for Internet dependence.

In order to investigate these ideas, measures of perceived social support, self-esteem, shyness, loneliness, and dissociation were administered to students at a university in Southwestern Ontario and used, in conjunction with the participants’ gender, to predict their level of Internet dependence. The first purpose of this study was to compare the characteristics associated with Internet dependent and non-Internet dependent university students. Specifically, Internet dependent and non-Internet dependent university students were compared on the basis of their levels of perceived social support, self-esteem, shyness, loneliness, gender, and level of dissociation. As a result of the self-selection bias inherent in much of the on-line research that has been conducted on Internet dependence these comparisons have been somewhat subjective and relatively uncommon. It was hoped that by recruiting participants off-line, a more
heterogeneous sample that included light and heavy Internet users would be found.

The second purpose of this study was to develop a model that could predict Internet dependence from a combination of perceived social support, self-esteem, shyness, loneliness, gender, and level of dissociation. Alternatively stated, the second purpose of this study was to investigate the relationship between Internet dependence and perceived social support, self-esteem, shyness, loneliness, gender, and level of dissociation and the relative importance of these variables in the development and/or maintenance of Internet dependence. Specifically, it was hypothesized that students who perceived less social support, had relatively low self-esteem, were shy, lonely, and who experienced dissociation while on-line would be more Internet dependent than students who perceived more social support, had relatively high self-esteem, were not shy or lonely, and did not demonstrate dissociation while on-line.

METHOD

Participants and Procedure

Two hundred and eleven undergraduate students enrolled in a first year Communications Studies course offered at a university in Southwestern Ontario agreed to participate in a study about Internet use, leisure, and social habits. Potential participants were told that the researcher, a doctoral student in psychology, was interested in gaining a clearer understanding about how the Internet is affecting various aspects of student life. During a regularly scheduled class, students were given an informed consent form to read and those who chose to participate were asked to sign and date the form (see Appendix A). To ensure that participants had a sufficient understanding of the research and the procedures involved, the consent form was read out loud, participants were advised that they would be receiving partial course credit in return for their
participation, and verbal instructions regarding the completion of the survey was provided. During the verbal instructions students were reminded that their participation would be voluntary and that their responses would remain anonymous. In order to distinguish between answer sheets, and as a means of assigning bonus marks for their participation, students were asked to provide their student numbers in the box labelled ‘Student Number’ on their answer sheets and they were assured that the researcher would only know their student numbers, not their names.

The ratio of female to male participants was relatively balanced: 99 (47%) female, 104 (49%) male, and 8 (4%) students who did not indicate their sex. One hundred and thirty eight students (65%) were enrolled in the College of Arts and Human Sciences, 38 (18%) were in the College of Business Administration, Education, and Law, 29 (14%) were enrolled in the College of Engineering and Sciences, and the remaining 6 (3%) did not report the college in which they were enrolled. The majority of the participants (n=125; 59% ) were in their first year of university. Forty three (20%) of the participants were in second year, 23 (11%) were in third year, 13 (6%) were in their fourth year, and 2 (1%) categorized themselves as students in some ‘other’ year. One half (n=106) of the respondents had families who live outside of the Southwestern Ontario city where the university was located, and almost as many (n= 98; 46%) had families who live within the Southwestern Ontario city where the university was located.

Research Design

Using multiple regression analysis, Internet dependence (the dependent/criterion variable) was predicted by the following independent variables: (1) social support, (2) self-esteem, (3) shyness, (4) loneliness, (5) gender, and (6) level of dissociation. Given that the first four of these predictors are important within the context of social interaction in general, it was expected that
they would be somewhat correlated. Therefore, stepwise multiple regression was used in order to
determine the relative importance of each of the variables and the unique contributions made by
each of the four predictors.

Operational Definitions and Measurement of Variables

Internet Dependence

Internet dependence was identified on the basis of responses to three items taken from
Young’s (1996b) Diagnostic Questionnaire (DQ) and 9 items regarding Internet use (Howitt,
1997) which were adapted from the South Oaks Gambling Screen (Lesieur & Blume, 1987).
Scores ranged from zero to 12 and can therefore be used as ratio scale data (see Appendix B for
the full questionnaire). Following Lesieur and Blume’s (1987) convention, scores were also
evaluated on the basis of cut-off scores: if a person answered affirmatively to three or more of the
12 items then they were classified as probable Internet dependents. On Lesieur and Blume’s
measure, those who answered affirmatively to five or more of 20 items were classified as
probable pathological gamblers.

Social Support

Within the context of this project, “social support refers to the various resources provided
by one’s interpersonal ties” (Cohen & Hoberman, 1983, p. 100). Participants were asked about
the perceived social support provided by the interpersonal relationships with their friends in real
life (i.e., off-line), the perceived social support provided by their Internet friends, and the
perceived social support provided by members of their families (Appendix B). These questions
were taken from Procidano and Heller’s (1983) Perceived Social Support (PSS) scales.
Procidano and Heller developed two questionnaires, one that measures perceived social support
from friends (PSS-Fr) and another that measures perceived social support from family members (PSS-Fa). These instruments measure perceived rather than actual social support and the questions ask respondents about the extent to which they perceive that their needs for support, information, and feedback are fulfilled by their friends and family. Sample items include “My friends give me the moral support I need,” and “My family is sensitive to my personal needs.” Respondents are asked to read the series of statements and provide one of the following answers: Yes, No, or Don’t Know. The PSS-Fr and PSS-Fa are homogeneous measures with Cronbach’s $\alpha = .88$ and $.90$ respectively and factor analysis confirmed that each scale is composed of one factor (Procidano & Heller).

The scales also have good construct validity; the PSS-Fr was correlated to social competence ($r = .35, p < .01$) and low self-confidence ($r = -.43, p < .001$) whereas the best predictors of PSS-Fa were participants’ ratings of intangible (positive correlation) and tangible support (negative correlation) provided by family members, multiple $R = .43; p < .002$ (Procidano and Heller, 1983). The negative correlation between tangible support and perceived social support provided by family members is probably based on the fact that excessive financial dependency diminished the perception of an overall positive family relationship in this sample of students.

The PSS subscales each consist of 20 items; therefore, the full scale is 40 items long. Responses to the PSS-Fa subscale had been collected from 100 undergraduate students and each item was evaluated on three criteria. Items were deleted from the sub-scale if: (1) the item had a low correlation with the total score, (2) the removal of the item resulted in an increase in the variance of the subscale, and (3) the alpha for the scale or subscale increased. In the interest of
shortening the scales, 10 items were dropped from each scale leaving two, 10-item subscales (items from the PSS-Fr subscale that were analogous to deleted PSS-Fa items were also deleted). After 10 items were deleted from the full length scale, the abbreviated version of the scale had a Cronbach's $\alpha = .88$ and was highly correlated to the full scale ($r = .92$, $p < .001$). Items on the PSS-Fr that were similar to the items that were deleted from the PSS-Fa subscale were deleted from the friends subscale to develop the abbreviated, 10-item PSS-Fr subscale.

**Self-Esteem**

Helmreich and Stapp's (1974) *Texas Social Behavior Inventory* (TSBI) is a short, straightforward, measure of self-esteem within the context of social situations or environments. Consequently, it works best as a measure of social self-esteem (i.e., the extent to which one values, likes, and approves of oneself within the context of their social interactions). Helmreich and Stapp’s two 16-item parallel forms of the scale are abbreviated versions of Helmreich, Stapp, and Ervin’s (1974) 32-item measure. The correlation between each short form and the full length scale was .97, a value that is high enough to justify the use of either of the two abbreviated forms of the scale. The two 16-item parallel forms of the scale have an alternate form reliability of .89 for the total 32 items, and McIntire and Levine (1984) reported a Cronbach’s $\alpha = .92$ for the full length version. All items are responded to on a 5-point scale (*not at all characteristic of me, not very characteristic of me, slightly characteristic of me, fairly characteristic of me, very much characteristic of me*; Appendix B).

The TSBI is a general measure of social self-esteem and as a global measure, some researchers (e.g., Rosenberg, 1965) contend that it should hold substantial predictive promise. The TSBI was chosen over Rosenberg’s (1965) older and more popular Self-Esteem Scale for
two reasons. Although the TSBI is somewhat longer (16 items compared to 10 items on the Rosenberg scale) it is less susceptible to socially desirable responding. In addition, when university students respond to the Rosenberg scale, their scale scores are often so negatively skewed that when one tries to divide the scores into low and high (or even low, medium, and high categories), even respondents with the lowest scores “have relatively high self-esteem in an absolute sense” (Blascovich & Tomaka, 1991, p. 123).

Shyness

Shyness is defined as “discomfort and inhibition in the presence of others” (Leary, 1991, p. 182). Typically, shy behaviour with casual acquaintances or strangers takes the form of “tension, concern, feelings of awkwardness and discomfort, and both gaze aversion and inhibition of normally expected social behavior” (Cheek & Buss, 1981, p. 330). Cheek and Buss developed the Shyness Scale which is a 9-item instrument designed to measure social anxiety and the tendency to be inhibited in social situations. In an effort to distinguish between shyness and sociability (i.e., the preference for being with others rather than being alone) scale items were designed to measure affective and behavioural aspects of shyness without including the desire to seek out or avoid social situations. As a result, shyness and sociability scores correlate only -.30, and shyness and sociability items load on separate factors when the items are factor analysed.

The 9-item scale originally developed by Cheek and Buss (1981) was subsequently revised to a 13-item measure (Cheek, 1983). For the revised 13-item version Cronbach’s α = .90 and the average inter-item correlation is .39, indicating that the Revised Shyness Scale is a reliable and valid measure of one’s tendency to be anxious and socially inhibited.

When responding to the Revised Shyness Scale participants indicate the extent to which a
series of statements are characteristic or uncharacteristic of them on a 5-point scale. The scale anchors are 1 (very uncharacteristic or untrue of me, strongly disagree) and 5 (very characteristic or true of me, strongly agree). Sample items from the Revised Shyness Scale include “It is hard for me to act natural when I am meeting new people” and “I feel tense when I’m with people I don’t know well” (Leary, 1991, p. 184; see Appendix B for the full scale).

Loneliness

DiTommaso and Spinner (1993; 1997) constructed a 37-item scale, the Social and Emotional Loneliness Scale for Adults (SELSA), to measure the levels of loneliness in each of three domains: social, romantic, and family loneliness. Emotional loneliness is subdivided into the romantic and family loneliness subscales because the results of factor analytic studies suggested that this was appropriate. The social loneliness subscale consists of 14 items (e.g., “What’s important to me doesn’t seem important to the people I know”), the romantic loneliness subscale consists of 12 items (e.g., “I am an important part of someone else’s life,” and the family loneliness subscale consists of 11 items (e.g., “I feel alone when I am with my family”). DiTommaso and Spinner reported internal consistency estimates of .89 or greater for each of the subscales and appropriate discriminant and concurrent validity.

The 37-item SELSA was reduced to a 15-item measure through an objective technique. Responses from 340 undergraduate students were used to test the internal reliability of abbreviated versions of each of the three subscales and then correlations between these new, shorter subscales and the full length subscales were calculated (Cramer, Ofosu, & Barry, in press). The resultant subscales were then evaluated for face validity to ensure that the nature of the remaining questionnaire items still reflected romantic, family, and social loneliness. The 12-
item romantic loneliness subscale ($\alpha = .93$) was reduced to a six item measure ($\alpha = .95$) that was highly correlated with the full length subscale ($r = .96, p < .001$). The 11-item family loneliness subscale ($\alpha = .88$) was reduced to a five item measure ($\alpha = .89$) that was highly correlated with the full length subscale ($r = .92, p < .001$). Lastly, the 14-item social loneliness subscale ($\alpha = .91$) was reduced to a four item measure ($\alpha = .88$) that was highly correlated with the full length subscale ($r = .88, p < .001$). A principal components analysis (with varimax rotation) was also conducted using the 15 items from this abbreviated SELSA scale. A three factor solution emerged and the factors were consistent with the three subscales (see Appendix B for the 15-item scale).

Dissociation

Dissociation was measured using an eight item measure of Jacobs' (1986) dissociative-like reactions developed by Frisch and Govoni (1996) and reprinted in Howitt (1997). Participants were instructed to read each statement and indicate the frequency with which they experienced the feelings described using a three point scale where 1 indicates never, 2 indicates occasionally, and 3 indicates often. Sample items include “After using the Internet, I’ve felt as though I had been in a trance” and “After using the Internet, I’ve felt like I had taken on another identity” (Appendix B).

RESULTS

Preliminary Analyses

Participants’ Internet Use

The overwhelming majority of the students surveyed ($n=202; 96\%$) indicated that they know how to access the Internet and most of them ($n=171; 81\%$) owned personal computers
(PCs) and, therefore, had sufficient access to them. Twenty eight respondents (13%) indicated that they did not own a PC but that they did have sufficient access to one whenever it was necessary. Only 10 (5%) reported that they did not own a PC and that they occasionally lacked sufficient access to a PC. The fact that almost all of the participants knew how to access the Internet and had sufficient access to a PC suggests that any lack of Internet-related activity is attributable to the respondents' choice rather than technological ignorance, inability, or limited access (see Table 1).

As indicated in Table 1, almost half of the participants 48% (n = 103) reported that their Internet use was an even balance of work (i.e., for paid employment and/or school) and play (i.e., for leisure/entertainment). Sixty one participants (29%) indicated that they used the Internet primarily for fun and/or entertainment and 20% (n = 43) indicated that they used the Internet primarily for school and/or paid employment. Most of the students surveyed had been using the Internet for more than one year. Specifically, 33% (n = 70) had been Internet users for one to two years and 36% (n = 77) had been using the Internet for more than two years. Almost equal numbers of respondents had been on-line for less than 6 months (13%; n = 27) or between 6 months and 1 year (12%; n = 26), whereas only 4% (n = 8) reported that they did not use the Internet at all.

Almost half of the students (49%; n = 103) reported that they paid a flat rate for unlimited Internet use, but 29% (n = 61) reported being charged for the exact amount of time that they spend on-line. Twenty five students (12%) indicated that they were charged for a fixed amount of time spent on-line but that once they had exceeded that time limit they were charged for additional time spent on-line (see Table 1).
In terms of social interactions both on- and off-line, the majority of the respondents (82%; \( n = 174 \)) reported that their Internet-based social interactions were ‘worse and less meaningful’ than their real life interactions and only 10% (\( n = 22 \)) reported that their on-line interactions were ‘better and more meaningful’ than their real life social interactions. The remaining 8% did not answer this question (see Table 1). In accordance with this finding is the fact that 85% (\( n = 180 \)) reported that they prefer their off-line, real life social interactions over Internet-based interactions. Twenty three (10%) of the participants reported no preference for on- or off-line social interactions, and 2% (\( n = 5 \)) indicated a preference for Internet-based rather than traditional real life social interactions. Most participants (87%; \( n = 184 \)) claimed that their interpersonal relationships have not changed since they started using the Internet. Nineteen students (9%) noted an improvement in their relationships following the commencement of their Internet use and 4 (2%) reported that their relationships had deteriorated since they started using the Internet.
Table 1

Summary of Participants' Internet Use and Access to Computers (n = 211)

<table>
<thead>
<tr>
<th>Question / Characteristic</th>
<th>Response (%)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understands how to access the Internet</td>
<td>96</td>
<td>202</td>
</tr>
<tr>
<td>Has been an Internet user for &lt; 6 months</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td>Has been an Internet user for 6 months to 1 year</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td>Has been an Internet user for 1 to 2 years</td>
<td>33</td>
<td>70</td>
</tr>
<tr>
<td>Has been an Internet user for over 2 years</td>
<td>37</td>
<td>77</td>
</tr>
<tr>
<td>Owns a personal computer (PC)</td>
<td>81</td>
<td>171</td>
</tr>
<tr>
<td>Does not own a PC but has sufficient access to one when necessary</td>
<td>13</td>
<td>28</td>
</tr>
<tr>
<td>Does not own a PC and lacks sufficient access to one</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Internet use is primarily for work / school</td>
<td>20</td>
<td>43</td>
</tr>
<tr>
<td>Internet use is primarily for fun / leisure</td>
<td>29</td>
<td>61</td>
</tr>
<tr>
<td>Internet use is an even balance (work / leisure)</td>
<td>49</td>
<td>103</td>
</tr>
<tr>
<td>Charged a flat rate for unlimited Internet access</td>
<td>49</td>
<td>103</td>
</tr>
<tr>
<td>Charged by the hour (or minute) for time on the Internet</td>
<td>29</td>
<td>61</td>
</tr>
<tr>
<td>Charged a flat rate for a fixed amount of time on the Internet; additional charge for additional time spent on-line</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Prefer traditional relationships over Internet-based relationships</td>
<td>85</td>
<td>180</td>
</tr>
<tr>
<td>Prefer Internet-based relationships over traditional relationships</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>No preference for Internet or traditional relationships</td>
<td>11</td>
<td>23</td>
</tr>
</tbody>
</table>

Note. 10% (n = 22) of the students did not indicate how they are billed for their Internet service and/or use and 2% (n = 3) of the students did not state their relationship preference (e.g., Internet, traditional).
Characteristics of the Frequency Distributions of Measured Variables

Internet Dependence.

Examination of the skewness and kurtosis associated with the frequency distribution for this variable makes it clear that Internet dependence was not normally distributed since most participants had very low scores on this measure (see Table 2; the interested reader is directed to Appendix C for additional details). In the present study, only 20% of the participants were classified as Internet dependent and 80% were classified as non-Internet dependent.

The distribution of scores on the Internet dependence scale was peaked (kurtosis = 2.22) and the tails of the distribution were long (skewness = 1.57). Moreover, the variance in Internet dependence was heterogeneous: there was more variance among Internet dependents (variance = 2.71) than there was among non-Internet dependents (variance = .55). As is the case with most dependencies, addictions, and/or disorders, however, one should not expect Internet dependence to be normally distributed in the general population or among students. Moreover, when one considers the distribution of scores associated with responses to the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), on which many of the Internet dependence scale items were based, it is clear that respondents' scores on the SOGS were not normally distributed.

The pattern of responses obtained on the Internet dependence scale, did however, lend itself to the use of Internet dependence scores as a dichotomous variable in a manner that was analogous to the way in which scores on the SOGS were interpreted. Additionally, statistical analyses using non-parametric procedures were feasible for variables such as Internet dependence that did not satisfy the assumptions of normality and homogeneity of variance that are required for parametric statistics.
Table 2

Characteristics Associated With Measured Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Variance</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Dependence</td>
<td>202</td>
<td>1.69</td>
<td>1.95</td>
<td>3.81</td>
<td>1.57</td>
<td>2.22</td>
</tr>
<tr>
<td>PSS - Friends</td>
<td>199</td>
<td>5.21</td>
<td>1.82</td>
<td>3.31</td>
<td>-.91</td>
<td>.01</td>
</tr>
<tr>
<td>PSS - Internet Friends</td>
<td>190</td>
<td>.71</td>
<td>1.45</td>
<td>2.09</td>
<td>2.40</td>
<td>5.63</td>
</tr>
<tr>
<td>PSS - Family</td>
<td>201</td>
<td>5.69</td>
<td>2.59</td>
<td>6.68</td>
<td>-.79</td>
<td>-.38</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>188</td>
<td>37.86</td>
<td>7.80</td>
<td>60.76</td>
<td>-.17</td>
<td>-.57</td>
</tr>
<tr>
<td>Shyness</td>
<td>186</td>
<td>19.68</td>
<td>8.75</td>
<td>76.49</td>
<td>.11</td>
<td>-.40</td>
</tr>
<tr>
<td>Social Loneliness</td>
<td>193</td>
<td>3.44</td>
<td>4.25</td>
<td>18.04</td>
<td>1.57</td>
<td>2.25</td>
</tr>
<tr>
<td>Family Loneliness</td>
<td>190</td>
<td>4.21</td>
<td>5.70</td>
<td>32.49</td>
<td>1.66</td>
<td>2.34</td>
</tr>
<tr>
<td>Romantic Loneliness</td>
<td>187</td>
<td>14.40</td>
<td>11.96</td>
<td>142.99</td>
<td>.34</td>
<td>-1.14</td>
</tr>
<tr>
<td>Dissociation</td>
<td>185</td>
<td>2.49</td>
<td>5.35</td>
<td>28.65</td>
<td>6.84</td>
<td>55.80</td>
</tr>
</tbody>
</table>

Note. Internet Dependence scores could range from 0 to 12; Perceived Social Support from Friends (PSS-Fr) Subscale scores could range from 0 to 20; PSS-Int scores could range from 0 to 18; PSS-Fa scores could range from 0 to 20; Texas Social Behaviour Inventory (a measure of social self-esteem) scores could range from 0 to 64; Revised Shyness Scale scores could range from 0 to 52; Romantic Loneliness subscale scores could range from 0 to 36; Family Loneliness subscale scores could range from 0 to 24; and Dissociation Scale scores could range from 0 to 16.
**Perceived Social Support Subscales.**

The frequency distribution of participants’ scores on the Perceived Social Support from friends (PSS-Fr) subscale closely resembled the normal distribution. This fact, combined with the fact that the distribution was based on responses from a large number of participants \( n = 199 \) suggested that these scores should be used as is. Participants’ scores on the Perceived Social Support from Internet friends (PSS-Int) subscale were not normally distributed but one should not necessarily expect the perception of social support from one’s Internet friends to be normally distributed. Rather, one might expect that the majority of the population would perceive and receive relatively little social support from on-line friends in comparison to support from other sources (the interested reader is directed to Appendix C for a more thorough discussion of this issue).

The frequency distribution associated with scores on the Perceived Social Support from Family (PSS-Fa) subscale was reasonably close to normal. Moreover, comparisons between the full-length and the abbreviated subscale on some measures of central tendency provided an early indication that the abbreviated subscale matched the original full-length version (see Appendix C for additional details). Finally, since PSS-Total is a derivative of the PSS-Fr, PSS-Fa, and PSS-Int subscales, and since PSS-Int and PSS-Fa were not normally distributed and were used as is, PSS-Total was also used as is (see Table 2).

**Texas Social Behavior Inventory.**

Participants’ scores on this scale were almost normally distributed and due to the fact that the distribution was based on a large number of observations \( n = 188 \) and the fact that the frequency distribution looked relatively normal, participants’ scores on the TSBI were used as is.
(see Table 2).

**Shyness Scale (Revised).**

Participants’ scores on this scale approximated the normal distribution and due to the fact that the distribution is based on a large number of observations ($n = 186$) participants’ scores on the Revised Shyness Scale were used as is (see Table 2).

**Social and Emotional Loneliness.**

The alpha coefficients on the full-length subscales and the abbreviated subscales were very comparable to each other and the sex differences on the abbreviated subscales matched those reported previously when the full scale was used (DiTommaso & Spinner, 1993). These two factors support the contention that the abbreviated SELSA subscales yield results that are similar to those obtained through the use of the full length subscales. Participants’ total scores on the SELSA were, for the most part, normally distributed and this finding helped to justify the use of these scores as is (see Table 2).

**Dissociation.**

The kurtosis and skewness values associated with the frequency distribution of Dissociation scale scores indicated that the distribution was not normally distributed (see Table 2). This finding was appropriate, however, given that one would not expect scores on the Dissociation scale to be normally distributed. Among people who are functioning at a reasonably high level (e.g., university students who are academically successful enough to maintain their status as students) one should expect relatively few participants to endorse a high number of the scale items. The positively skewed and leptokurtic (i.e., peaked) distribution warranted the use of non-parametric statistics that are not based on the assumptions of normality or homogeneity of
variance (the interested reader is directed to Appendix C for further detail).

**Psychometrics**

In the interest of making clear and accurate interpretations of the data generated through the use of abbreviated and hybrid (i.e., comprised of items taken from various scales) measures, each of the following measures was evaluated for its psychometric properties: the Internet Dependence Scale, the Perceived Social Support (PSS) Scale and its component subscales, and the Social and Emotional Loneliness Scale (SELSA) and its component subscales. Specifically, internal consistency coefficients (αs) for all scales and/or subscales, item-total correlations, variance, and the resultant alpha if a particular item was deleted from the scale or subscale were calculated. When examining a full scale or subscale, an individual item was deleted if: (1) the item had a low correlation (i.e., < .25) with the total scale score, (2) the removal of the item resulted in an increase in the variance of the scale or subscale, and (3) the alpha for the scale or subscale increased following removal of the item. In the case of the PSS and the SELSA, principal components factor analysis was also conducted to ensure that the factor structures associated with the full length scales were maintained in the abbreviated versions that were administered to the research participants in the present study (see Appendix C for additional details about these analyses). Additionally, the psychometric properties associated with the Revised Shyness Scale, the Texas Social Behavior Inventory, and the Dissociation Scale were evaluated.

**Internet Dependence.**

The majority of the items included on the Internet dependence measure, specifically items 4 through 12, were adapted by Howitt (1997) from items on the South Oaks Gambling Screen
(SOGS; Lesieur & Blume, 1987). Items one, two, and three on the Internet Dependence Scale were taken directly from Young's (1996b) Diagnostic Questionnaire. The alpha value associated with the Internet Dependence Scale used in the present study was within the acceptable range for an instrument designed for research purposes (α = .75; Kaplan & Saccuzzo, 1989). The majority of the Internet Dependence Scale items, specifically items 3, 4, 6, 8, 9, 10, and 11, were moderately correlated to total scale scores (rs = .41 to .63, p < .01). Items 5, 7, and 12 were strongly correlated to total scale scores (rs = .68 to .70, p < .01), and the two remaining items (1 and 2) had weaker correlations to the total scale score (rs = .25 and .37 respectively; see Table 3). Participants' scores on the Internet Dependence Scale were related to other measures in directions that support the contention that the measure had convergent validity. For instance, Internet Dependence was related to the amount of time that participants spent on-line in a typical week (r = .43, p < .01), the average time spent using the World Wide Web (WWW; r = .48, p < .01), the average length of time spent in Chat Rooms (r = .31, p < .01), and their longest continuous Internet session (r = .30, p < .01).
Table 3

Psychometric Properties of the Internet Dependence Scale (n = 202)

<table>
<thead>
<tr>
<th>Item</th>
<th>$\alpha^1$</th>
<th>$R_{TOTAL}^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I feel preoccupied with the Internet.</td>
<td>.77</td>
<td>.25</td>
</tr>
<tr>
<td>2. I feel restless, moody, depressed, or irritable when attempting to cut down or stop using the Internet.</td>
<td>.75</td>
<td>.37</td>
</tr>
<tr>
<td>3. I use the Internet as a way of escaping from problems or of relieving a bad mood (e.g., feelings of helplessness, anxiety, sadness).</td>
<td>.75</td>
<td>.41</td>
</tr>
<tr>
<td>4. Do you find you need to spend longer and longer periods of time on the Internet?</td>
<td>.74</td>
<td>.47</td>
</tr>
<tr>
<td>5. Do you feel you have ever had a problem with the amount of time you spend on the Internet?</td>
<td>.71</td>
<td>.70</td>
</tr>
<tr>
<td>6. Did you ever spend more time than you intended to on the Internet?</td>
<td>.76</td>
<td>.54</td>
</tr>
<tr>
<td>7. Have any of your friends or family members complained about the amount of time you spend on the Internet?</td>
<td>.71</td>
<td>.70</td>
</tr>
<tr>
<td>8. Have you ever felt guilty about the amount of time you spend on the Internet or what happens when you’re on-line?</td>
<td>.72</td>
<td>.63</td>
</tr>
<tr>
<td>9. Have you ever felt like you wanted to stop or cut down on the time you spend on the Internet, but didn’t think you could?</td>
<td>.74</td>
<td>.42</td>
</tr>
<tr>
<td>10. Have you ever been secretive about the time you spend on the Internet or not wanted someone to know you were on-line?</td>
<td>.74</td>
<td>.49</td>
</tr>
<tr>
<td>11. Do you spend a lot of time buying Internet books, trying out new WWW browsers, researching Internet vendors, organizing folders of downloaded files, or any other activity related to Internet use?</td>
<td>.73</td>
<td>.58</td>
</tr>
<tr>
<td>12. Have you ever lost time at work or school due to using the Internet?</td>
<td>.71</td>
<td>.68</td>
</tr>
</tbody>
</table>

Note. 1. Item as refer to the scale’s reliability with the deletion of this item. 2. $R_{TOTAL}$ denotes the relation between participants’ response to the item and their total score on the scale (all $R_{TOTAL}$ values are statistically significant, $p < .01$).
Perceived Social Support.

All three Perceived Social Support (PSS) subscales were examined using the same criteria used to evaluate the Internet dependence scale (see Table 4). Three items, item 4, "I feel that I’m on the fringe in my circle of friends," item 9, "When I confide in friends, it makes me feel uncomfortable," and item 10, "I wish my friends were much different," were deleted from the PSS-Fr subscale. The resultant coefficient of internal consistency, alpha, for the PSS-Fr subscale was .72 and the correlation between the subscale and the entire PSS scale was .71 (p < .001; see Table 4).

Item 9, "When I confide in members of my family, it makes me feel uncomfortable," and item 10, "I wish my family were much different," were deleted from the PSS-Family (PSS-Fa) subscale resulting in a subscale with an α = .84. The correlation between the PSS-Fa subscale and the entire abbreviated PSS scale was .86 (p < .001).

Only item number 8, "When I confide in my Internet friends, it makes me feel uncomfortable," was deleted from the PSS-Internet Friends (PSS-Int) subscale and its removal yielded a subscale with an α = .80. Unlike the other two subscales, the PSS-Int subscale had a weak correlation with the total PSS scale .28 (p < .05) which suggests that although the PSS-Int is internally consistent, it is measuring something distinct from the other two subscales. Overall, the PSS scale which included all items from the PSS-Fr, PSS-Fa, and PSS-Int had an α = .79.

A principal components analysis with orthogonal (varimax) rotation was conducted on the abbreviated PSS scale to confirm that the factor structure obtained by Procidano and Heller (1983) was maintained when the subscales were abbreviated (see Table 4). A three-factor solution that accounted for 44% of the variance in the items was obtained (the interested reader is
directed to Appendix C for additional details). Factor one corresponded to the PSS-Internet (PSS-Int) subscale, accounted for 16% of the total variance, and had an eigenvalue of 4.90. The second factor corresponded to the PSS-Family (PSS-Fa) subscale, had an eigenvalue of 3.57, and also accounted for 16% of the total variance. The third and final factor corresponded to the Perceived Social Support-Friends (PSS-Fr) subscale, had an eigenvalue of 1.96, and accounted for 12% of the total variance. With respect to the PSS-Fr and PSS-Fa subscales, the pattern of factor loadings was consistent with the 2-factor solution reported by Procidano and Heller (1983) and the fact that the PSS-Int subscale constitutes a third factor is conceptually appropriate.

**Texas Social Behavior Inventory.**

The overall alpha associated with this measure was acceptable ($\alpha = .79$), and for the most part, the alphas that would result following the removal of individual items were lower than the alpha for the full scale. There was, however, one exception; when item five, "*When in a group of people, I have trouble thinking of the right things to say,*" was removed from the TSBI, the alpha coefficient increased from .73 to .79. Consequently, item five was not included in the calculation of the total score on this scale.

**Shyness Scale.**

An evaluation of the alpha coefficients, item-total correlations, and variance associated with Cheek's (1983) Revised Shyness Scale items suggested that the scale should be used in its entirety. The scale had a good level of internal consistency ($\alpha = .85$), the correlations between the individual scale items and the total scale score were positive and moderately strong, and the removal of any of the items would result in a lower alpha value for the total scale.
Table 4

Psychometric Properties of the Perceived Social Support Subscales (n = 183)

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Mean</th>
<th>SD</th>
<th>$\alpha$</th>
<th>$R_{TOTAL}$</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eigenvalue</td>
<td>4.90</td>
<td>3.57</td>
<td>1.96</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of Variance Explained</td>
<td>16.00</td>
<td>16.00</td>
<td>12.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Social Support - 'Real Life' Friends</td>
<td>5.21</td>
<td>1.82</td>
<td>.72</td>
<td>.71**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. My friends give me the moral support I need.</td>
<td>.68</td>
<td>.48</td>
<td>-.21</td>
<td>.03</td>
<td>.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. My friends enjoy hearing about what I think.</td>
<td>.68</td>
<td>.46</td>
<td>.00</td>
<td>.22</td>
<td>.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I rely on my friends for emotional support.</td>
<td>.68</td>
<td>.44</td>
<td>-.13</td>
<td>.05</td>
<td>.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. My friends and I are very open about what we think about things.</td>
<td>.71</td>
<td>.30</td>
<td>-.02</td>
<td>.26</td>
<td>.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. My friends are sensitive to my personal needs.</td>
<td>.65</td>
<td>.54</td>
<td>.10</td>
<td>.21</td>
<td>.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. My friends are good at helping me solve problems.</td>
<td>.69</td>
<td>.42</td>
<td>-.08</td>
<td>.29</td>
<td>.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I have a deep sharing relationship with a number of friends.</td>
<td>.70</td>
<td>.37</td>
<td>.07</td>
<td>.00</td>
<td>.57</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table Continues
### Table 4 (continued)

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Mean</th>
<th>SD</th>
<th>$\alpha$</th>
<th>$R_{\text{TOTAL}}$</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived Social Support - Family</strong></td>
<td>5.69</td>
<td>2.58</td>
<td>.84</td>
<td>.86**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. My family gives me the moral support I need.</td>
<td>.65</td>
<td>.45</td>
<td>-.34</td>
<td>.56</td>
<td>.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. My family enjoys hearing about what I think.</td>
<td>.65</td>
<td>.46</td>
<td>-.26</td>
<td>.55</td>
<td>.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Members of my family share many of my interests.</td>
<td>.65</td>
<td>.43</td>
<td>.22</td>
<td>.50</td>
<td>.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I rely on my family for emotional support.</td>
<td>.63</td>
<td>.54</td>
<td>.11</td>
<td>.57</td>
<td>.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. My family and I are very open about what we think about things.</td>
<td>.62</td>
<td>.54</td>
<td>.20</td>
<td>.60</td>
<td>.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. My family is sensitive to my personal needs.</td>
<td>.61</td>
<td>.62</td>
<td>-.09</td>
<td>.85</td>
<td>.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Members of my family are good at helping me solve problems.</td>
<td>.62</td>
<td>.59</td>
<td>-.09</td>
<td>.74</td>
<td>.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I have a deep sharing relationship with a number of members of my family.</td>
<td>.62</td>
<td>.59</td>
<td>-.06</td>
<td>.78</td>
<td>-.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 4 (continued)

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
<th>$\alpha^1$</th>
<th>$R_{TOT AL}^2$</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Social Support - Internet Friends</td>
<td>1. My Internet friends give me the moral support I need.</td>
<td>.71</td>
<td>1.45</td>
<td>.80</td>
<td>.28**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. My Internet friends enjoy hearing about what I think.</td>
<td>.75</td>
<td>.45</td>
<td>.59</td>
<td>.63</td>
<td>-.17</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. I rely on my Internet friends for emotional support.</td>
<td>.73</td>
<td>.54</td>
<td>.63</td>
<td>.63</td>
<td>-.04</td>
<td>-.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. My Internet friends and I are very open about what we think about things.</td>
<td>.72</td>
<td>.62</td>
<td>.63</td>
<td>.76</td>
<td>.03</td>
<td>-.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. My Internet friends are sensitive to my personal needs.</td>
<td>.74</td>
<td>.49</td>
<td>.61</td>
<td>.75</td>
<td>.01</td>
<td>-.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. My Internet friends are good at helping me solve problems.</td>
<td>.71</td>
<td>.65</td>
<td>.61</td>
<td>.82</td>
<td>.00</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. I have a deep sharing relationship with a number of Internet friends.</td>
<td>.73</td>
<td>.60</td>
<td>.75</td>
<td>.75</td>
<td>-.06</td>
<td>.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. My Internet friends seek me out for companionship.</td>
<td>.75</td>
<td>.41</td>
<td>.49</td>
<td></td>
<td>.18</td>
<td>-.14</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** $^1$ Item $\alpha$ refers to the total scale reliability with the deletion of this item.

$^2R_{TOT AL}$ denotes the relation between the short and full subscale total, and also represents the relation between each item and the short-form subscale total (*p < .05, **p < .01, ***p < .001). Substantial factor loadings are presented in boldface type.
Social and Emotional Loneliness Scale for Adults.

A recently developed, 15-item version of DiTommaso and Spinner’s (1993; 1997) 37-item Social and Emotional Loneliness Scale for Adults (SELSA) was used in the present study (Cramer, Ofosu, & Barry, in press). This measure was evaluated in the same manner as were the Internet dependence and Perceived Social Support (PSS) measures (see Table 5). Using the aforementioned criteria, item 5, “I really belong in my family,” was removed from the family loneliness subscale, and item 6, “I have a friend or friends with whom I can share my views,” was deleted from the social loneliness subscale. The final 13 items included on the abbreviated SELSA yielded a scale with the following characteristics: for the entire scale $\alpha = .87$, the family loneliness subscale had an $\alpha = .89$ and it had a moderately strong positive correlation of .65 with the total scale (i.e., $R_{\text{TOTAL}}=.65$), the romantic loneliness subscale had an $\alpha = .92$ and $R_{\text{TOTAL}}=.82$, and the social loneliness subscale had an $\alpha = .89$ and $R_{\text{TOTAL}}=.62$.

The alphas on DiTommaso and Spinner’s (1993) full-length subscales and the abbreviated subscales are comparable to each other and vary by only ± .02. Similarly, the sex differences on the abbreviated subscales matched those reported previously when the full scale was used. DiTommaso and Spinner found that men were significantly more lonely as measured by the romantic and social loneliness subscales than were women ($F[1, 350] = 5.51, p<.02$ and $F[1, 351] = 4.89, p<.03$ respectively) but that men and women did not differ significantly with respect to family loneliness.

A principal components analysis with orthogonal (varimax) rotation was conducted on the abbreviated SELSA scale to confirm that the factor structure observed for the full version was maintained in the short form (see Table 5). Three factors were extracted on the basis of the scree
plot and eigenvalues ≥ 1 criterion and the 3-factor solution accounted for 78% of the variance in the 13 SELSA items (the interested reader is directed to Appendix C for additional details).

Factor one corresponded to the items on the romantic loneliness subscale of the SELSA, had an eigenvalue of 5.31, and accounted for 41% of the total variance. The second factor corresponded to the social loneliness subscale, had an eigenvalue of 3.87, and accounted for 30% of the total variance. The third and final factor was not as amenable to interpretation as the two preceding factors had been. This is probably due, at least in part, to the fact that it explained relatively little total variance (7%) and had a relatively low eigenvalue of .93. Although the third factor had high factor loadings from items on the family loneliness subscale, it also had high loadings from items on the social loneliness subscale (factor 2). The findings regarding the romantic and social loneliness factors replicate those previously reported by DiTommaso and Spinner (1997) in terms of the relative contributions to the explained variance, but the complex pattern of factor loadings associated with the family loneliness subscale differs somewhat from previously reported results.
Table 5

Psychometric Properties Associated With the SELSA Subscales (n = 173)

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Mean</th>
<th>SD</th>
<th>α¹</th>
<th>R\text{TOTAL}²</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of Variance Explained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>5.31</td>
<td>3.87</td>
<td>.93</td>
<td></td>
<td>41</td>
<td>30</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
<th>α¹</th>
<th>R\text{TOTAL}²</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romantic Loneliness</td>
<td>14.40</td>
<td>11.96</td>
<td>.92</td>
<td>.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. I have a romantic partner to whose happiness I contribute.</td>
<td>.89</td>
<td>.86</td>
<td>.91</td>
<td>.05</td>
<td>-.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I have a romantic or marital partner who gives me the support and encouragement I need.</td>
<td>.89</td>
<td>.86</td>
<td>.92</td>
<td>.11</td>
<td>.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I have a romantic partner with whom I share my most intimate thoughts and feelings.</td>
<td>.89</td>
<td>.86</td>
<td>.92</td>
<td>.03</td>
<td>.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I have someone who fulfills my needs for intimacy.</td>
<td>.90</td>
<td>.80</td>
<td>.87</td>
<td>.13</td>
<td>.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I have an unmet need for a close romantic relationship.</td>
<td>.94</td>
<td>.52</td>
<td>.63</td>
<td>.17</td>
<td>-.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I am in love with someone who is in love with me.</td>
<td>.91</td>
<td>.73</td>
<td>.82</td>
<td>-.03</td>
<td>.11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table continues
Table 5 (continued)

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
<th>α</th>
<th>$R_{TOTAL}$</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social Loneliness</strong></td>
<td>8. I have friends to whom I can talk about the pressures in my life.</td>
<td>3.44</td>
<td>4.25</td>
<td>.89</td>
<td>.62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. I can depend upon my friends for help.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.90</td>
<td>.72</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>11. I have friends that I can turn to for information.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.78</td>
<td>.84</td>
<td>.04</td>
</tr>
<tr>
<td><strong>Family Loneliness</strong></td>
<td></td>
<td>4.21</td>
<td>5.70</td>
<td>.89</td>
<td>.65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. My family really cares about me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.88</td>
<td>.71</td>
<td>.15</td>
</tr>
<tr>
<td></td>
<td>4. My family is important to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.86</td>
<td>.80</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>12. I feel part of my family.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.83</td>
<td>.84</td>
<td>.04</td>
</tr>
<tr>
<td></td>
<td>13. I feel close to my family.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.87</td>
<td>.75</td>
<td>.07</td>
</tr>
</tbody>
</table>

**Note.** 1. Item αs refer to the total scale reliability with the deletion of this item. 2. $R_{TOTAL}$ denotes the relation between the short and full subscale total, but denotes the relation between each item and the short-form subscale total; correlations between total subscale score and total scale are significant at $p < .01$ item. Substantial factor loadings are presented in boldface type.
Dissociation Scale.

Although the Dissociation Scale has been used previously within the context of compulsive or pathological gambling (Frisch & Govoni, 1996) and Internet use (Howitt, 1997), its psychometric properties when used within the context of Internet dependence were unknown. The correlations between the individual items and participants’ scores on the total scale ranged from .48 to .87, all correlations positive. Moreover, the scale demonstrated very high internal consistency, $\alpha = .92$. The removal of item 1, "After using the Internet, I’ve felt like I had taken on another identity," would have resulted in a minor increase in the $\alpha$ value from $\alpha = .92$ to $\alpha = .94$, but given that the alpha for the full scale was already sufficiently high, all items were retained for use in the calculation of the total score on this measure.

Primary Analyses

The first purpose of this study was to compare the characteristics associated with Internet dependent and non-Internet dependent university students. Specifically, Internet dependent and non-Internet dependent university students were compared on the basis of the level of dissociation that they experienced on-line, their levels of perceived social support (PSS), self-esteem, shyness, social and emotional loneliness, and their gender composition. Following the convention used when interpreting scores on the South Oaks Gambling Screen, on which the Internet Dependence Scale was based, students were categorized as Internet dependent if their total score on the scale was greater than or equal to three (i.e., $\geq 3$) and they were categorized as non-Internet dependent if they had a total score that was $\leq 2$. Using these criteria, 20% of the participants were classified as Internet dependent and 80% were classified as non-Internet dependent.

As hypothesized, Internet dependents demonstrated more dissociation than did Non-
dependents (based on non-parametric rather than parametric analyses). Recall that the frequency distribution associated with the Dissociation scale was very positively skewed and also demonstrated positive kurtosis. Consequently, the use of an $F$- or $t$-test to determine whether the average scores on the Dissociation scale differed according to participants' Internet dependence status was somewhat inappropriate. In order to evaluate differences between dependents and non-dependents in terms of their relative levels of Dissociation a non-parametric test should be used because non-parametric tests do not require on the same stringent assumptions that the parametric statistics rely on. If the non-parametric test yields a different outcome than was obtained by the parametric test then the results of the non-parametric procedure should be accepted and considered as more valid than the results generated by the analogous parametric test. Within the context of this study, Dissociation scale scores were treated as a function of Internet dependence status and the results generated by the non-parametric Mann-Whitney U Test were preferred over the parametric analogue (i.e., $F$- or $t$-test) because the Mann-Whitney U test is more powerful statistically. The Mann-Whitney test is more able to detect differences between groups or, in other words, it is more likely to reject a false null hypothesis than the corresponding $F$ or $t$-test. If, however, both procedures yield the same outcomes then it suggests that despite the violation of the assumptions underlying the parametric test, the parametric test is robust and the results generated through its application can be accepted with confidence. The Mann-Whitney U test evaluates the relative ranks of Internet dependent and non-Internet dependent participants' scores on the Dissociation scale. The rationale underlying this test implies that if Internet dependents demonstrate higher levels of Dissociation then most of the Internet dependents would have higher ranked scores on the Dissociation scale than would the non-dependents (this is because a rank of 1
was assigned to the lowest score on the Dissociation scale). Due to the relatively large sizes of
the two groups (i.e., Internet dependents and the non-Internet dependents) the sampling
distribution of $U$ approximates the normal distribution, and $z$ - scores are calculated from the $U$
statistic, the mean of the sampling distribution, and the standard deviation of the sampling
distribution. The computed $z$ - score (- 4.9) significantly exceeded the critical value ($p < .001$),
therefore, the null hypothesis that both groups had equivalent rankings on the Dissociation scale
was handily rejected. Alternatively stated, Internet dependents had an average rank of 126.8 on
the Dissociation scale and this value was significantly higher than non-Internet dependents’
average rank of 82.8 on the Dissociation scale. Moreover, this finding supports the hypothesis
that Internet dependents demonstrate more Dissociation while using the Internet than do Non-
Internet dependents.

An examination of the results of the analysis of variance reported in Table 6 indicates that, as
predicted, Internet dependents, compared to non-dependents, perceived significantly less social
support from friends and family ($F [1, 143] = 17.57, p < .001$ and $F [1, 143] = 4.42, p < .05$
respectively) and significantly more social support from their Internet friends ($F [1, 143] = 4.81, p$
$< .05$). Contrary to expectations, Internet dependents did not differ from non-dependents in terms
of their levels of self-esteem, but, as hypothesized, Internet dependents demonstrated more
shyness than did Non-dependents ($F [1, 143] = 7.62, p < .01$). The hypothesis that Internet
dependents would demonstrate more loneliness as measured by the Social and Emotional
Loneliness Scale (SELSA) was partially supported. Internet dependents reported more social
loneliness than did Non-dependents ($F [1, 143] = 5.74, p < .01$), but the two groups did not differ
significantly with respect to their scores on the romantic or family loneliness subscales.
Finally, and as hypothesized, more males than females were classified as Internet dependents. Chi-square analysis was used to examine the ratio of male to female Internet dependents and Non-Internet dependents. Among the female participants, there were fewer Internet dependents and more non-Internet dependents than one would expect by chance and among male participants there were more Internet dependents and fewer non-Internet dependents than one would expect by chance ($\chi^2 [1, N = 198] = 9.45, p < .01$). Only 13% of the women surveyed were classified as Internet dependent whereas 31% of the male participants were classified as Internet dependent. Based on the 2 x 2 chi-square frequency table (gender by Internet dependence status) it was possible to calculate an odds ratio which tells us that the relative risk of Internet dependence was 3 given that a participant was male, or in other words, male participants were three times more likely to be Internet dependent than were females. Not only did male and female participants differ in terms of the percentage of each group that was classified as Internet dependent, there was also a significant difference on their average ranked scores on the Internet dependence scale. The computed $z$-score (-2.18) significantly exceeded the critical value ($p < .05$), therefore, the null hypothesis that male and female participants had equivalent rankings on the Internet dependence scale was rejected. Alternatively stated, males had an average rank of 108.1 on the Internet dependence scale and this value was significantly higher than females’ average rank of 90.9 on the scale. Moreover, this finding supports the hypothesis that males demonstrate more Internet dependence than do females.

As one would expect, Internet dependents spent significantly more time using the Internet than did Non-Internet dependents ($F [1, 198] = 42.74, p < .001$). Although dependents did not
Table 6

Differences Between Internet Dependents and Non-Internet Dependents (n = 144)

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Social Support - Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>11.93</td>
<td>3.88</td>
<td>6.08*</td>
</tr>
<tr>
<td>Dependent</td>
<td>9.93</td>
<td>3.97</td>
<td></td>
</tr>
<tr>
<td>Perceived Social Support - Friends</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>5.57</td>
<td>1.59</td>
<td>17.57***</td>
</tr>
<tr>
<td>Dependent</td>
<td>4.07</td>
<td>2.19</td>
<td></td>
</tr>
<tr>
<td>Perceived Social Support - Family</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>5.80</td>
<td>2.61</td>
<td></td>
</tr>
<tr>
<td>Dependent</td>
<td>4.66</td>
<td>2.68</td>
<td></td>
</tr>
<tr>
<td>Perceived Social Support - Internet Friends</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>.56</td>
<td>1.47</td>
<td>4.81*</td>
</tr>
<tr>
<td>Dependent</td>
<td>1.21</td>
<td>1.24</td>
<td></td>
</tr>
<tr>
<td>Self-Esteem</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>37.90</td>
<td>7.79</td>
<td>1.34</td>
</tr>
<tr>
<td>Dependent</td>
<td>35.97</td>
<td>9.11</td>
<td></td>
</tr>
<tr>
<td>Shyness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>19.14</td>
<td>8.66</td>
<td>7.62**</td>
</tr>
<tr>
<td>Dependent</td>
<td>24.10</td>
<td>8.64</td>
<td></td>
</tr>
</tbody>
</table>

Table Continues
Table 6 (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELSA-Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>21.19</td>
<td>15.72</td>
<td>3.84</td>
</tr>
<tr>
<td>Dependent</td>
<td>27.69</td>
<td>16.91</td>
<td></td>
</tr>
<tr>
<td>SELSA-Social</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>3.03</td>
<td>4.34</td>
<td>5.74**</td>
</tr>
<tr>
<td>Dependent</td>
<td>5.17</td>
<td>4.12</td>
<td></td>
</tr>
<tr>
<td>SELSA-Romantic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>13.87</td>
<td>11.73</td>
<td>1.01</td>
</tr>
<tr>
<td>Dependent</td>
<td>16.34</td>
<td>12.48</td>
<td></td>
</tr>
<tr>
<td>SELSA-Family</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>4.29</td>
<td>5.94</td>
<td>2.27</td>
</tr>
<tr>
<td>Dependent</td>
<td>6.17</td>
<td>6.35</td>
<td></td>
</tr>
<tr>
<td>Dissociation³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Dependent</td>
<td>2.32</td>
<td>6.46</td>
<td>.90</td>
</tr>
<tr>
<td>Dependent</td>
<td>3.48</td>
<td>2.38</td>
<td></td>
</tr>
</tbody>
</table>

Note.

1. Non-Internet dependent (n = 115) was abbreviated as Non-dependent and Internet dependent (n = 29) was abbreviated as dependent.

2. Between groups df = 1, within groups df=142, df total =143.

3. Dissociation is not normally distributed nor is its variance homogeneous (refer to non-parametric statistics cited in text).

*p < .05, **p < .01, ***p < .001
spend more time using newsgroups than did non-dependents, they did spend significantly more
time using email, the World Wide Web, and Chat Rooms ($F[1, 198] = 8.04, p < .01$, $F[1, 198] =
42.31, p < .001$, and $F[1, 198] = 16.68, p < .001$ respectively).

The second purpose of this study was to develop a model that can predict Internet
dependence from a combination of perceived social support, self-esteem, shyness, social and
emotional loneliness, gender, and level of dissociation. Through the development of such a
model it was expected that the relationship between Internet dependence and the six predictors
would be clarified and that the relative importance of these variables to Internet dependence
would be determined. Specifically, it was hypothesized that participants who perceived
insufficient social support, had relatively low self-esteem, were shy and lonely, male, and who
experienced dissociation while on-line would be more Internet dependent than participants who
perceived adequate social support, had relatively high self-esteem, were not shy or lonely, were
female, and did not experience dissociation while on-line. In order to test the stated hypothesis,
multiple regression analyses were conducted. Initially, all six predictors (including the total scale
scores for PSS and the SELSA) were entered into the regression equation. The resultant model
was, however, very poor regardless of the approach taken (e.g., stepwise or simultaneous).
Subsequently, total scores were replaced by subscale scores in instances where the subscale score
had a higher correlation to Internet dependence than did the total scale score. Given the largely
exploratory nature of this study and the fact that no reliable precedent had been established that
would justify the introduction of predictor variables into the regression in a specific order, the
stepwise or hierarchical regression technique was used in order to allow the data (rather than
assumptions which may or may not be accurate) to guide the outcome (see Tables 7 & 8).
Of the variables included in the analysis, only participants’ scores on the friendship subscale of the perceived social support measure (PSS-Fr) had a modest and statistically significant correlation with the outcome variable, Internet dependence (r = -.33, p < .001; see Table 7). This finding was somewhat surprising given that, with the exception of self-esteem, Internet dependents differed significantly from non-Internet dependents on all of the predictors when analysis of variance was performed. This apparent inconsistency is probably due to the fact that perceived social support from friends is explaining much of the same variance in Internet dependence as are the other predictors (e.g., loneliness and shyness, and perhaps to a lesser extent, gender and dissociation). In other words, perceived social support from friends probably explains some of the same variance in Internet dependence that is explained by loneliness and shyness. Although many other predictors had statistically significant correlations with the dependent variable, these correlations were quite low (i.e., r = .08 to .19, p < .001). Moreover, when the stepwise multiple regression procedure was conducted the only predictor that made it into the equation was PSS-Fr. Perceived social support from friends had an unstandardized regression coefficient, $b = -.36$, and a standardized regression coefficient, $\beta = -.33$ (p < .001). Despite the fact that this model met the criteria for statistical significance (F[1, 162] = 20.18, p < .001) it explained only 11% of the variance in participants’ scores on the Internet dependence scale since it has a multiple R = .33 and a corresponding $R^2 = .11$. These findings mean that 89% of the variation in participants’ scores on the Internet dependence scale is attributable to variables other than PSS-Friends.

An examination of the correlation matrix associated with the original multiple regression analysis using raw, non-ranked scores resulted in the discovery of some meaningful correlations
between variables measured in this study (see Table 8). For example, there was a very strong
negative correlation between participants' scores on the shyness scale and their scores on the self-
esteeem measure ($r = -0.68$, $p < 0.001$), and a moderate negative correlation between scores on the
self-esteem measure and SELSA scores ($r = -0.33$, $p < 0.001$). Additionally, SELSA scores were
moderately correlated with shyness scores ($r = 0.37$, $p < 0.001$). Moreover, participants' scores on
the social subscale of the SELSA (SELSA-S) were modestly correlated with: PSS-Fr ($r = -0.48$,
$p < 0.001$), self-esteem ($r = -0.33$, $p < 0.001$), shyness ($r = 0.37$, $p < 0.001$), and dissociation ($r = 0.31$, $p < 0.001$).

Next, correlational analyses were performed using participants' transformed scores on the
Dissociation and Internet dependence scales. Although it is difficult to conceptualize the meaning
of a correlation between the square root of one variable and the logarithm of another, the resultant
Pearson Product Moment Correlation ($r$) of the relationship between the square root of Internet
dependence and the logarithm of Dissociation was relatively similar to the result obtained using
the non-parametric Spearman's Rho correlation ($r_s$) that calculates the relationship between two
ranked variables. In both instances of correlational analysis, the resultant correlation was modest,
positive, and significant at the .001 level. Specifically, the $r = 0.35$, $p < 0.001$ when the transformed
variables were used and $r_s = 0.44$, $p < 0.001$ when the ranked variables were used. Given the nature
of the frequency distributions associated with Internet dependence and Dissociation, and the fact
that both distributions violated the assumptions that underlie parametric statistics, the non-
parametric Spearman correlation will be taken as more accurate and meaningful.
### Table 7

**Summary of Stepwise Multiple Regression Analysis for All Variables Predicting Internet Dependence (n=164)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation With DV (r)</th>
<th>R</th>
<th>SE R</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>----</td>
<td>3.52</td>
<td>.44</td>
<td>----</td>
</tr>
<tr>
<td>PSS-Friends</td>
<td>-.33***</td>
<td>-.36</td>
<td>.08</td>
<td>-.33***</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>-.18*</td>
<td>----</td>
<td>----</td>
<td>-.10</td>
</tr>
<tr>
<td>Shyness</td>
<td>.19**</td>
<td>----</td>
<td>----</td>
<td>.08</td>
</tr>
<tr>
<td>Social Loneliness</td>
<td>.18**</td>
<td>----</td>
<td>----</td>
<td>.03</td>
</tr>
<tr>
<td>Dissociation</td>
<td>.08</td>
<td>----</td>
<td>----</td>
<td>.01</td>
</tr>
<tr>
<td>Gender</td>
<td>.15*</td>
<td>----</td>
<td>----</td>
<td>.09</td>
</tr>
</tbody>
</table>

**Note.** R = .33, R² = .11

* p < .05  ** p < .01  *** p < .001
Table 8

Correlations Between Predictor Variables Included In Multiple Regression (n=164)

<table>
<thead>
<tr>
<th></th>
<th>PSS-Fr</th>
<th>SE</th>
<th>SHY</th>
<th>SELSA-S</th>
<th>DISS</th>
<th>SEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSS-Fr</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>.24***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHY</td>
<td>-.33***</td>
<td>-.68***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELSA-S</td>
<td>-.48***</td>
<td>-.33***</td>
<td>.37***</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISS</td>
<td>-.21**</td>
<td>-.27***</td>
<td>.27***</td>
<td>.31***</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>SEX</td>
<td>.19**</td>
<td>-.01</td>
<td>.08</td>
<td>.15*</td>
<td>-.08</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note:
Perceived Social Support from Friends (PSS-Fr)
Self-Esteem (SE)
Shyness (SHY)
Social and Emotional Loneliness - Social Subscale (SELSA-S)
Dissociation (DISS)
Gender (SEX)

* p < .05  ** p < .01  *** p < .001 (1-tailed)
A stepwise multiple regression using participants' rankings on the various scales (where a rank of 1 was assigned to the lowest score on a measure) was conducted (see Tables 11 and 12). Ranked Dissociation scores were entered on the first step and ranked PSS-Fr scores were entered on the second step ($\Delta R^2 = .04, p < .01$), $F (2, 161) = 21.32, p < .001$. For the ranked Dissociation scores the unstandardized coefficient ($B$) was $.39$ and the standardized coefficient ($\bar{B}$) was $.36$, and for the ranked PSS-Fr scores the $B = -.21$ and $\bar{B} = -.21$. An identical analysis was performed using transformed rather than raw or ranked scores on the Internet dependence and Dissociation scales. The fact that the same predictors were included in both regression models, the predictors were entered into the model in the same order (which implies that the predictors had the same relative importance in both models), and that both models explain approximately the same percentage of variance (20% for the transformed variables and 21% for the ranked variables) is encouraging and increases one's confidence in the results.

The non-parametric analogue to the Pearson Product Moment correlation (\(r\)), namely, the Spearman correlation (\(\rho\), ) was calculated to clarify the relationship between Dissociation scores, Internet dependence scores, and other variables. The Spearman correlation is based on ranked scores on two variables (a rank of 1 is assigned to the smallest/lowest value on each variable) instead of the actual value on that measure. The $\rho, = .44, p < .01$ for the relationship between participants' rank on the Internet dependence scale and their rank on the Dissociation scale. This moderate positive correlation means that those who had high ranks on the Internet dependence scale (indicative of high scores on the scale) also tended to have high ranks on the Dissociation scale (indicative of high scores on the scale).
Table 9

Summary of (Rank-Based) Stepwise Multiple Regression of Variables Predicting Internet Dependence (n= 164)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation With DV (r)</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>----</td>
<td>84.10</td>
<td>12.22</td>
<td>----</td>
</tr>
<tr>
<td>PSS-Friends</td>
<td>-.30***</td>
<td>-.21</td>
<td>.07</td>
<td>-.21**</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>-.16*</td>
<td>----</td>
<td>----</td>
<td>-.01</td>
</tr>
<tr>
<td>Shyness</td>
<td>.22**</td>
<td>----</td>
<td>----</td>
<td>.01</td>
</tr>
<tr>
<td>Social Loneliness</td>
<td>.24**</td>
<td>----</td>
<td>----</td>
<td>.00</td>
</tr>
<tr>
<td>Dissociation</td>
<td>.41***</td>
<td>.39</td>
<td>.08</td>
<td>.36***</td>
</tr>
</tbody>
</table>

Note.  \( R = .46, \ R^2 = .21, F (2, 161) = 21.32, p < .001, \Delta R^2 = .04, p < .01 \)

* \( p < .05 \)  ** \( p < .01 \)  *** \( p < .001 \) (1-tailed)
### Table 10

**Correlations Between Ranked Predictor Variables Included In Multiple Regression (n = 164)**

<table>
<thead>
<tr>
<th></th>
<th>PSS-Fr</th>
<th>SE</th>
<th>SHY</th>
<th>SELSA-S</th>
<th>DISS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSS-Fr</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>.29***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHY</td>
<td>-.37***</td>
<td>-.72***</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELSA-S</td>
<td>-.59***</td>
<td>-.36***</td>
<td>.44***</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>DISS</td>
<td>-.25**</td>
<td>-.23**</td>
<td>.38***</td>
<td>.32***</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Note.**

Perceived Social Support from Friends (PSS-Fr)
Self-Esteem (SE)
Shyness (SHY)
Social and Emotional Loneliness - Social Subscale (SELSA-S)
Dissociation (DISS)

* \( p < .05 \)  \( ** p < .01 \)  \( *** p < .001 \) (1-tailed)
Given the non-normal distribution associated with participants' scores on the Dissociation scale and the Internet dependence scale, the Spearman correlation should be considered more valid and appropriate than the Pearson correlation and findings based on the non-parametric Spearman correlations should take precedence over the Pearson correlation (the Pearson correlation between Internet dependence and Dissociation was close to zero and non-significant, \( r = .08, p > .05 \)). The Spearman correlation (\( r_s \)) between Dissociation and the SELSA-S scores was \( .32, p < .001 \) which is consistent with the Pearson correlation between these two variables, \( r = .31, p < .001 \). As expected, there was a positive correlation between scores on the Internet dependence scale and the amount of time that respondents spend on the Internet in an average week (\( r_s = .25, p < .001 \)).

Following the convention used when interpreting scores on the South Oaks Gambling Screen (SOGS), on which the Internet dependence scale was based, students were categorized as Internet dependent if their total score on the scale was greater than or equal to three (i.e., \( \geq 3 \)) and they were categorized as non-Internet dependent if they had a total score that was \( \leq 2 \). The treatment of participants' Internet dependence scores as a dichotomous variable allows one to evaluate whether a combination of the predictor variables (e.g., PSS, self-esteem, shyness, loneliness, dissociation, and gender) could accurately predict a participant's classification as Internet dependent or non-Internet dependent. Moreover, beyond the finding that 20-21% of the variance in students' scores on the Internet dependence scale was accounted for by a linear combination of the two predictor variables, Dissociation and PSS-Fr (based on multiple regression using transformed or ranked scores), two interesting questions could be answered through the application of logistic regression: (1) Is there a non-linear combination of variables that can correctly classify participants as Internet dependent or non-Internet dependent, and (2)
How does a one unit change on the total score on a scale(s) or subscale(s) affect a participant's probability of being classified as Internet dependent?

In order to answer these questions logistic regression analysis was conducted using the six predictor variables that were hypothesized to explain the variance in participants' Internet dependence scores and status (see Table 11). Although other approaches (e.g., stepwise, forward, backward, etc. logistic regression procedures) were also implemented, the simultaneous logistic regression procedure in which all variables were entered into the equation at one time yielded the model that accounted for the most explained variance while remaining statistically significant. The results of these analyses were similar to those derived through the stepwise multiple regression analysis using raw scores in the sense that PSS-Fr was the only statistically significant predictor. There was a negative relationship between PSS-Fr and Internet dependence ($\beta = -.11$) and the odds ratio suggests that for a 1 unit increase in total PSS-Fr score, a participant is 11% less likely to be Internet dependent ($-2$ Log Likelihood Chi-Square = 126.79, $p < .05$). In other words, and as expected, for every one point increase in a participant's total score on the PSS-Fr subscale which is indicative of greater perceived support, a participant is 11% less likely to be (correctly) classified as Internet dependent. Despite the fact that the odds ratio is not terribly effective at predicting Internet dependence status, this logistic regression model is relatively accurate because overall it classifies 81% of cases correctly.
Table 11

Summary of Logistic Regression Analysis for All Variables Predicting Internet Dependence Status (n= 144)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (β)</th>
<th>Standard Error</th>
<th>Wald Statistic</th>
<th>Odds Ratio (e^β)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSS</td>
<td>-.11</td>
<td>.06</td>
<td>3.77*</td>
<td>.89</td>
</tr>
<tr>
<td>Self Esteem</td>
<td>.03</td>
<td>.04</td>
<td>.52</td>
<td>1.03</td>
</tr>
<tr>
<td>Shyness</td>
<td>.08</td>
<td>.04</td>
<td>4.98*</td>
<td>1.08</td>
</tr>
<tr>
<td>Loneliness</td>
<td>.01</td>
<td>.02</td>
<td>.18</td>
<td>1.01</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>3.69</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5.43</td>
<td>25.56</td>
<td>.83</td>
<td>227.93</td>
</tr>
<tr>
<td>Female</td>
<td>6.33</td>
<td>25.56</td>
<td>.81</td>
<td>560.67</td>
</tr>
<tr>
<td>Dissociation</td>
<td>.00</td>
<td>.03</td>
<td>.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Constant</td>
<td>-8.97</td>
<td>25.63</td>
<td>.12</td>
<td></td>
</tr>
</tbody>
</table>

Note. Participants' total score on the Perceived Social Support scale is abbreviated as PSS

* p < .05  ** p < .01  *** p < .001

- 2 Log Likelihood Chi-Square = 126.79, p < .05.
DISCUSSION, CONCLUSIONS, AND FUTURE RESEARCH DIRECTIONS

It was hypothesized that participants who were Internet dependent would experience a greater degree of dissociation while on-line than would non-Internet dependents and this hypothesis was supported. Moreover, participants’ scores on the Dissociation scale were somewhat predictive of Internet dependence in a multiple regression analysis.

It was hypothesized that participants who perceived inadequate social support would be more Internet dependent than participants who perceived adequate social support. As expected, Internet dependents had lower scores on the perceived social support scale overall (PSS), the perceived social support from friends (PSS-Fr), and the perceived social support from family (PSS-Family) subscales than did Non-Internet dependents. Moreover, participants’ scores on the PSS-Fr subscale were somewhat predictive of Internet dependence in multiple and logistic regression analyses. On the perceived social support from Internet friends (PSS-Int) subscale, Internet dependents had higher scores (which were indicative of more perceived social support) than did non-Internet dependents. Although it was not hypothesized explicitly that Internet dependents would perceive more social support from their on-line friends, this finding is consistent with the notion that Internet dependents gravitate toward the Internet to seek social support that they might be missing from their traditional, face-to-face relationships with their friends and family.

Although it was hypothesized that participants who had relatively low self-esteem would be more Internet dependent than those who had relatively high self-esteem, Internet dependents did not differ significantly from non-Internet dependents in terms of their measured social self-
esteem; thus, this hypothesis was not supported.

It was predicted that participants who demonstrated more shyness on a questionnaire designed to measure this characteristic would be more Internet dependent than participants who were not shy. As hypothesized, participants classified as Internet dependent demonstrated more shyness as measured by the Revised Shyness Scale than did students who were classified as non-Internet dependent, therefore, this hypothesis was also supported.

It was anticipated that participants who demonstrated more social and emotional loneliness would be more Internet dependent than participants who demonstrated less social and emotional loneliness and this hypothesis was partially supported. The partial support is due, at least to some extent, to the ability to distinguish between social, family, and romantic loneliness. If one considers family and romantic loneliness then one finds that Internet dependents and non-Internet dependents did not differ significantly from one another. If, however, one considers social loneliness, then the hypothesis was supported because Internet dependents had higher scores than did non-Internet dependents on the social loneliness subscale of the Social and Emotional Loneliness Scale (SELSA). The fact that Internet dependents demonstrated more social loneliness is consistent with the finding that the most popular Internet applications (e.g., email and Chat Rooms) have inherently social components.

Lastly, it was hypothesized that Internet dependence would be more common among male than female participants and this hypothesis was also supported. Among the female participants, there were fewer Internet dependents and more non-Internet dependents than one would expect by chance and among male participants there were more Internet dependents and fewer Non-Internet dependents than one would expect by chance.
Interestingly, in this study 20% of the participants were Internet dependent and 80% were non-Internet dependent, ratios that were the exact opposite of the findings reported by Young (1996b). The present findings are, however, relatively consistent with those reported by Egger and Rauterberg (1996) who found that a small minority (10%) of their research participants considered themselves to be dependent upon the Internet. Another study based on a sample of college students conducted by Scherer (1997) suggests that a relatively small minority of Internet users (13%) reported symptoms associated with Internet dependence. Most research (e.g., Dunn, 1998; Egger & Rauterberg, 1996; Scherer, 1997) suggests that non-Internet dependence is the rule and that Internet dependence is the less common exception. The fact that the results of one study widely diverged from the rest, and that non-Internet dependence appears to be the rule rather than the exception suggests that the way in which some studies are promoted might lead to the recruitment of a biased research sample and unique results.

Most (81%) of the research participants surveyed at the Southwestern Ontario university owned personal computers (PCs) and, consequently, had sufficient access to them; moreover, most of the participants use the Internet on a regular basis. These figures suggest that Communications Studies students at the mid-sized university in Southwestern Ontario (and possibly students at large) are more likely to have their own computers and use the Internet than are members of the Canadian population. For example, in “1997, 4.2 million [36%] of the 11.6 million households in Canada had a home computer, according to Statistics Canada ... [and] just 1.5 million [13% of] Canadian households were making use of the Internet” (Jackman, 1999b, p. A20).

The overwhelming majority of the students surveyed (96%) indicated that they know how
to access the Internet, and most students also owned their own PC, therefore, it is likely that much Internet-related activity is attributable to respondents’ choice rather than technological ignorance, inability, or limited access. Sixty-four percent of the participants surveyed use the Internet on a weekly basis which suggests that at least in terms of Internet use, this sample of students uses the Internet more frequently than does the general population. For example, “According to A.C. Nielsen, the market-research company, 23% of Canadians aged 12 and over used the Internet in September of 1996. By September ... [1998] ... it was 38%” (Jackman, 1998, p. A26; Jackman, 1999a), and according to more recent statistics “only 25% of Canadian households use the Internet” (Evans, 1999, p. B24). Despite the fact that these figures do not match perfectly, they illustrate the point that most estimates are much lower than the 64% reported in the present study involving students.

The majority of the respondents reported that their Internet-based social interactions were ‘worse and less meaningful’ than were their real life interactions whereas only 10% reported that their on-line interactions were ‘better and more meaningful’ than their real life social interactions. Not surprisingly, 85% of the participants reported that they prefer their off-line, traditional social interactions over their Internet-based interactions.

There was a strong relationship between Internet dependence and Dissociation but given the correlational nature of this study it is impossible to conclude that Internet dependence causes Dissociation or vice versa. This study does, however, provide initial support for the notion that Jacob’s (1986) General Theory of Addiction applies within the context of Internet dependence and that Internet dependence shares common ground with other behavioural addictions (e.g., compulsive gambling, overeating, and sexual addictions; Gupta, 1997; Martinez-Pina et al., 1991)
which are also marked by Dissociation.

Two indices of perceived social support, specifically perceived social support from friends (PSS-Fr) and perceived social support from family (PSS-Fa), showed the predicted relationship to Internet dependence. These measures are psychometrically sound and they have demonstrated validity for use with a student sample (e.g., Procidano & Heller, 1983). It is, therefore, possible that participants' lack of social support from friends and family is being manifested in their dependence on the Internet as measured in this study and/or that these Internet dependent students are gravitating to the Internet to seek social support to compensate for a perceived shortage of social support in their real lives. The fact that Internet dependents perceived significantly more social support from their Internet friends than did non-Internet dependents is consistent with the notion that Internet dependents may be using the Internet in order to compensate for inadequate social support from the traditional sources. Although there is a clear relationship between Internet dependence and social support from family and friends, on- and off-line, one cannot infer causation given the correlational nature of this study. Perhaps future research participants can be asked explicitly if they seek social support on-line to make up for insufficient support off-line.

Self-esteem, particularly within the social context of social situations, as measured by the Texas Social Behaviour Inventory (TSBI) did not show the predicted relationship with Internet dependence. Given that the TSBI is an excellent measure of social self-esteem that has been used successfully with other student samples, the lack of a significant relationship between Internet dependence and self-esteem is unlikely to be an artifact of measurement. The current study was, however, exploratory so the finding that Internet dependents did not differ significantly from Non-Internet dependents would benefit from confirmation in future studies. Moreover, it is possible
that self-confidence, a characteristic that is related to, yet more specific than self-esteem, might vary as a function of a respondent’s Internet dependence.

The full-length TSBI has been factor analysed and all 32 items contribute to one large factor and four conceptually related factors: confidence, dominance, social competence, and social withdrawal (Helmreich & Stapp, 1974). The two abbreviated parallel forms of the TSBI each consist of 16 items and both forms have very high correlations with the full length scale and have very high alternative form reliability. If, at some point, the items designed to measure the four components or factors associated with social self-esteem are examined explicitly it might be found that although Internet dependents do not differ on overall social self-esteem they do differ on one or more of the sub-components of social self-esteem. Future research might involve revisiting the full length scale to identify which items belong to which specific factors, and evaluating differences between Internet dependents and non-Internet dependents on the various subtypes of social self-esteem. Looking at specific aspects of social self-esteem in the same way that various aspects of perceived social support and loneliness were examined in this study might clarify the ways in which computer and/or Internet-mediated communication is related to specific elements of self-esteem.

Shyness demonstrated the predicted relationship with Internet dependence; Internet dependents demonstrated more shyness than did non-Internet dependents. The Revised Shyness scale had excellent psychometric properties and it has been used successfully with student samples before. Therefore, it is reasonable to accept these findings at face value. The Revised Shyness Scale evaluates the components of social anxiety and inhibition present in the shyness syndrome (Leary, 1991). Consequently, it seems plausible that Internet dependents who spend
significantly more time engaging in email and chat room based communication would
demonstrate significantly more social anxiety and social inhibition in the traditional off-line social
environments that the scale’s developers had in mind when creating the scale, as measured by the
Revised Shyness Scale, than non-Internet dependents who spend less time engaging in computer-
mediated communication.

Internet dependents demonstrated significantly more social, but not family or romantic,
loneliness than did non-Internet dependents. Perhaps the reason why these participants have
chosen the Internet as their object of dependence is because of the match between their social
needs and the social aspects of Internet applications. The Social and Emotional Loneliness Scale
(SELSA) has demonstrated reliability and validity for use with a student sample; therefore, it is
reasonable to assume that the findings represent an underlying truth. The fact that this study was
correlational does, however, mean that causal conclusions cannot be made but at least these
preliminary findings suggest that the relationship between social loneliness and Internet
dependence should be examined further in future studies.

The relationship between Internet dependence and gender was as anticipated; males were
more likely to be Internet dependent than were females. This pattern matches the gender pattern
in various forms of dependence reported elsewhere (e.g., Dawson, 1996; Oppenheimer, 1991;
Shotton, 1991) whereby males demonstrated more alcohol, drug, and computer dependence
(respectively) than did females. The sample on which the present findings are based was fairly
balanced in terms of the ratio of male to female participants, therefore, the findings are unlikely to
be due to chance and should be replicable.
Placing the Present Findings in the Context of Previous Findings

The present study was designed, in part, to see whether Jacobs' General Theory of Addiction (1986) applies to Internet dependence in the same way that it applies to other addictive behaviours such as problem gambling, alcoholism, and overeating (e.g., Gupta, 1997; Martinez-Pina et al., 1991). Jacobs postulated that an addictive preoccupation, such as gambling or Internet use, allows an individual to escape from painful realities and act out fantasies of being wanted, successful, admired, and recognized. These dissociative states are thought to be common to all forms of addiction and allow the individual to escape into denial from psychological distress. This 'altered state of identity' which is believed to be the goal of addictive behaviour is positively reinforcing and is therefore instrumental in maintaining the addiction. The results of this study lend support to the notion that dissociation is a marker for various forms of dependence since Internet dependents demonstrated more dissociation than did non-Internet dependents, a finding that replicates the findings reported by Howitt (1997). Another positive outcome of the current study was the psychometric evaluation (which was previously unreported) of the dissociation scale which suggests that the scale has very good internal consistency, at least within the context of Internet dependence in a university student sample.

Although relatively few studies have investigated the relationship between social support and Internet use (and/or dependence) or the relationship between loneliness and Internet use (and/or dependence), the few that have been conducted and subsequently published suggest that there are positive associations between Internet use (and/or dependence), social support, and loneliness (e.g., Kraut et al., 1998; Young, 1997).

For example, Kraut et al. (1998) utilized a longitudinal approach to evaluate the
relationship between Internet use and social involvement. The most relevant components, at least in terms of the comparisons between Kraut et al. and the present study, are the fact that one aspect of social involvement was social support and that one aspect of psychological well-being was loneliness. Kraut et al. used a different measure of social support than was used in the present study; social support was evaluated using 16 (of 40) items from the Interpersonal Support Evaluation List (Cohen et al., 1985). Kraut et al. conceptualized psychological well-being as being comprised of the relative absence of loneliness, stress, and depression. Loneliness was measured using three (of 20) items from the UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980; the three items selected had an $\alpha = .54$) rather than the abbreviated but multidimensional Social and Emotional Loneliness Scale ($\alpha = .87$).

There are several differences between Kraut et al.'s (1998) study and the present study. Most notably, Kraut et al. used a community rather than a student sample, a longitudinal rather than a cross-sectional design, and operationalized social support and loneliness differently. Despite the methodological differences between the two studies, and some slightly irregular statistical procedures and interpretations made by Kraut et al., both studies point in the same general direction: greater Internet dependence, which in the present study is also correlated with Internet use, was associated with greater loneliness and less social support. Essentially, the present study replicates Kraut et al.'s findings regarding loneliness and social support, and extends their findings to the context of Internet dependence among students. The present study also extends Kraut et al.'s findings in terms of specific aspects of loneliness because of the measures that were utilized. Kraut et al. used three items taken from the UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) which when used in its entirety provides a good global index
of loneliness with an emphasis on social loneliness (Cramer & Barry, in press). In the present study, an abbreviated form of the Social and Emotional Loneliness Scale (SELSA) was used which facilitated the examination of social, romantic, and family loneliness and how each subtype of loneliness was related to Internet dependence. Interestingly, Internet dependents and non-Internet dependents differed only in terms of social loneliness, a finding which reinforces the notion that the Internet is often used for social purposes and that perhaps people who experience more social loneliness use the Internet to compensate for these feelings.

Perhaps more important is the fact that the present study was able to offer the distinction between: (a) an association between Internet use and/or dependence and global loneliness, and (b) an association between Internet use and/or dependence and social but not family or romantic loneliness (in other words, a difference in social but not overall or global loneliness, family, or romantic loneliness). Similarly, because of the measure of perceived social support that was used in the present study it was possible to report the specific relationship between Internet use and/or dependence and perceived social support from family and on- and off-line friends rather than stating that a relationship exists between overall social support and Internet use and/or dependence.

Young (1997) noted that Internet dependents who were surveyed cited social support as a major benefit of their Internet use. This finding suggested that social support was probably a relevant factor in an Internet dependent person's decision to use the Internet. Based on Young's study we do not know, however, if Internet dependents and non-Internet dependents differed in terms of perceived (or real social support) from family, traditional friends, or on-line friends because non-dependent Internet users were not asked what they found rewarding about the
Internet. The present study demonstrated that among a sample of university students, Internet dependents perceived less social support from family and traditional off-line friends, and perceived more social support from their Internet friends than did non-Internet dependent students. The present study, therefore, clarified an important difference between dependents and non-dependents that was not evident from previous research. Equally important is the fact that the present study, unlike Young's, provides information about three specific subtypes of perceived social support whereas the previous studies had conceptualized social support differently and more globally. Young's research sample was recruited on-line to participate in a study about Internet Addiction. Consequently, it is reasonable to infer that Young's participants were drawn from a population of people who used the Internet and who were interested in Internet Addiction and who, therefore, may not be typical of the general population. Although the present sample may or may not be representative of the general population, it is arguably more typical of the general population than a sample drawn from World Wide Web (WWW) pages advertising a study of Internet Addiction.

Procidano and Heller's (1983) measures of perceived social support from family and traditional (but not Internet) friends have been used previously in studies involving university students. The present study, however, utilized an abbreviated form of Procidano and Heller's two subscales and these subscales demonstrated desirable psychometric properties and the same factor structure as the full length subscales. Moreover, Internet dependents and non-Internet dependents differed significantly on both of the abbreviated subscales, and also on the newly adapted perceived social support from Internet friends subscale. The abbreviated subscales might be of use to future researchers who are interested in evaluating perceived social support from
family, traditional friends, or Internet friends in a sample of adolescents or adults, and who would prefer to use a shorter version that has psychometric properties that are similar to the full scale.

The present study also provides a unique contribution to the field of social psychology with respect to shyness and self-esteem in the sense that there are no previously reported studies that have explicitly examined the relationship between these variables and Internet dependence and/or use. Kiesler et al. (1984) did contend that the ability to communicate via computer with other people under an assumed identity provides computer communicators with a cover of anonymity that helps them to overcome certain interpersonal difficulties (e.g., severe shyness and/or low self-esteem) that they might experience in real life. At the time of Kiesler et al.'s study, however, the general population did not have widespread access to email and Chat Rooms, consequently, it was not possible for them to explore the relationships between shyness, self-esteem, and Internet use to the same extent that it is possible to do now. The fact that Internet dependents demonstrated more shyness but no less self-esteem than did non-Internet dependents supports, but cannot confirm, Kiesler et al.'s contention.

The majority of the research conducted on Internet use suggests that men are more likely than women to use email (McCormick & McCormick, 1992) and News groups (Parks & Floyd, 1996) and subsequently participate in studies about their use of these Internet applications. Men are also more likely to experience computer addiction (Shotton, 1991) but there has been some conflicting evidence regarding Internet use and Internet dependence (e.g., Brenner, 1997; Egger & Rauterberg, 1996; Griffiths, 1997; Young, 1996b). For example, Egger and Rauterberg (1996) and Brenner (1997) reported that Internet use and subsequent dependence is more common among males whereas Young (1996b) suggests the opposite. The results of the present study
replicate most of the previous findings: the majority of the Internet dependents were male.

Brenner’s (1997) findings were based on a sample that was quite different from the current sample of participants. Seventy percent of Brenner’s valid surveys were completed by males, whose average age was 34 years old, who used the Internet for 19 hours per week, and had been using the Internet for two years. In contrast, the current sample was evenly balanced between males and females, was younger, and tended to use the Internet for much less time per week (i.e., less than 10 hours rather than close to 20 hours per week). Similarly, Egger and Rauterberg’s (1996) research sample was biassed in a way that was quite different from the biases demonstrated in the current sample, yet their conclusion, like Brenner’s conclusion, that Internet dependence is more common among males was replicated in the current study. Egger and Rauterberg posted a questionnaire designed to measure Internet dependence and related behaviours on the WWW. The people who responded to their on-line survey tended to be male (84% male and 16% female), whose average age was ‘around 30 years’, and 55% of the participants had at least one college degree. The fact that Internet dependence seems to be a male phenomenon whether the research sample is comprised primarily of students or non-students, and whether the participants were recruited on-line or off-line provides some evidence for the generalizability of the conclusion that Internet dependence is more common among men than women.

Implications of the Research Findings

Jacobs’ General Theory of Addictions (1986; 1993) postulates that individuals who are addicted to one or more substances and/or behaviours will demonstrate more dissociation while engaging in their favoured behaviour or using their substance(s) of choice than will non-addicted
people. Internet dependents did in fact demonstrate more dissociation than did Non-Internet dependents which in turn suggests that the General Theory of Addictions applies within the context of Internet dependence and also provides some construct validity for Internet dependence. The fact that Internet dependence is associated with dissociation in the same way as compulsive gambling, alcoholism, and overeating suggests that some of the ways in which these other conditions are treated might prove useful within the context of Internet dependence. Another characteristic that Internet use and gambling appear to share is the ‘randomness and the intermittent reward’ that occurs when Internet users search the WWW and ‘meet’ new people in Chat Rooms (Petrie, 1998 as cited by Jackman, 1998) and this observation might be another area to examine further in future studies.

Common sense suggests that in many important respects, having a well-developed social life is associated with having adequate social support since social support refers to the resources provided by one’s interpersonal relationships (Cohen & Hoberman, 1983). Although the present study was correlational rather than experimental, the results are consistent with the notion that people who appreciate the benefits associated with increased social support (e.g., psychological well-being; Kraut et al., 1998; Procidano & Heller, 1983) gravitate toward the various Internet communities where they can experience the social support that they do not perceive from the traditional sources of family, friends, and other off-line associates. At this point, however, it is difficult to know whether the greater amount of social support that Internet dependents perceive from their on-line friends exerts a positive, negative, or neutral effect on various aspects of their lives. If the net effect is neutral or positive then there is no cause for worry or alarm. If, however, it turns out that the perception of social support from Internet friends is based on
superficial or even false relationships that Internet dependents are substituting in place of real and possibly more significant social support from family and traditional friends then it might be an indication of problems to come. Moreover, perceived and received social support are negatively correlated with health outcomes such as mortality among a sample of elderly people (Sarason et al., 1987) and if this finding generalizes to other segments of the population then Internet dependents who perceive less social support from family and friends are potentially at risk.

Future studies might determine that Internet dependents use the Internet, rather than engaging in another potentially addictive activity such as gambling, because they are seeking social support on-line to compensate for inadequate off-line social support (currently all that we know is that Internet dependence is associated with greater perceived social support from Internet friends but less PSS from family and traditional off-line friends). If Internet dependent students are found to use the Internet because they are seeking social support on-line, then perhaps efforts can be made to enhance the quantity and quality of campus programs designed to foster social interaction, particularly for those who are new to the university environment and may not have access to the same levels of social interaction as they have had previously. If these real life activities fulfill students’ needs for social support while consuming less time than visiting Chat Rooms, sending email, and surfing the WWW do, then perhaps students will benefit. The assumption here is that students will gain the support or at least the perception of social support while not incurring the problems associated with heavy or dependent use of the Internet (e.g., preoccupation with the Internet that might result in distraction or poor concentration, lost time for school and/or work related activities because they are on-line too much, less time for sleep, etc.). Moreover, psychologists and others who in the future may be required to provide therapy to
people who have problems associated with Internet dependence can use the fact that the typical Internet dependent student perceives less social support from their family and traditional friends but perceives more social support from on-line friends as background information that might influence their approach to treatment. In some cases it might be appropriate to help Internet dependents develop social skills that will help them to improve aspects of their interpersonal relationships so that their relationships can provide greater support. The present findings provide information regarding the correlates of Internet dependence but this is really only an initial step toward a greater understanding of the phenomenon of Internet dependence. The fact that perceived social support from friends was a statistically significant predictor of Internet dependence in multiple and logistic regression reinforces its relative importance in the development and/or maintenance of Internet dependence. The regression models do not, however, explain most of the variance in Internet dependence scores which means that there are other (possibly more important) factors at work that have yet to be identified.

It was predicted that people with low self-esteem, particularly those who also experience anxiety, depression, jealousy, and loneliness (Baumeister, 1993) in their traditional face-to-face and/or telephone interactions could improve the quality of their social interactions by interacting with others over the Internet. The rationale was that while socializing on-line, it might be easier for people with low self-esteem to impersonate the personal characteristics that they lack (or believe that they lack) in their real lives. Perhaps in the process of their on-line role playing these people can re-invent themselves as ‘better versions’ of themselves so that the negative emotions that they experience during real life interactions are minimized or absent in their on-line interactions. This strategy may make their on-line social contact more rewarding than their off-
line interactions and might even diminish their experience of loneliness.

There is evidence that some people with low self-esteem do not have what it takes to develop well-developed and full social lives or social support networks (e.g., Baumeister, 1993; Nurmi et al., 1997). Consequently, it is possible that some of these people with low self-esteem, who may also lack adequate social networks, and who have Internet access, will gravitate to the Internet where characteristics that they might feel insecure about are easier to conceal than is possible in real life. It is, therefore, easy to predict that some people will be drawn toward Internet-based social interactions because while they are on-line they can experience social interaction and inclusion which is thought to be related to enhanced self-esteem (Baumeister, 1993).

Previous and present research (e.g., Jones & Briggs, 1984) has found that self-esteem and shyness are negatively correlated. Although the anticipated relationship between self-esteem and Internet dependence was not borne out in the present study, the negative relationship between self-esteem and shyness was replicated (Jones & Briggs, 1984). On the basis of this exploratory and preliminary study, one might recommend that psychologists and others who are interested in or charged with helping Internet dependents overcome their difficulties focus their interventions on issues that are beyond self-esteem since the current study suggests that self-esteem is not an important determinant or correlate of Internet dependence.

People who are shy might be unwilling or unable to engage in behaviour that leads to the development of meaningful relationships (e.g., Horowitz & de Sales French, 1979; Jones, 1985). Moreover, strangers and friends have described shy people as less attractive, less friendly, less open, less warm (Jones & Briggs, 1983, as cited in Jones, 1985) snobbish, unfriendly, and
untalented (Briggs et al., 1983 cited in Jones, 1985). Given this constellation of somewhat undesirable characteristics it is easy to see how these qualities are likely to impair the development of relationships. It is possible that people who, as a result of their shyness, experience difficulties interacting socially with others might have an easier time socializing on-line than they do off-line. This notion was supported by the fact that Internet dependents, who on average spend more time on-line, demonstrated more shyness than did non-dependents. On-line interactions are not likely to elicit the same level of emotional arousal and discomfort that off-line interactions often generate. Internet-based social interactions might be easier for shy people to manage because they might find that the Internet context is more egalitarian and less discriminatory (e.g., Rheingold, 1993), and therefore, provides a forum in which they can establish meaningful relationships perhaps even to a greater extent than they can accomplish this task off-line. Shy people might have an easier time developing relationships on the Internet because in many respects computerized communication is less threatening than meeting and communicating with others in person (Kiesler et al., 1984). Moreover, “people who are shy have an opportunity to relate on-line, developing social skills and increasing their confidence as they go” (Cooper & Sportolari, 1997) and as with many activities and skills, practice makes perfect (or at least better). These preliminary findings suggest that psychologists and others who are involved with Internet dependents might try to incorporate social skills training into their psychological interventions to help dependents overcome issues that might be related to their shyness and to help dependents interact with people in traditional (i.e., non-computerized) ways rather than relying on Internet-based relationships.

Loneliness has been associated with inadequate social skills such as shyness, and poor
self-regard (e.g., low self-esteem; Jones & Briggs, 1983) in the past and it was moderately correlated to shyness in the present study. Moreover, Internet dependents demonstrated more social loneliness than did non-Internet dependents. By definition, lonely people desire more social interaction than they currently have, and given the large number of opportunities for socialization that are available on the Internet, it makes sense that Internet dependents who generally experienced a higher level of social loneliness than did non-dependents spent more time on-line using email and conversing in Chat Rooms. The current study was correlational rather than experimental in nature. Therefore, it is inappropriate to claim that social loneliness caused a higher degree of Internet dependence since all that is clear is that Internet dependence was associated with a higher level of social loneliness. It is possible, however, that should Internet dependents ever seek help to overcome their Internet related difficulties, one aspect of their lives that might deserve attention and amelioration is their level of social loneliness.

In terms of the implications that might have relevance within the broader social context of the workplace, it is possible that work environments and work arrangements that facilitate and/or provide opportunities for substantial social support while minimizing employees' experiences with social loneliness and minimizing reasons for employees to feel shy and insecure might decrease the extent to which Internet dependence is maintained and allowed to adversely affect employees' productivity and ability to concentrate. These directives are not based on the notion that inadequate social support, social loneliness, or shyness cause Internet dependence, but rather they are based on the understanding that these characteristics are associated with Internet dependence. In other words, since the perception of relatively high levels of social support from family and friends is not associated with Internet dependence, it makes sense to do whatever is
possible and feasible to facilitate the perception of social support from these sources. For instance, workshops and/or retreats that explore and enhance supportive relationships can be offered to employees as a benefit of their employment. Likewise, the physical arrangement of work space and the way that work is allocated can be designed to maximize the warmth, friendliness, and non-threatening aspects of teamwork such that employees are less likely to experience loneliness and are more able to overcome the problems associated with shyness. The rationale here is that if non-Internet dependents are less likely to demonstrate social loneliness and shyness then anything that diminishes the experience of loneliness or shyness might work to minimize the probability of Internet dependence.

Limitations Associated With the Research Findings

The fact that this study was conducted using questionnaires with forced-choice response options imposes limitations on the range of participants’ possible responses. If this study had been conducted through the use of semi-structured interviews in which all participants were asked the same questions (to facilitate meaningful comparisons between responses), yet given the opportunity to offer comments that extend beyond the researcher’s pre-conceived questions (and can, therefore, capture unanticipated yet important responses), more information might have been gathered. Qualitative research methods that impose less structure on participants’ responses can sometimes provide more insightful and detailed information than can be generated through the use of survey research methods. It is, however, possible that less information might have been gathered from interviews because interviews are much more time consuming to conduct (therefore, fewer people tend to be included in qualitative studies) and do not necessarily guarantee a better understanding of any given phenomenon. Qualitative studies based on
relatively small sample sizes often require larger follow-up studies designed to provide additional substantiation of the preliminary findings.

In the current study, the reliance on a student sample increased the probability of finding participants who fell at both extremes of the Internet use and Internet dependence spectrums. Among university students there is a higher level of access to computers and the Internet than there is within the general population. Therefore, it should be easier (at least in theory) to find a portion of the student population who are heavy or perhaps even dependent Internet users. But, as with any sample of 'normal', non-institutionalized people, it was also expected that a portion of the student population is not dependent on the Internet because they rarely use the Internet. As more and more people gain access to the Internet chances are good that a more and more diverse population of people will be on-line. It would, therefore, be worth investigating the characteristics of perceived social support, shyness, self-esteem, loneliness, dissociation, and gender within the more heterogeneous population that will. It is entirely possible that the present results generalize to the general population but without asking a broader range of people it is unwise to assume widespread generalizability.

The use of self-report rather than more objective behavioural measures is another limitation associated with the design and execution of this study. Ideally, participants would have agreed to surveillance during which their every movement and social interaction could be observed and scored by a series of independent judges who had received training on how to recognize and measure instances of shyness, social support, loneliness, dissociation, etc. so that these behavioural measures could be used to cross-validate self-report measures provided by the participants. Behavioural measures do not necessarily suffer from the same problems associated
with biases inherent in self-report measures. For example, students participating in this study might have minimized the shyness and/or loneliness that they experienced because of self-consciousness and/or a desire to have socially desirable personality and behavioural characteristics. The argument against the validity of self-report measures does, however, apply to most of the research conducted in social psychology and, typically, as was the case with the instruments used in this study, efforts are made to compensate for issues such as social desirability and response biases by the developers of most modern measurement instruments.

In terms of the measurement of self-esteem, the decision to use the Texas Social Behaviour Inventory (TSBI) means that global self-esteem, particularly within social contexts was measured. Although this was an excellent choice given the fact that the social aspects associated with Internet use were central to this project, it is possible that other elements, such as self-confidence, might have been more predictive of Internet use and/or subsequent Internet dependence. If the focus had been on a more specific or at least a different aspect of self-esteem then a difference between Internet dependents and non-Internet dependents might have been discovered. This, however, is analogous to the trade-offs that are inherent in any form of survey research. Researchers are constrained by the limits of the typical respondents’ attention span which means that there is a limit to the number of questions that one can reasonably expect a participant to respond to. Moreover, one can only uncover differences between groups when questions designed to uncover these differences are included. In addition, one must balance the need to include a sufficiently broad range of questions to capture underlying differences between people with the need to keep one’s measures from becoming oppressively long.

The reliance upon a self-report measure of Internet use means that there is some error
inherent in the measurement. All things being equal, however, there is no compelling way around this when using a sample drawn from the university computing community. For example, the reliance upon computerized records of students' use of the university computer system would probably have introduced more, not less, error into the estimates of Internet and computer use (R. Patil, Director of Information Technology, personal communication, December 2, 1998). When students use PCs on campus they do not need to log on using their user identification, therefore, their use of the campus computers for Internet and other purposes goes unrecorded. It is only when students dial into the university computer system using their modems that their computer use is recorded for accounting and billing purposes. Moreover, when students use the popular Windows® based email programs (e.g., Netscape Communicator, Eudora, or Pegasus) they need not be on-line while composing, editing, or reading their email. Therefore, a student could spend 2 hours per day using their email software to perform these tasks but be connected to the Internet for 2 minutes during which they can download many new email messages and send composed email to others. Moreover, Patil, as would most ethical researchers and computer centre administrators, had concerns over students' privacy and confidentiality and did not want to provide information about students' Internet use.

**Issues Related to Internal and External Validity**

All of the measures used in this study had reasonably desirable psychometric properties. For example, the Cronbach's alpha values associated with the questionnaires used were all within an acceptable range for research purposes (i.e., the range was from a low of .72 for the PSS-Fr subscale to a high of .92 for the romantic loneliness subscale of the Social and Emotional Loneliness Scale [SELSA-R] and the Dissociation scale), and most of the item-total correlations
were positive and moderate to very high. The only potentially problematic psychometric issue is the fact that the abbreviated SELSA did not factor analyse in the exact same way that the full scale did. Specifically, items from the romantic and social loneliness subscales loaded strongly on the first and second factors (respectively) but the third factor which should have consisted entirely of items from the family loneliness subscale was comprised of items from the family subscale, and also some items from the social subscale. This third factor, however, explained considerably less variance than did the first two factors which suggests that family loneliness is much less important than the romantic or social loneliness factors. It is possible, therefore, that if additional items had been included on the abbreviated SELSA or if a larger number of students had participated in the study the third factor might have been more interpretable. Fortunately, however, Internet dependent students differed only in terms of their average scores on the social loneliness subscale and the factor that corresponds to that subscale was very interpretable.

The present study is best described as correlational since the extent to which changes in one variable corresponded with changes in one or more other variables was evaluated. The major benefit of this approach is that it is very realistic (rather than contrived) and it permits a higher degree of generalizability than would be possible if the findings were based upon a contrived and unrealistic laboratory situation. Moreover, with many naturally occurring phenomena, including Internet use, it is impossible to manipulate the variables of interest, therefore, correlational designs are the only ones that are feasible.

As is the case with most research in social psychology, the measurement and control of response bias poses challenges to the meaning of one’s findings (Paulhus, 1991). Response bias can be defined as a systematic tendency to answer a range of questionnaire items on some basis
other than what the items are supposed to measure. For example, a research participant might choose the most socially desirable option or they might choose the most extreme option. To the extent that a respondent demonstrates a particular bias consistently across time and circumstances, the bias is said to be a response style. The potential consequence associated with all self-report measures, whether they measure attitudes, traits, or behaviours, is that the responses might confound the content measured by the actual items and the respondent’s response style. In other words, a questionnaire might evaluate an individual’s response style in addition to the content of the questionnaire. If this is the case then every correlation with this measure is open to at least two alternative explanations: a real relationship between the variables of interest or a relationship between the respondent’s response style and the variable of interest (Paulhus, 1991).

Common response biases are socially desirable responding (e.g., the tendency to give answers that make oneself look good), acquiescence (e.g., the tendency to agree), and extremity bias (e.g., the tendency to use extreme ratings; Paulhus, 1991). Socially desirable responding was controlled, at least to a certain extent, by several methods employed by the authors of some of the measures used in this study (Cheek, 1983; DiTommaso & Spinner, 1997; Helmreich & Stapp, 1974; Procidano & Heller, 1983). For example, the scales utilized forced-choice formats in which the choices were, for the most part, equivalent in terms of their social desirability. Acquiescence and extremity biases were compensated for by reverse scoring many of the questionnaire items. The fact that many items were reversed means that as long as respondents read the items they would be forced to use the opposite end of the scoring continuum if they wanted to provide consistent answers. Moreover, in an effort to reduce demand characteristics,
students were assured of anonymity and they were asked not to place any identifying marks on the questionnaires or answer keys (except for student numbers that were required for the assignment of bonus points in return for their participation).

Previous studies have been based on samples recruited from World Wide Web (WWW) pages advertising studies and treatments for Internet Addiction (e.g., Brenner, 1997; Dunn, 1998; Egger & Rautenberg, 1996; Young, 1997), and are therefore, somewhat biased. On-line participants were recruited through newspaper ads, flyers posted on college campuses, postings on electronic support groups who offer help to those suffering from Internet addiction, and those who searched using the keywords “Internet addiction” on popular Web search engines (e.g., Yahoo.com, or AltaVista.com). These Internet-based samples are essentially a self-selected group of Internet users interested in Internet addiction who may differ in important ways from other Internet users who chose not to participate in the study. The Internet users who participated in these Internet-based studies may have experienced more dramatic negative consequences as a result of their Internet use than other Internet users (who did not participate in these on-line studies) and these adverse effects might have compelled them to respond to the advertising material. If this was the case, then the moderate and severe outcomes associated with Internet use may be a methodological artifact that exaggerated the effects of Internet dependence. Perhaps future researchers can administer the same survey to large samples of both populations (i.e., on- and off-line populations) to determine whether there are any meaningful differences. It is plausible that participants who are interested in Internet Addiction may be quite different from those who volunteer to fill out a survey in class for bonus points. The present study, although also biassed in the sense that it was an all volunteer, all student sample, introduces a slightly
different bias. The fact that the findings based on this all volunteer, all student sample replicated some previous findings (e.g., Dunn, 1998; Kraut et al., 1998; Young, 1997) suggests that there are some underlying truths about Internet dependents and how they differ from non-dependents.

**Future Research Directions**

The present study contributes to the field of social psychology in the sense that until now, it was not known that Internet dependents perceive less social support from their family and friends, but more social support from their Internet friends than do non-Internet dependents, and that Internet dependents demonstrate more social loneliness, more shyness, and more Dissociation while on-line than do non-Internet dependents. Despite the fact that Internet dependents differed from non-Internet dependents on many variables, when these variables were incorporated into a multiple regression model only perceived social support from friends and Dissociation experienced on-line were useful at predicting participants’ scores on the Internet dependence scale. Also important was the fact that these variables (plus a constant) left much of the variance in Internet dependence unexplained. Consequently, there are unidentified variables above and beyond perceived social support from friends and dissociation that predict Internet dependence.

For example, when Young (1997) asked a group of Internet dependents how they benefited from their time on-line they claimed that sexual fulfilment was a reinforcing aspect of Internet-mediated communication. It is now well known that sex-related World Wide Web (WWW) sites are among the most popular sites on the Internet (Cooper, 1997; Mardesich, 1999). Consequently, despite the relative absence of romantic loneliness as measured by the romantic loneliness subscale of the SELSA, it is possible that non-romantic sexual content might be luring
a lot of people to the Internet. Future studies might in fact find that the consumption or viewing of sexual content is the most popular activity on the Internet and it might explain much of the variance in Internet dependence that has yet to be accounted for.

When Young (1997) asked Internet dependents what they perceived as an attraction of using real time, direct dialogue features, the majority of Internet dependents stated anonymity. Kiesler et al. (1984) also contended that the ability to communicate via computer with other people under an assumed identity provides computer communicators with a cover of anonymity that helps them to overcome certain interpersonal difficulties (e.g., severe shyness and/or low self-esteem) that they might experience in real life. Naturally, no single study can incorporate all aspects of a phenomenon, and the issue of anonymity was not addressed in the present study. In the future it would be interesting to explore anonymity and the precise functions that it serves. For instance, do people assume different identities on-line and are assumed identities more common among dependent than non-dependent Internet users? Are the shy more likely to benefit from anonymity? Are respondents with low self-esteem most likely to make use of and perhaps benefit from anonymity?

Another issue related to on-line anonymity is the fact that Internet users can anonymously gain unprecedented and unlimited access to all forms of information, including hate literature and pornography that they would probably have less access to through other media and/or information outlets. This anonymous access to controversial materials minimizes the probability that the consumer of these materials will be held accountable for their behaviours and/or attitudes related to these materials. Traditionally, in the off-line world these documents would probably attract negative attention from others (i.e., mail delivery people, family members or others who share the
house or apartment, or co-workers) if they were delivered to the Internet user's home or workplace and others knew about it.

Another potentially problematic consequence of Internet-based hate documents, pornography, other controversial material, and the related Newsgroups/Discussion groups is the fact that Internet users can get a very distorted perspective on what is considered acceptable and they may not be able to benefit from checks and balances that tend to exist off-line. For instance, Internet users who might be reluctant to join an off-line/real life hate group might join an on-line hate group because they have little concern that their friends, family, or law enforcement will be able to detect their activities or intervene. These on-line hate group members might have very limited contact with people from outside of the group and they might come to believe that the ideas of the group are common or normative. In essence, some of these Internet groups eliminate diversity and remove many of the checks and balances that would ordinarily encourage group members to remain accountable for their opinions and/or actions. In the interest of continued social harmony and the peaceful co-existence of people who have different attitudes and values, anonymity within the context of Internet use as it relates to the culture of hate, oppression, and/or exploitation, also warrants further study.

In the future it would be useful to replicate this study off campus and survey people who have non-university Internet Service Providers (ISPs). This might facilitate the use of two measures of Internet use: self-report as was used in the current study and ISP-logged Internet use (e.g., have the ISPs provide accurate accounts of Internet use for the various purposes, including email, Chat Rooms, WWW, etc.). This will facilitate the determination of the typical accuracy, (or biases such as underestimates or overestimates) of time spent on-line and whether this differs
as a function of Internet dependence. Moreover, this provides additional variability in Internet use that was lost when participants in the current study were asked to categorize their Internet use. It is important to note, however, that students were asked to categorize their Internet use because it seemed unrealistic that most students would know precisely how much time they spend on-line in a typical week and inaccurate estimates would probably be less meaningful than accurate categories.

Future research should also investigate the deeper meanings behind some of the responses that Internet dependents provided to the Internet dependence scale. For example, "I feel preoccupied with the Internet" may have been endorsed for a number of reasons. It might be simply because dependents enjoy some features that are inherent in their Internet use, but, more interestingly, it might be due to the fact that their friends and associates are on-line and that they enjoy the interaction and look forward to resuming their interactions where they left off. Similarly, after this study it is still unclear why some people reported feeling depressed or irritable when they attempted to cut down or stop using the Internet. Basically, we do not know if they feel this way because of qualities or characteristics associated with the Internet, or if it is because of relationships that they have with people on-line. It would also be interesting to determine why some respondents claimed that they use the Internet as a way of escaping from problems or of relieving a bad mood (e.g., feelings of helplessness, anxiety, sadness). It could be a normal response to typical problems, it might be related to their experiences with dissociation, or it might be due, in part, to loneliness since there is a correlation between dissociation and loneliness. Essentially, these questions could be addressed through a series of specific questions or even open-ended questions/interviews rather than making observations and calculating
correlations.

It is important to note that although a percentage of the participants were identified or classified as Internet dependent the negative effects of Internet dependence must be taken in context: even the Internet dependents identified in this study were capable of fulfilling their responsibilities as students at a level that was sufficient to avoid expulsion. It would be interesting to see what percentage of Internet dependents were on academic probation, and what percentage had severe relationship problems (even if the participants might not acknowledge the problems, their families, friends, and/or romantic partners might).

It is also possible that the results of this study were affected by timing. If this study had been done during the first two months of students' first semester at university we might get more dramatic readings on the measures of Internet use (i.e., frequency and duration) and their scores on the Internet dependence scale. It makes sense that students who spent extremely long periods of time on-line (i.e., 40, 50, 60 hours per week or more) are probably the same students who might have become "Christmas Graduates" because they failed too many courses.

Finally, in response to the sentiment that it is pathetic for some people to spend so much time interacting on-line or who might be Internet dependent, Rheingold replies:

one honest answer to the question, 'Don't these people have lives?' is that most people don't have a terribly glamorous life. They work, they subsist, they are lonely or afraid or shy or unattractive or feel that they are unattractive. Or they are simply different ... not everyone can have a life as 'having a life' is defined by the mainstream...who does the judging? (Rheingold, 1993, p. 167).

It may be that for shy people who experience social loneliness and inadequate social support from family and friends, the Internet, rather than being a real problem of dependence, is a positive response to interpersonal difficulties.
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APPENDIX A (Informed Consent Form and Written Feedback)

CONSENT FOR RESEARCH PARTICIPATION

The following research in which I am participating is being conducted by Helen Ofosu, a Doctoral Candidate completing her degree requirements in Applied Social Psychology at the University of Windsor. This dissertation research is under the supervision of Dr. Shelagh Towson and has been approved by the Psychology Department Ethics Committee. If I have any comments, questions, or complaints, I can report them to the Head of the Psychology Department (253-3000, Ext. 2215) for referral to the Ethics Committee.

I have been asked to respond to questions and statements in a survey about my Internet use, and my leisure and social habits. The entire process is expected to last approximately one half hour to forty-five minutes.

I understand that my anonymity will be protected and that my answers will be kept confidential. The completed results for the study will not be attributable to me and will be available to me upon request.

I understand that participation is completely voluntary and I reserve the right to withdraw at any time during this study and/or refrain from answering any questions I prefer not to answer.

I hereby give my informed consent to participate in this research project.

Signed: ________________________________

Dated: ________________________________
WRITTEN FEEDBACK

Much attention has been given to Information Technology, particularly the Internet and its widespread use. Recently, a controversy regarding the social costs associated with the Internet, including 'Internet Addiction,' has developed. A review of the social psychology literature suggests that: (1) Internet applications are used primarily for social purposes (e.g., IRC, MUDs, email, Newsgroups), and that (2) creating a positive persona (presumably to feel better about oneself or enhancing one's self-esteem), and (3) obtaining social support are positively reinforcing characteristics associated with using the Internet cited by Internet dependents/Addicts. Although there is now some preliminary information about heavy Internet use and Internet dependence the following question remains unanswered: Why would someone choose to spend over 40 hours per week on-line to socialize when they can socialize off-line?

A review of the social psychology literature has provided a few possible answers to this question. For example, lonely people crave more interaction and social contact than they currently have. Loneliness is also very common among young people who have recently relocated for academic purposes, and therefore, lonely people might gravitate toward the Internet for social and recreational purposes to a greater extent than do non-lonely people. The early part of the university experience is marked by novel and unfamiliar situations which are associated, at least in some people, with shyness. Shyness can inhibit some people's ability to interact with others, and if someone would like access to more opportunities for social interaction than they have, then they might be likely to seek social interaction on the Internet. As mentioned previously, past research on Internet use has implicated self-esteem and social support issues as reasons why some people use the Internet. Therefore, these variables were also included in the present study.

Some researchers have described extremely heavy Internet use as Internet Addiction or Internet dependence and have developed a way to identify this condition using a scale adapted from one that measures pathological gambling. Many pathological gamblers and people with other addictions demonstrate a tendency that has been labelled dissociation. Dissociation involves an altered state of identity that occurs while engaging in the addictive behaviour and dissociation has been described as: (a) feeling as if in a trance; (b) feeling like a different person; (c) being outside oneself, and/or (d) blacking out (i.e., having no memory of all or part of the event. By asking research participants questions about their Internet use and their dissociative-like reactions it is hoped that comparisons can be made between Internet dependence and other behavioural addictions such as pathological gambling.

Later in the semester, I, Helen Ofosu, plan to return to this class to discuss the results of this study on university students' Internet use, social and leisure habits, and social psychological variables. Thank you for participating in this study and if you would like further information I can be reached by email at ofosu@server.uwindsor.ca.

Sincerely,

Helen Ofosu
APPENDIX B (Questionnaires)

Part I: Internet and PC Use

DIRECTIONS: Please indicate your responses to the following questions on your scan sheet.

1. Do you know how to access the Internet?
   0 = No
   1 = Yes

2. In a typical week, how much time do you spend using the Internet?
   0 = 0 hours per week (never use the Internet)
   1 = 1 to 5 hours per week
   2 = 6 to 10 hours per week
   3 = 11 to 15 hours per week
   4 = 16 to 20 hours per week
   5 = 21 to 30 hours per week
   6 = More than 30 hours per week

3. How would you describe your Internet use?
   0 = Most of my time spent on-line is for fun/entertainment
   1 = Most of my time spent on-line is for work and/or school
   2 = About half of my time spent on-line is for fun/entertainment and about half for school and/or work

4. Do you have your own computer?
   0 = No
   1 = Yes

5. How are you billed for your access to the Internet?
   0 = I pay a flat rate for unlimited Internet access
   1 = I pay a flat rate for a specific number of hours per month; when I exceed this limit then I am charged a certain fee per minute/hour
   2 = I am charged a fee per minute of Internet use / I am charged a fee per hour of Internet use
6. How long have you been using the Internet?

0 = I do not use the Internet
1 = Less than 6 months
2 = Between 6 months and 1 year
3 = Between 1 and 2 years
4 = More than 2 years

7. How would you describe your on-line social interactions/relationships?

0 = Worse (less meaningful and more impersonal) than my real world social interactions
1 = Better (more meaningful and closer) than my real world social interactions

8. Where do you prefer to interact socially with others?

0 = On-line / on the Internet
1 = Off-line / in ‘real life’

9. Do you feel that you have sufficient access to a computer when you need one?

0 = I own a computer and I have sufficient access
1 = I do not own a computer but I have sufficient access to computers
2 = I do not own a computer and I do not have sufficient access to computers

10. How has the quality of your interpersonal relationships changed since you started using the Internet?

0 = It has improved
1 = It has become worse
2 = It has stayed the same

11. What is the longest continuous period of time that you have spent on the Internet?

0 = Less than 5 hours
1 = Between 5 and 10 hours
2 = Between 11 and 15 hours
3 = Between 15 and 20 hours
4 = Over 20 hours
12. On average, how much time do you spend using email?

0 = 0 hours per week  
1 = 1 to 5 hours per week  
2 = 6 to 10 hours per week  
3 = 11 to 15 hours per week  
4 = 16 to 20 hours per week  
5 = 21 to 30 hours per week  
6 = More than 30 hours per week

13. On average, how much time do you spend on Usenet News / Newsgroups?

0 = 0 hours per week  
1 = 1 to 5 hours per week  
2 = 6 to 10 hours per week  
3 = 11 to 15 hours per week  
4 = 16 to 20 hours per week  
5 = 21 to 30 hours per week  
6 = More than 30 hours per week

14. On average, how much time do you spend on the World Wide Web (WWW)?

0 = 0 hours per week  
1 = 1 to 5 hours per week  
2 = 6 to 10 hours per week  
3 = 11 to 15 hours per week  
4 = 16 to 20 hours per week  
5 = 21 to 30 hours per week  
6 = More than 30 hours per week

15. On average, how much time do you spend in Chat Rooms / on Internet Relay Chat (IRC)?

0 = 0 hours per week  
1 = 1 to 5 hours per week  
2 = 6 to 10 hours per week  
3 = 11 to 15 hours per week  
4 = 16 to 20 hours per week  
5 = 21 to 30 hours per week  
6 = More than 30 hours per week
Part II: Dependent Measures

Internet Dependence

The following statements questions apply to the Internet applications (e.g., email, WWW, IRC, etc.) that you use. Please indicate your responses on the scan sheet.

\[ \text{No} = 0 \]
\[ \text{Yes} = 1 \]

1. I feel preoccupied with the Internet.*
2. I feel restless, moody, depressed, or irritable when attempting to cut down or stop using the Internet.*
3. I use the Internet as a way of escaping from problems or of relieving a bad mood (e.g., feelings of helplessness, anxiety, sadness).*
4. Do you find you need to spend longer and longer periods of time on the Internet?
5. Do you feel you have ever had a problem with the amount of time you spend on the Internet?
6. Did you ever spend more time than you intended to on the Internet?
7. Have any of your friends or family members complained about the amount of time you spend on the Internet?
8. Have you ever felt guilty about the amount of time you spend on the Internet or what happens when you're on-line?
9. Have you ever felt like you wanted to stop or cut down on the time you spend on the Internet, but didn’t think you could?
10. Have you ever been secretive about the time you spend on the Internet or not wanted someone to know you were on-line?
11. Do you spend a lot of time buying Internet books, trying out new WWW browsers, researching Internet vendors, organizing folders of downloaded files, or any other activity related to Internet use?
12. Have you ever lost time at work or school due to using the Internet?

* Taken from the Diagnostic Questionnaire (DQ); all other items taken from Howitt (1997)
Part III: Independent Measures

Perceived Social Support - Friends (PSS-Fr) - Off-line/Real Life

Directions: The statements which follow refer to feelings and experiences which occur to most people at one time or another in their relationships with friends. For each statement there are three possible answers: Yes, No, Don’t Know. Please indicate your answers on the bubble sheet provided.

0 = No
1 = Yes
2 = Don’t Know

1. My friends give me the moral support I need.
3. I rely on my friends for emotional support.
4. I feel that I’m on the fringe in my circle of friends.*
5. My friends and I are very open about what we think about things.
6. My friends are sensitive to my personal needs.
7. My friends are good at helping me solve problems.
8. I have a deep sharing relationship with a number of friends.
9. When I confide in friends, it makes me feel uncomfortable.*
10. I wish my friends were much different.*

Perceived Social Support - Friends (PSS-Fr) - On-line

Directions: The statements which follow refer to feelings and experiences which occur to most people at one time or another in their relationships with Internet friends. For each statement there are three possible answers: Yes, No, Don’t Know. Please indicate your answers on the bubble sheet provided.

0 = No
1 = Yes
2 = Don’t Know

1. My Internet friends give me the moral support I need.
2. My Internet friends enjoy hearing about what I think.
3. I rely on my Internet friends for emotional support.
4. My Internet friends and I are very open about what we think about things.
5. My Internet friends are sensitive to my personal needs.
6. My Internet friends are good at helping me solve problems.
7. I have a deep sharing relationship with a number of Internet friends.
8. When I confide in my Internet friends, it makes me feel uncomfortable.*
9. My Internet friends seek me out for companionship.

* Reverse scored
Perceived Social Support - Family (PSS-Fa)

Directions: The statements which follow refer to feelings and experiences which occur to most people at one time or another in their relationships with family members. For each statement there are three possible answers: No, Yes, Don’t Know. Please indicate your answers on the bubble sheet provided.

0 = No
1 = Yes
2 = Don’t Know

1. My family gives me the moral support I need.
3. Members of my family share many of my interests.
4. I rely on my family for emotional support.
5. My family and I are very open about what we think about things.
6. My family is sensitive to my personal needs.
7. Members of my family are good at helping me solve problems.
8. I have a deep sharing relationship with a number of members of my family.
9. When I confide in members of my family, it makes me uncomfortable.*
10. I wish my family were much different.*

* Reverse scored
Texas Social Behaviour Inventory – Form A (A measure of Social Self-Esteem)

INSTRUCTIONS: Please read each item carefully and decide to what extent it is characteristic of your feelings and behaviour. Indicate your answers on the scan sheet provided.

0 = Very uncharacteristic or untrue of me / strongly disagree
1 = Uncharacteristic of me
2 = Neutral / Neither characteristic nor uncharacteristic of me
3 = Characteristic of me
4 = Very characteristic or true of me / strongly agree

1. I am not likely to speak to people until they speak to me.*
2. I would describe myself as self-confident.
3. I feel confident of my appearance.
4. I am a good mixer.
5. When in a group of people, I have trouble thinking of the right things to say.
6. When in a group of people, I usually do what the others want rather than make suggestions.*
7. When I am in disagreement with other people, my opinion usually prevails.
8. I would describe myself as one who attempts to master situations.
9. Other people look up to me.
10. I enjoy social gatherings just to be with people.
11. I make a point of looking other people in the eye.
12. I cannot seem to get others to notice me.*
13. I would rather not have very much responsibility for other people.*
15. I would describe myself as indecisive. *
16. I have no doubts about my social competence.

* Reverse Scored
Revised Shyness Scale

INSTRUCTIONS: Please read each item carefully and decide to what extent it is characteristic of your feelings and behaviour. Indicate your answers on the scan sheet provided.

0 = Very uncharacteristic or untrue / strongly disagree
1 = Uncharacteristic
2 = Neutral
3 = Characteristic
4 = Very characteristic or true / strongly agree

1. I feel tense when I’m with people I don’t know well.
2. I am socially somewhat awkward.
3. I do not find it difficult to ask other people for information.*
4. I am often uncomfortable at parties and other social functions.
5. When in a group of people, I have trouble thinking of the right things to talk about.
6. It does not take me long to overcome my shyness in new situations.*
7. It is hard for me to act natural when I am meeting with new people.
8. I feel nervous when speaking to someone in authority.
9. I have no doubts about my social competence.*
10. I have trouble looking someone right in the eye.
11. I feel inhibited in social situations.
12. I do not find it hard to talk to strangers.*
13. I am more shy with members of the opposite sex.

* Reverse scored
Abbreviated Social and Emotional Loneliness Scale for Adults (SELSA)

0 = Strongly Disagree
1 = Moderately Disagree
2 = Slightly Disagree
3 = Neither Disagree or Agree
4 = Slightly Agree
5 = Moderately Agree
6 = Strongly Agree

Romantic Subscale

1. I have a romantic partner with whom I share my most intimate thoughts and feelings.*
2. I have a romantic or marital partner who gives me the support and encouragement I need.*
3. I have an unmet need for a close romantic relationship.
4. I have someone who fulfills my needs for intimacy.
5. I have a romantic partner to whose happiness I contribute.
6. I am in love with someone who is in love with me.

Family Subscale

1. I feel part of my family. *
2. My family really cares about me.*
3. My family is important to me.*
4. I feel close to my family.*
5. I really belong in my family

Social Subscale

1. I have friends that I can turn to for information.*
2. I can depend upon my friends for help.*
3. I have friends to whom I can talk about the pressures in my life.*
4. I have a friend(s) with whom I can share my views.

* Reverse scoring on these items.
Dissociation Screen

**Directions:** Please indicate on your scan sheet how often you experience each of the following situations using the scale below.

- 0 = Never
- 1 = Occasionally
- 2 = Often

1. After using the Internet, I’ve felt like I had taken on another identity.
2. After using the Internet, I’ve felt as though I had been in a trance.
3. While using the Internet, I feel as though I am outside of myself - watching myself use the Internet.
4. I’ve experienced memory blackouts for a period of time while using the Internet.
5. I lose track of time while using the Internet.
6. I lose awareness of bodily sensations (such as hunger, thirst, the need to urinate, pain, etc.) while using the Internet.
7. I like to use the Internet when I am upset or stressed.
8. I use the Internet to feel good about myself.

**Part IV: Demographics**

1. Does your family live in Windsor?

- 0 = No
- 1 = Yes

2. Which college / faculty are you enrolled in?

- 0 = College of Arts and Human Sciences
- 1 = College of Business Administration, Education, and Law
- 2 = College of Engineering and Science
- 3 = College of Graduate Studies and Research

3. What year are you in?

- 0 = First Year
- 1 = Second Year
- 2 = Third Year
- 3 = Fourth Year
- 4 = Graduate Studies
- 5 = Other

4. What is your gender?

- 0 = Female
- 1 = Male
5. What is your student number? (Your responses to this survey will not be linked to your name by the researcher or your professor, it will only be used to assign bonus points)

Please enter your student number in the box labelled 'STUDENT NUMBER' on your scan sheet / answer sheet.
APPENDIX C

Characteristics of the Frequency Distributions of Measured Variables

Internet Dependence.

Examination of the skewness and kurtosis associated with the frequency distribution for this variable makes it clear that Internet dependence was not normally distributed (see Table 2). Specifically, the distribution of scores on the Internet dependence scale is peaked (kurtosis = 2.22) and the tails of the distribution are long (skewness = 1.57). Moreover, the variance in Internet dependence is heterogeneous: there is more variance among Internet dependents (variance = 2.71) than there is among non-Internet dependents (variance = .55).

Closer examination of the frequency distribution of Internet dependence scores suggests that the distribution might be normalized by using a square root transformation. Although a square root transformation might normalize the distribution, it would also make the interpretation of results related to Internet dependence less life-like or realistic and more mathematically complex. Although this numerical transformation might produce a more elegant mathematical relationship between Internet dependence and other constructs measured in this study it does not make much practical sense. As is the case with most dependencies, addictions, and/or disorders, one should not expect Internet dependence to be normally distributed in the general population or among students. Moreover, when one considers the distribution of scores associated with responses to the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), on which many of the Internet dependence scale items were based, it is clear that respondents’ scores on the SOGS were not normally distributed. For example, the majority of the SOGS respondents (72%) endorsed zero out of 20 on the screen, 15% endorsed ≤ 20% of the items on the screen, and 13%
of the respondents endorsed ≤ 25% of the items on the screen. This pattern of responses yields positive skewness and kurtosis (i.e., a peaked or leptokurtic shape) which are values that indicate a non-normal distribution (Lesieur & Blume, 1987). In the present study, 20% of the participants were classified as Internet dependent and 80% were classified as non-Internet dependent. The pattern of responses obtained on the Internet dependence scale, does however, lend itself to the use of Internet dependence scores as a dichotomous variable in a manner that is analogous to the way in which scores on the SOGS were interpreted rather than applying a square root transformation to the variable that is mathematically appealing but logically somewhat inappropriate. Additionally, statistical analyses using non-parametric procedures are feasible for variables such as Internet dependence that do not meet the assumptions of normality and homogeneity of variance that are required for parametric statistics.

**Perceived Social Support Subscales.**

The frequency distribution of participants’ scores on the Perceived Social Support from friends (PSS-Fr) subscale closely resembles the normal distribution. This fact, combined with the fact that the distribution is based on responses from a large number of participants (n = 199) suggests that these scores should be used as is.

Participants’ scores on the Perceived Social Support from Internet friends (PSS-Int) subscale are not normally distributed. Although these scores are not normally distributed, one should not necessarily expect the perception of social support from one’s Internet friends to be normally distributed, rather, one might expect that the majority of the population would perceive and receive relatively little social support from on-line friends in comparison to support from other sources. With time, however, and with more and more people using the Internet for a wider
variety of activities and tasks this could change. Currently, however, it is implausible that a high percentage of the population derives most of their social interaction and support from the Internet. One should expect that relatively few people would perceive a high level of social support from people with whom they interact primarily on-line (i.e., they rarely or never interact with such people in person or on the telephone). Moreover, most respondents spend relatively little time on-line in a typical week (i.e., 64 % use the Internet for 1-5 hours per week) so one should expect that PSS-Int will, by necessity, be limited.

The frequency distribution associated with scores on the Perceived Social Support from Family (PSS-Fa) subscale was not indicative of a perfect normal distribution, but it was reasonably close to normal. Comparisons between the full-length and the abbreviated subscale on some measures of central tendency provide an early indication that the abbreviated subscale mimics the original full-length version. On this 8-item subscale, the mean and standard deviation are within a range that is expected based on the mean and standard deviation reported by the authors of the original 20 item subscale ($M = 13.40, \text{SD} = 4.83$ for the full-length original subscale, and for the abbreviated subscale $M = 5.69, \text{SD} = 2.59$). Given that the abbreviated subscale consists of 40% of the items used in the full version, it is reasonable to predict that the mean and standard deviation of the abbreviated scale will be approximately 40% lower. If one were to estimate the mean and standard deviation based on the values associated with the full length subscale then one would predict $M = 5.36$ and $\text{SD} = 1.93$, values that are quite similar to the values observed in the present study.

One possible reason why PSS-Fa scores differed somewhat from normality is because PSS-Fa is thought to be optimal at a moderate level but that beyond that level, it appears to be
associated with diminishing returns among student research participants. The rationale is that if PSS-Fa is too high then it might be indicative of a situation in which the students' financial autonomy is threatened. Although "a certain amount of emotional support from family [members] is an asset for college students, excessive financial dependency detracts from the perception of an overall positive family relationship for this population" (Procidano & Heller, 1983, p. 9). Finally, since PSS-Total is a derivative of the PSS-Fr, PSS-Fa, and PSS-Int subscales, and since PSS-Int and PSS-Fa were not normally distributed and were used as is, PSS-Total was also used as is.

**Texas Social Behavior Inventory.**

Participants' scores on this scale were almost normally distributed and the average score on this 15-item measure was comparable to the average score on the full 16 item measure (for the 15-item version $M = 37.9$ and $SD = 7.8$, and $M = 40.5$ and $SD = 8.0$ for the original 16-item version). Due to the fact that the distribution was based on a large number of observations ($n = 188$) and the fact that the frequency distribution looked relatively normal, participants' scores on the TSBI was used as is.

**Shyness Scale (Revised).**

Participants' scores on this scale were almost normally distributed but students' average scores on this scale were lower than the average scores reported by the scale's authors (the previously reported $M_{\text{College Men}} = 33.3$, $M_{\text{College Women}} = 32.4$, and in the present study $M = 19.68$ ($M_{\text{Men}} = 19.85$, $M_{\text{Women}} = 19.31$; Cheek, 1983) with higher scores indicating more shyness. Due to the fact that the distribution is based on a large number of observations ($n = 186$) and the fact that the frequency distribution looks relatively normal participants' scores on the Revised Shyness
Scale were used as is.

**Social and Emotional Loneliness.**

The alpha coefficients on the full-length subscales and the abbreviated subscales were very comparable to each other and the sex differences on the abbreviated subscales matched those reported previously when the full scale was used (DiTommaso & Spinner, 1993). These two factors support the contention that the abbreviated SELSA subscales yield results that are similar to those obtained through the use of the full length subscales. Participants’ total scores on the SELSA were, for the most part, normally distributed and this finding helped to justify the use of these scores as is.

**Dissociation.**

The kurtosis and skewness values associated with the frequency distribution of Dissociation scale scores indicate that the distribution is not normally distributed. This finding is appropriate, however, given that one would not expect scores on the Dissociation scale to be normally distributed. Among people who are functioning at a high level (e.g., university students who are academically successful enough to maintain their status as students) one should expect relatively few participants to endorse a high number of the scale items. The positively skewed and leptokurtic (i.e., peaked) distribution warrants the use of non-parametric statistics that are not based on the assumptions of normality or homogeneity of variance.

**Psychometrics**

**Perceived Social Support.**

A principal components analysis with orthogonal (varimax) rotation was conducted on the abbreviated PSS scale to confirm that the factor structure obtained by Procidano and Heller
(1983) was maintained when the subscales were abbreviated (see Table 4). One hundred and eighty three complete cases (i.e., with no missing data from any of the subscales) were included in the principal components analysis and three factors were extracted on the basis of the scree plot and eigenvalues ≥1 criterion. A three-factor solution that accounted for 44% of the variance in the items was obtained. Factor one corresponded to the PSS-Internet (PSS-Int) subscale, accounted for 16% of the variance, and had an eigenvalue of 4.90. Five of the eight items included on the PSS-Int subscale had substantial factor loadings (i.e., >.60) and the three remaining items had moderate factor loadings (i.e., between .45 and .60). The second factor corresponded to the PSS-Family (PSS-Fa) subscale, had an eigenvalue of 3.57, and also accounted for 16% of the variance. Four of the eight items included on the PSS-Fa subscale had substantial factor loadings and the remaining four items had moderate factor loadings. The third and final factor corresponded to the Perceived Social Support-Friends (PSS-Fr) subscale, had an eigenvalue of 1.96, and accounted for 12% of the variance. Four of the seven items included on the PSS-Fr subscale had substantial factor loadings, three items had moderate factor loadings, and the one remaining item had a weak (i.e., < .45) factor loading. With respect to the PSS-Fr and PSS-Fa subscales the pattern of factor loadings were consistent with the 2-factor solution reported by Procidano and Heller (1983) and the fact that the PSS-Int subscale constitutes a third factor is conceptually appropriate.

Social and Emotional Loneliness Scale for Adults.

A recently developed, 15-item version of DiTommaso and Spinner's (1993, 1997) 37-item Social and Emotional Loneliness Scale for Adults (SELSA) was used in the present study (Cramer, Ofosu, & Barry, 1998). This measure was evaluated in the same manner as were the
Internet dependence and Perceived Social Support (PSS) measures (see Table 5). Using the aforementioned criteria, item 5, "I really belong in my family," was removed from the family loneliness subscale, and item 6, "I have a friend or friends with whom I can share my views," was deleted from the social loneliness subscale. The final 13 items included on the abbreviated SELSA yielded a scale with the following characteristics: for the entire scale $\alpha = .87$, the family loneliness subscale had an $\alpha = .89$ and it had a moderately strong positive correlation of $.65$ with the total scale (i.e., $R_{\text{TOTAL}} = .65$), the romantic loneliness subscale had an $\alpha = .92$ and $R_{\text{TOTAL}} = .82$, and the social loneliness subscale had an $\alpha = .89$ and $R_{\text{TOTAL}} = .62$.

The alphas on DiTommaso and Spinner's (1993) full-length subscales and the abbreviated subscales are comparable to each other and vary by only $\pm .02$. Similarly, the sex differences on the abbreviated subscales matched those reported previously when the full scale was used. DiTommaso and Spinner found that males were significantly more lonely as measured by the romantic and social loneliness subscales than were women ($F[1, 350] = 5.51, p < .02$ and $F[1, 351] = 4.89, p < .03$ respectively) but that men and women did not differ significantly with respect to family loneliness. DiTommaso and Spinner's findings were replicated in the present study; males were significantly more lonely as measured by the romantic and social loneliness subscales than were women ($F[1, 183] = 6.21, p < .05$ and $F[1, 189] = 5.19, p < .05$ respectively) but men and women did not differ significantly with respect to family loneliness. This sex difference is consistent with the findings reported in previous research that also used loneliness measures that did not require participants to explicitly label themselves as lonely (Borys & Perlman, 1985).

A principal components analysis with orthogonal (varimax) rotation was conducted on the abbreviated SELSA scale to confirm that the factor structure observed for the full version was
maintained in the short form (see Table 5). Three factors were extracted on the basis of the scree plot and eigenvalues ≥ 1 criterion and the 3-factor solution accounted for 78% of the variance in the 13 SELSA items. Factor one corresponded to the items on the romantic loneliness subscale of the SELSA, had an eigenvalue of 5.31, and accounted for 41% of the total variance. All of the items included on the romantic loneliness subscale had substantial factor loadings (i.e., > .60) which made the interpretations regarding this factor very clear. The second factor corresponded to the social loneliness subscale, had an eigenvalue of 3.87, and accounted for 30% of the total variance. All three of the items included on the social loneliness subscale had substantial factor loadings which made the factor highly interpretable. The third and final factor was not as amenable to interpretation as the two preceding factors had been. This is probably due, at least in part, to the fact that it explained relatively little variance (7%) and had a relatively low eigenvalue of .93. Despite the fact that this factor had a low eigenvalue it was retained because of the scree plot and out of a desire to factor analyse the abbreviated SELSA in the exact same way that the full length scale was analysed. Although the third factor had high factor loadings from items on the family loneliness subscale, it also had high loadings from items on the social loneliness subscale (factor 2). Specifically, items 12 and 13 from the family loneliness subscale had substantial factor loadings (.74 and .81, respectively), item 4 had a moderate factor loading of .53, and item 3 had a weak factor loading of .31. As mentioned, however, three items from the family loneliness subscale also had meaningful loadings on factor 2. Specifically, items 3 and 4 loaded substantially, and item 12 loaded moderately on factor 2. The findings regarding the romantic and social loneliness factors replicate those previously reported by DiTommaso and Spinner (1997) in terms of the relative contributions to the explained variance, but the complex pattern of
factor loadings associated with the family loneliness subscale differs somewhat from previously reported results.

**Statistical Analyses Based on Transformed Scores**

Examination of the frequency distributions associated with Internet dependence and Dissociation showed that both variables had positively skewed distributions that also demonstrated positive kurtosis. In an effort to clarify the relationship between these two variables, and their relationship with the other variables measured in this study Internet dependence and Dissociation were each subjected to mathematical transformations. The distribution associated with Internet dependence required a square root transformation in order to produce normality whereas the Dissociation distribution required a logarithmic transformation to produce normality (Tabachnick & Fidell, 1996). It was hoped that by performing these transformations and then conducting appropriate statistical analyses it would be possible to confirm findings based on non-parametric analyses and parametric analyses using non-transformed scores.

An analysis of variance (ANOVA) based on a sample of 120\(^3\) (37 dependents and 83 non-dependents) was conducted using the logarithm of participants' scores on the Dissociation scale as the continuous dependent variable and participants’ classification (i.e., Internet dependent or Non-Internet dependent) as a 2-level independent variable. The average score on the log transformed Dissociation scale was significantly lower ($M = .32$, $SD = .38$) for non-dependents than it was for Internet dependents ($M = .54$, $SD = .28$; $F[1, 118] = 9.53$, $p < .01$). Interestingly, these results

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\(^3\) Many participants' scores could not be used because it is mathematically impossible to take the logarithm of 0.
based on a log transformed and normalized variable support the hypothesis that Internet
dependents demonstrate more Dissociation than do non-Internet dependents and override the non-
significant finding that was obtained when raw scores were used.

Although this finding of a significant relationship between Internet dependence status and
Dissociation scores is somewhat difficult to interpret because it is a statistically significant
relationship involving the logarithm of Dissociation scores, it is consistent with the findings
obtained when a non-parametric procedure, the Mann-Whitney U test, was used to evaluate the
relationship between Internet dependence status and scores on the Dissociation scale. When
Internet dependents and non-Internet dependents were compared in terms of their ranked scores
on the Dissociation scale, the Internet dependents demonstrated more Dissociation than did non-
dependents and this result is consistent with those obtained using the log transformed Dissociation
scores.

Next, the logarithm of Dissociation was treated as one of six potential predictors in the
multiple regression analysis and it was found that the correlation between the logarithm of
Dissociation and the square root of Internet dependence was moderate and statistically significant
($r = .35, p < .001$) based on a relatively small sample of 85 cases which were included in the
analysis (126 cases were excluded due to missing data and/or because the participants’ total score
on the Dissociation score was 0 and the logarithm of 0 is undefined and therefore cannot be
calculated). It is also important to note that the comparison of this regression model with the
analogous one using raw scores is not an entirely fair comparison since the sample based on
transformed scores is much smaller than the sample used for the parallel analysis using raw
scores. This result is quite different and more valid than the tiny non-significant correlation ($r =$
.08, p > .05) based on a sample of 164 cases that was obtained when raw rather than transformed Dissociation and Internet dependence scores were used.

When the transformed scores on the Internet Dependence Scale (i.e., the square root of participants' total score on the Internet Dependence Scale) were used as the outcome variable and the logarithm of the total score on the Dissociation scale was used as one of the predictors there was a minor improvement in the multiple regression model. The R-squared value associated with the regression model was .20 and there were two significant predictors of Internet dependence: perceived social support from friends (PSS-Fr) and the logarithm of participants' total score on the Dissociation scale (the model was statistically significant, (F [2, 82] = 9.93, p < .001). The Dissociation scores were entered on the first step and PSS-Fr scores were entered on the second step (ΔR² = .07, p < .01). Perceived social support from friends (PSS-Fr) had an unstandardized regression coefficient, B = -.08, and a standardized regression coefficient, β = -.28, p < .01 and the (log of) Dissociation scale scores had an unstandardized regression coefficient, B = .51, and a standardized regression coefficient, β = .29, p < .01. These findings mean that 80% of the variation in participants' scores on the Internet dependence scale are, therefore, attributable to variables other than PSS-Friends and the logarithm of dissociation.

Although the stepwise multiple regression using transformed rather than raw, non-transformed scores did not yield a model that accounted for more of the variance in Internet dependence scores than did the initial model using non-transformed scores it implicated two rather than one predictors. The fact that the model included variables that had undergone mathematical transformation does, however, make the interpretation of the results much more difficult. In an effort to clarify the relationship between the various predictor variables and
Internet dependence another multiple regression procedure was used in which participants' rankings on the various scales were used in place of their raw scores or their transformed scores.

The results of this rank-based multiple regression were consistent with those obtained when the multiple regression procedure was conducted using the transformed scores. Specifically, ranked Dissociation scores were entered on the first step and ranked PSS-Fr scores were entered on the second step ($\Delta R^2 = .04, p < .01$) just as they had been when the transformed scores were used and the regression model was statistically significant, $F (2, 161) = 21.32, p < .001$. For the ranked Dissociation scores the unstandardized coefficient ($B$) was .39 and the standardized coefficient ($\beta$) was .36, and for the ranked PSS-Fr scores the $B = -.21$ and $\beta = -.21$. The fact that the same predictors were included in both regression models, the predictors were entered into the model in the same order (which implies that the predictors had the same relative importance in both models), and that both models explain approximately the same percentage of variance (20% for the transformed variables and 21% for the ranked variables) is encouraging and increases one's confidence in the results.
VITA AUCTORIS

Helen Ofosu was born on June 26, 1969 in Toronto, Ontario, Canada. She graduated from Lester B. Pearson High School as an Ontario Scholar in 1988 and went on to McMaster University in Hamilton, Ontario, Canada. While at McMaster, Helen completed a B.Sc. in Psychology with First Class Honours. In 1995 Helen completed her Master's degree in Applied Social Psychology at the University of Windsor. Helen currently lives in Ottawa where she is employed as a Psychologist in the Management Test Development Unit, Personnel Psychology Centre, Public Service Commission of Canada (a department of the Federal Government of Canada).