The racial digital divide: Motivational, affective and cognitive correlates of Internet use

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RACIAL DIGITAL DIVIDE

The indisputable existence of a racial digital divide calls into question the democratizing potential of the Internet. Beyond issues of access to the technology are psychological factors that may influence Internet use. A survey of 787 college undergraduates, 630 European Americans and 157 African Americans, who have similar access to the Internet was used to examine motivational, affective and cognitive factors that may influence Internet use and contribute to the racial digital divide. Race differences in Internet use were obtained, but were limited to e-mail use. African Americans used the Web as frequently as did European Americans, but used it primarily to obtain personally relevant information. Race differences in e-mail use were mediated by differences in loneliness, computer anxiety, Internet trust, and attitudes toward computers, as well as by differences in father's computer use and current computer ownership. A model of Internet use is offered that considers motivational, affective and cognitive antecedents and consequences of use. Research testing the model is described briefly.

The racial digital divide: Motivational, affective and cognitive correlates of Internet use

We approach the next millenium with two indisputable facts in hand. First, the Internet is becoming increasingly important to educational, occupational, economic, political and even social opportunities (Dertouzos, 1997; Hoffman, Kalsbeek, & Novak, 1996; Jackson, 1998, 1999; Kiesler, 1997; Tapscott, 1996, 1998, Turkel, 1995; 1-6)[1] Second, African Americans are underrepresented on the Internet, representing as little as 2% of Internet users, compared to 12.8% of the U.S. population (7, 8). Moreover, their underrepresentation has remained unchanged since systematic tracking began in 1995 (9). Given population projections that African Americans will represent 15.4% of the U.S. population by 2050 (10), without change in their Internet participation we can anticipate that 58 million of the 60 million African Americans will not be online in 2050. Clearly there is a problem.

The solution to the problem, coined the "racial digital divide" (Hoffman & Novak, 1998), has been to increase access to the Internet for African Americans, particularly in low-income groups (Hoffman, Novak & Vankatesh, 1997). Considerable human effort and material resources have been devoted to wiring schools and communities in an effort to realize the democratizing potential of new digital technologies. And such efforts are well placed. There is no question that differential access to the Internet is a major cause of the digital divide (11). However, the "increase access" solution is based on the assumption that access translates readily into use - that "if we build it, they will come." Evidence is mounting that challenges this assumption. Decades of psychological research on how motivational, affective and cognitive factors influence behavior also challenges this assumption.

Evidence that equal access to the Internet will not result in equal use comes from several sources. First, Carnegie Mellon University's (CMU) HomeNet project, a field study of residential Internet use, provided free access to a diverse sample of Pittsburgh residents (Kraut, Sherlis, Mukhopadhyay, Manning, & Kiesler, 1996; 12-13). Results of three years of Internet use data indicate that income and education do not predict Internet use, but race does. Thus, after removing economic barriers, people across socioeconomic lines used the Internet equally, but racial minorities used it less.

Second, survey research has consistently found that racial minorities are less likely to own and use home computers, even after controlling for income and education (Anderson, Bikson, Law & Mitchell, 1995). Indeed the much publicized racial digital divide study (Hoffman & Novak, 1998) found that for household incomes under $40,000, Whites were twice as likely as Blacks to own home computers. A similar difference was observed at every educational level; Blacks were less likely than comparably educated Whites to own home computers.

Third, the National Telecommunications and Information Administration (NTIA) has been analyzing Internet penetration rates in the U.S. since 1994 (11, 14, 15). In 1997 (14), they reported that despite significant growth in computer ownership and usage by all racial/ethnic groups, the digital divide actually increased since 1994 (11). According to their report, Blacks and Hispanics "now lag ***even further behind*** Whites in their levels of PC-ownership and on-line access" (emphasis in the original, 14). Based on a still more recent survey (July, 1999), NTIA again reported that the racial digital divide has actually widened among low-income groups (15).

Fourth, research on computer use in the school suggests that classroom use mirrors and reinforces existing inequalities rather than mitigates them (Schofield, 1995, 1997; Shofield, Davidson, Stocks, & Futoran, in press). More affluent students, mainly Whites, dominate classroom computer use. The manner in which computers are used in the classroom also varies with social class and consequently with race. More affluent students, mainly Whites, are more likely to use software that fosters higher-order thinking skills; less affluent students, mainly Blacks and other racial/ethnic minorities, are more likely to use software for drill and practice of basic skills. Differences in their experiences with the computer no doubt influence minority children's motivation for and enjoyment of computer activities in ways that reinforce existing racial/ethnic group differences (Schofield et. al., in press).

Fifth, the efficacy of community-based technology projects, a popular vehicle for delivering the Internet to low-income groups, is uncertain, in part because so little has been done to evaluate these projects. In a forthcoming volume (Schon, Sanyal, & Mitchell, in press; 16), researchers at the Massachusetts Institute of Technology (MIT), in collaboration with community technology leaders, are raising questions about the community computing movement. Despite the best of intentions, evidence of their efficacy has yet to appear (Beamish, in press, 17-20).

Overall, the evidence suggests that increasing access to the Internet for racial/ethnic groups, particularly low-income groups, may be only a first step toward realizing the democratizing potential of these new technologies. What remains unclear is why access does not necessarily translate into use. The purpose of this research was to address this question by examining the

relationship between motivational, affective and cognitive factors that may be influencing Internet use and accounting in part for the racial digital divide.

Motivational Factors and Internet Use

Why does the average person use the Internet? One answer may lie in the behavior of the earliest computer users, scientists. Beyond their obvious use of computers for work, scientists have always used computers to communicate with each other, often about nonwork-related matters (Walsh & Bayma, 1997). For example, the first newsgroup among networked scientists was about science fiction, not science (21). Thus, since the earliest days of networking, computers have been used to satisfy the fundamental human motive to communicate with others.

The situation is no different for the average Internet user today. According to CMU HomeNet researchers, "Despite the hoopla surrounding the WWW, and not to dismiss its power in many domains, it is possible that interpersonal communication is driving the average person's use of the Internet." (13). For example, HomeNet respondents used e-mail more than the Web, and e-mail use was a better predictor of sustained Internet use than was Web use. Among Internet users in general, e-mail is the most popular application (Katz & Aspden, 1996). In survey of 1000 Internet users 90% said they used the Internet primarily to communicate with family and friends (Roper Starch Worldwide, 1998). Even information search on the Web is often motivated by the need to communicate with others. The most popular reason for using a search engine is to find other people (Jansen, Spink, Baterman, & Saracevic, 1998).

Of course, the monumental success of the World Wide Web (WWW) suggests that additional motives, besides interpersonal communication, are driving Internet use. There is no denying the power of the Internet to satisfy information needs. However, as Dertouzos (1997) noted, information is valued only insofar as it is personally relevant. In terms of the digital divide, it may be that the lack of personally relevant content on the Internet has contributed to lesser use of it by African Americans. Moreover, the popularity of newsgroups, topic-specific chats and listservs suggests that people are not just seeking information, but are seeking information embedded in a social context. The 65,000 newsgroups that host nearly 10 million posts made by 1.2 million people are as much social organizations as they are repositories of information (22). Again in terms of the digital divide, it may be that the lack of same-race information sources on the Internet has contributed to lesser use of it by African Americans.

Thus, motives behind Internet use for the average user are interpersonal communication and personally valued information.[2] Our research addressed these motives by examining the frequency of e-mail communication, the availability of e-mail communication partners, and the frequency of visits to Web sites that contained personally valued information. Also examined was the recently observed and disturbing relationship between Internet use and loneliness (Kraut, Patterson, Lundmark, Kiesler, Mukopadhyay, & Scherlis, 1998).[3] Analyses focused on race differences in Internet use and hypothesized motivational correlates, and on whether correlates of use could explain race differences.

Affective Factors and Internet Use

One of the oldest and most fundamental principles in psychology is that behavior that produces pleasant affective experiences is repeated, and behavior that produces unpleasant affective experiences is avoided (Thorndike, 1898). Simply put, people do things that make them feel good, and avoid doing things that make them feel bad. Despite its intuitive appeal and decades of research support, this simple principle has been all but ignored in understanding Internet use, especially among racial/ethnic minority groups.

Estimates suggest that about half of U.S. adults are technophobic (Rosen & Weil, 1994). Technophobia is defined as "anxiety about present or future interactions with computers or computer-related technology, negative global attitudes about computers, their operation, or their societal impact and/or specific negative cognitions or self-critical internal dialogues during actual computer interaction or when contemplating future computer interaction" (Rosen & Weil, 1992). Among the correlates of technophobia are the manner in which computer technology is introduced, poverty, and racial/ethnic group membership (Rosen & Weil, 1995).

Briefly, when technology is introduced by individuals who are themselves uncomfortable with it, technophobia is more likely to result. The poor, who have less contact and familiarity with technology, are more likely to experience technophobia. Members of negatively stereotyped racial/ethnic groups are more likely to experience technophobia, for reasons explained by C. Steele's theory of stereotype threat (Steele, 1997, 1999; Steele & Aronson, 1995).

According to stereotype threat theory, a negative stereotypic association between group membership and performance in a domain may cause group members to experience negative

affect (e.g., anxiety) when performing in, or even thinking about performing in that domain. One consequence of this negative affect is impaired performance in that domain. Moreover, the salience of a negative stereotype about one's group may contribute to self-doubt and concern that one may confirm the negative stereotype, which contributes further to impaired performance. Ultimately, these self-fulfilling prophecies may cause group members to devalue the domain, disengage from it physically, and disidentify with it psychologically. Although physical and psychological distancing eliminates the anxiety and threat to self-esteem engendered by the domain, it also eliminates the opportunity to develop competence in the domain.

There is considerable empirical support for the theory of stereotype threat for racial groups and low-income groups in general (Brown & Josephs, 1999; Major, Spencer, Schmader, Wolfe, & Crocker, 1998), and with regard to performance in the technology domain in particular (Shih, Pittinsky, & Ambady, 1999; Steele, 1997, 1999). Moreover, simply priming racial or income group membership is sufficient to produce the decrements in performance on intellectual tasks predicted by the theory (Croiset & Claire, 1998; Stangor, Carr & Kiang, 1998). Thus, with respect to Internet technology, a stereotypic association between racial or income group membership and technological competence may be sufficient to evoke negative affect (e.g., anxiety) when engaged in or thinking about engaging in this domain. As the fundamental principle of behavior dictates (Thorndike, 1898), people avoid behavior that is associated with negative affect.

In Project 2000, Hoffman and Novak (23) have been focusing on the other side of the affective coin, namely, how positive affect sustains Internet use. They have redefined Csikszentmihalyi's

(1977) concept of flow for online environments as follows: "the state occurring during network navigation that is: (1) characterized by a seamless sequence of responses facilitated by machine interactivity; (2) intrinsically enjoyable; (3) accompanied by a loss of self-consciousness; (4) self-reinforcing. Among the most important dimensions of the flow-online construct are positive affect and playfulness. Both contribute to flow, which contributes to Internet use.

The affective consequences of Internet use have been a topic of heated debate, but little systematic research. Proponents of the Internet argue that the opportunities that the Internet provides for connecting with others, expressing identity, and finding personally valued information should contribute to the positive affect and well-being (Rheingold, 1993; Sproull & Faraj, 1995). One study supports this view (Katz & Aspden, 1996). At the other extreme are arguments that Internet use is isolating, that relationships on the Internet are fleeting and impoverished, and that information on the Internet is overwhelming and unreliable (Rawlins, 1996; Stoll, 1996; Vitalari, Venkatesh, & Gronhaug, 1995). Thus, Internet use should have negative consequences for affect and well-being. One study supports this view. As mentioned earlier, the CMU HomeNet researchers found that Internet use contributed directly to feelings of loneliness, and to social isolation and depression (Kraut et al., 1998).

Thus, evidence suggests that negative affect (anxiety) may be more strongly associated with Internet use for African Americans than for European Americans. It also suggests that Internet use may be related to either positive or negative affect (depression). In this research we examined the relationship between Internet use and two affective states - anxiety and depression.

Analyses focused on race differences in affect and the role of affect in explaining race differences in Internet use.

Cognitive Factors and Internet Use

There is no question that familiarity with technology is related to Internet use. For example, in the CMU HomeNet project, familiarity with technology, especially computer technology, was a strong predictor of Internet use (Kraut et al., 1996; 13). One factor likely to influence familiarity with computer technology among college students is whether they had a home computer prior to coming to college. Race differences in Internet use among college students may be attributable in part to differences in having had a home computer and the familiarity with computer technology that home use provides (Schofield, 1995, 1997).

Self-confidence with regard to technology use is a second cognitive factor likely to influence Internet use and explain race differences in use. Well-established in the psychological literature is that confidence in one's ability in a domain is positively related to behavior in that domain (Bandura, 1986). Computer self-confidence refers to specific beliefs about the self, as distinct from the affective factor, computer anxiety (discussed earlier), that refers to general feelings about some external object (e.g., computers). If African Americans lack self-confidence in the domain of Internet technologies, based in part on their lesser familiarity and in part on internalized stereotypes, as discussed earlier (Steele, 1997, 1998), this may help to explain their lesser Internet use than European Americans.

A third cognitive factor likely to influence Internet use is computer attitudes. The relationship between attitudes and behavior is well established, despite questions about its strength (Eagly & Chaiken, 1993). Although the exponential increase in this decade in the number of people online suggests favorable attitudes toward computers, there is another side to the coin. Concerns about computers controlling people's lives, replacing relationships, contributing to the delinquency of minors and exposing young children to inappropriate material and dangerous situations abound. Yet no research has examined the relationship between computer attitudes and Internet use or considered race differences in computer attitudes and their relationship to use.

The fourth cognitive factor that may influence Internet use and help to explain race differences in use is trust in the technology. In addition to evidence of global concerns about privacy and confidentiality on the Internet (7, 8), there is some evidence that African Americans trust the Internet less than do European Americans (Ervin & Gilmore, 1999). Among the sources of their mistrust is the belief that government officials can find out about your Internet activities if they were motivated to do so. These findings with regard to the Internet are consistent with a large body of research indicating that African Americans are more likely to believe in U.S. Government conspiracies against them than are European Americans (Crocker, Luhtanen, Broadnax, & Blain, 1999; DeParel, 1990; Turner, 1993).

Thus, familiarity with technology, computer self-confidence, computer attitudes and trust in the Internet are cognitive factors likely to be associated with Internet use. In this research we examined the relationship between these cognitive factors and Internet use, and whether these relationships could account for race differences in use.

Methods

Respondents

Surveys were mailed to a random sample of European American students, stratified by year in college, and to all African American students. Responses from 630 European Americans (410 females and 220 males) and 157 African Americans (121 females and 36 males) were used in the analyses. The response rate, which was similar for African Americans and European Americans, was nevertheless low (10%), urging caution in generalizing the findings. Evidence that the sample may be biased in favor of individuals more likely to use the Internet comes from findings that both groups, but especially African American, were more likely to be in engineering and computer science than is the case for same-race peers in the general population of students at this university. It is important to note that the direction of bias suggests that any race differences observed in this research are likely to be stronger in the general student population, and stronger still in the general U.S. population than in our more technology-literate sample.

Student Internet and Computer Survey

The Student Internet and Computer Survey was designed to measure quantitative and qualitative aspects of computer Internet use and hypothesized motivational, affective and cognitive correlates. The survey consisted of the following sections:

Section 1: Internet Use

E-mail Use: Eighteen questions measured frequency of e-mail use and motivational and cognitive correlates of use. Frequency of use was measured by such questions as "How often do you use e-mail?" Motivational correlates of e-mail use (e.g., availability of communication

partners) were measured by such questions as "How often does your mother use a computer?" Cognitive correlates of use (e.g., trust in e-mail) were measured by such questions as "Do you think that your e-mail activity is private and confidential?" Five-point ratings scales were used unless the question called for a categorical response.

Web Use: Thirty-seven questions measured frequency of Web use and motivational and cognitive correlates of use. Frequency of use was measured by such questions as "How often do you use the web?" Motivational correlates of use (e.g., Web use to obtain personally relevant information) were measured by such questions as "How often do you visit the MSU Financial Aid page?" Cognitive correlates of use (e.g., trust in the Web) were measured by such questions as "Do you think that government authorities/officials can find out what you do on the Web if they wanted to?" Responses were made on five-point rating scales unless the question called for a categorical response.

Section 2: General Information

Demographic information (e.g., race, sex, family socioeconomic status) and information about motivational and cognitive correlates of computer/Internet use were obtained in this section. Respondents indicated how often each of their parents used a computer (1=never, 5=very often), whether they had a computer at home prior to coming to college (Yes/No), and whether they currently owned a computer (Yes/No).

Section 3: Additional Motivational, Affective, and Cognitive Correlates of Internet Use

Motivational correlates: The Revised UCLA Loneliness scale (Russell, Peplau, & Cutrona, 1980) was used to examine the relationship between interpersonal communication motives and Internet use. Respondents indicated on 5-point scales how often they felt as described in each of 10 statements (e.g., "I feel in tune with people."). Responses were coded so that higher values indicated greater loneliness.

Affective correlates: The Computer Feelings Survey (CFS, 20 items; Rosen & Weil, 1992) measured affective correlates of Internet use, specifically, computer anxiety. Reliability and validity of the CFS are well-established in previous research using diverse samples (e.g., race/ethnicity, nationality, socioeconomic status). Respondents indicated how anxious they felt when engaged in, or when thinking about engaging in each of 20 computer activities (e.g., Applying for a job that requires some computer training.). Five-point rating scales were used and coded so that higher values indicated greater computer anxiety.

An abridged version of the Beck Depression Inventory (BDI, 10 items; Beck, 1978) was used to examine the relationship between depression and computer/Internet use. Each item of the BDI consists of a group of statements reflecting increasing levels of negative affect. Respondents circled the statement that best described how they usually felt. Higher values indicated greater depression.

Cognitive correlates: The Computer Attitudes Survey (CAS; 20 items; Rosen & Weil, 1992) measured computer self-confidence. Respondents indicated how much they had each of 20 thoughts when they used or thought about using a computer (e.g., "I feel stupid."). Five-point

rating scales were used and coded so that higher values indicated greater computer self-confidence.

The Computers and Society Survey (CSS, 20 items; Rosen & Weil, 1992) was used to measure computer attitudes (e.g., "Computers prepare students for the future.") Five-point rating scales were used; higher values indicated stronger agreement with the attitude statement. Half of the statements indicated favorable attitudes and half indicated unfavorable attitudes toward computers. For the preliminary analyses, items were scored so that higher values indicated more favorable attitudes.

E-mail and Web use subsections were counterbalanced across surveys. The CSS, CAS, and CFS were presented in counterbalanced order, followed by the Revised UCLA Loneliness Scale and Beck Depression Inventory.

Results

Factor Analyses

E-mail use measures: Six factors (eigenvalues>1) accounted for 60.6% of the variance in the 18 e-mail items. Factor 1 (15.3% of the variance) consisted of 4 items tapping a belief that officials (government, university, computer administrators) and computer hackers could get information about your e-mail activities if they wanted to (E-mail privacy, α=.80). Factor 2 (3 items, 11.1% of the variance) consisted of items that measured the frequency of e-mail use (E-mail use, α=.71). Items that measured E-mail trust (overall trust, belief in the privacy and confidentiality of e-mail activities) loaded on Factor 3 (3 items, 10.3% of the variance, α=.64). Conceptually, E-mail trust may be distinguished from E-mail privacy in that the latter focuses on a belief that

specific agents will deliberately seek information about you, whereas the former focuses on a more general belief in the trustworthiness of e-mail. Factor 4 (9.1% of the variance) contained 3 items about e-mail and course work, and factors 5 (8.4% of the variance) and 6 (6.4% of the variance) each contained only two items. The latter 3 factors were conceptually ambiguous, resulted in unreliable composites, and were excluded from further analyses.

Thus, 3 e-mail measures were used in the analyses: E-mail use, E-mail trust and E-mail privacy. E-mail use is one (of two) criterion measures;E-mail trust and E-mail privacy are potential cognitive correlates of Internet use.[4]

Web use measures: Ten factors (eigenvalues >1) accounted for 61.3% of the variance in the 37 Web items. Factor 1 (6 items, 10.6% of the variance) contained items that measured success at Web searches (Web success; α=.86). Items that loaded on factor 2 (4 items, 7.5% of the variance) measured the frequency of using non-specific university web pages (e.g., home page; Web-general; α=.79). Factor 3 (4 items, 7.4% of the variance) contained items comparable to those contained in e-mail factor 1, tapping beliefs that officials could find out about your Web activities if they wanted to (Web privacy; α=.78). Factor 4 (4 items, 7.3% of the variance) items measured the frequency of using Web pages that contained personally relevant information for students (e.g., Computer Laboratory Help pages; Financial Aids Office pages; Web-personal; α=.66). Factor 5 (4 items, 7.3% of the variance), comparable to e-mail factor 2, measured frequency of using the Web (Web use; α=.78). The sixth factor contained only 2 items (5% of the variance) about the Web and course work and, like the comparable factor for e-mail (factor 4), proved unreliable. Factor 7 (4 items, 5% of the variance) contained items concerning trust of

the Web (Web trust; α=.60), comparable to the trust factor (factor 3) for e-mail.[4] The remaining 3 factors each contained only 2 items and did not form reliable or conceptually meaningful dimensions.

Four Web measures were used in the main analyses: Web use, Web trust, Web privacy, and Web success. Web use was one (of two) criterion measures (along with E-mail use). Web trust, Web privacy, and Web success were potential cognitive correlates of Internet use.[5] In addition, Web-personal and Web-general were used in analyses that examined the importance of personally relevant information in motivating Web use.

Additional measures of motivational, affective and cognitive factors: Coefficient alphas for the Revised UCLA Loneliness Scale (motivational factor) and the Beck Depression Inventory (affective factor) were both .83. Composite measures were labeled Loneliness and Depression. Coefficient alphas for the Computer Feelings (affective factor) and Computer Attitudes Surveys (cognitive factor) were .90 and .83, respectively. Composite measures were labeled Computer Anxiety and Computer Self-confidence.

Efforts to develop one or more composite measures of computer attitudes from the Computers and Society Survey (CSS) were unsuccessful. Factor analysis suggested 6 factors, each having 3-4 items, but composites based on these factors proved unreliable (αs<.53). Ten single-item attitude measures (from the 20 CSS items) were selected for subsequent analyses based on a consideration of racial/ethnic stereotypes regarding technology use (e.g., Whites are better at using computers than are Blacks; Steele, 1997, 1999), on previous research suggesting that

African Americans view computers/Internet as less important than do European Americans (e.g., Computers help you to increase control in your life; Ervin et al., 1999), and on media-promoted concerns about the adverse effects of Internet use (e.g., Computers ruin relationships).

Race differences in Internet use and hypothesized correlates of use

Table 1 contains results of the analyses comparing African American and European American respondents on the three Internet use measures and hypothesized motivational, affective, and cognitive correlates of use. Overall Internet use was greater for European Americans than African Americans. European Americans used e-mail more than did African Americans. However, the races did not differ in their use of the Web.

Supporting the importance of motivational factors in Internet use, when information was personally relevant, African Americans used the Web more than did European Americans (1.74 versus 1.45, $t(766)=5.78$, $p<.001$). African Americans were more likely than European Americans to visit University Web pages that contained information of personal relevance to them, namely financial aid and computer services. Financial aid information is more likely to be personally relevant to African than European Americans because the former are more likely to be on financial assistance at this university. Computer services are more likely to be personally relevant to African than European Americans because the former have less experience with computers upon entering college. European Americans were more likely to visit general MSU Web pages (e.g., Home page; 2.76 versus 2.62, $t(766)=2.11$, $p<.05$). The races did not differ in how successful they were at Web searches.

Race differences in E-mail use provide indirect support for the importance of motivational factors (i.e., the motive to communicate). African Americans were less likely than European Americans to have parents who used computers often (fathers, European Americans=3.83, African Americans=3.01, $t(782)=5.48$, $p<.001$; mothers, European Americans=3.61, African Americans=3.38, $t(782)=1.68$, $p<.1$), suggesting that one reason they used e-mail less was because they had fewer communication partners. Consistent with this findings, although both groups indicated that they e-mailed friends the most (European Americans=82%, African Americans=85%), European Americans were more likely than African Americans to indicate that they e-mailed family the most (8.6% versus 2.6%; $\chi^2(2)=12.74$, $p<.05$).

African Americans reported greater loneliness than did European Americans. This finding, together with African American's lesser use of e-mail, suggests a negative relationship between e-mail use and loneliness, examined later.

Race differences were obtained on hypothesized affective correlates of Internet use. African Americans had more computer anxiety than did European Americans. African Americans also reported higher levels of depression than did European Americans, again suggesting that e-mail use is inversely related to negative affect. The relationship between e-mail use and depression is examined later in the mediational analysis.

Race differences were obtained on all hypothesized cognitive correlates of Internet use (Table 1). African Americans had less trust in both e-mail and the Web, and were more likely than were European Americans to believe that officials (government, university, computer administrators)

could find out about your Web activities. However, contrary to expectations, African Americans reported greater computer self-confidence than did European Americans. Eight computer attitudes depended on race. African Americans were more likely to believe that computers were taking over, and that there will still be good jobs in the future that do not require computer skills. European Americans were more likely to believe that computers help you to increase control in your life, and that within 5 years everyone will need to know how to operate a computer. European Americans were more likely to endorse gender and racial/ethnic stereotypes about computer skills, and to believe that computers may cause health problems and ruin relationships.

Insert Table 1 about here.

Race differences in demographic characteristics support the importance of familiarity with technology and social support for Internet use. African Americans were less likely to have had a home computer prior to attending college (63% versus 83%; $\chi^2(1)=31.10$, $p<.001$) and, as mentioned earlier, less likely to have parents who used computers often. African Americans were less likely than European Americans to own a computer at college (50% versus 66%; $\chi^2(1)=13.87$, $p<.001$), a factor controlled for in subsequent analyses. In addition, African Americans were of lower socioeconomic status (European Americans=3.30, African Americans=2.83, $t(782)=7.34$, $p<.001$), and less likely to have parents who were college educated (fathers, 63% versus 34%, $\chi^2(1)=41.75$, $p<.001$, mothers, 55% versus 46%, $\chi^2(1)=4.34$, $p<.05$).

Mediational Analyses to Explain Race Differences in Internet Use

Mediational analyses were used to explain the relationship between race and E-mail use. Following procedures described by Baron and Kenny (1986), three regression models were estimated: the regression of each potential mediator on the predictor (i.e., race; Equation 1); the regression of the predictor on the criterion (i.e., e-mail use/overall Internet use on race; Equation 2); the regression of the criterion on the predictor plus mediator (Equation 3). The mediator must relate to the criterion in Equation 3 and reduce the effects of the predictor, ideally to nonsignficance. Equations 1 and 3 were estimated separately for each potential mediator.

Tables 2 and 3 summarize results of the mediational analysis. As indicated in Table 2, standardized β coefficients for the regression of each mediator on race (Equation 1), controlling for current computer ownership, were significant for all but E-mail privacy, mother's college education, and mother's computer use. These 3 measures were excluded from subsequent analyses. The regression of E-mail use on race was significant (Equation 2), and provided the standardized β coefficient against which to compare values obtained for Equation 3.

Insert Tables 2 and 3 about here.

Inspection of the β coefficients for predicting E-mail use from race plus each mediator, presented in Table 3, indicated that 5 survived the second test of mediation. They were loneliness, E-mail trust, father's computer use, the belief that computers can help you to increase control in your life, and the belief in the future importance of knowing how to operate a computer. All were

significant predictors of E-mail use and reduced the effects of race on E-mail use to nonsignificance.

Because the races did not differ in their use of the Web, mediational analysis was not performed. Instead, simple regressions were used to determine the subset of factors that best predicted Web use. Results indicated that computer ownership (β=-.102, p<.05), computer self-confidence (β=.359, p<.001), Web trust (β=.131, p<.01), and the belief that computers can help increase control in your life (β=-.187, p<.001) predicted Web use ($F(22, 468)=8.95$, p<.001).

Structural equations (path) analyses (LISREL 8.3, Joreskog & Sorbom, 1998) was used to provide a simultaneous analysis of the mediators identified in the preceding analysis, and to assess their relative importance in explaining race differences in Internet use. E-mail trust and Web trust (r=.57) were combined (averaged) for the analysis to form a measure of overall Internet trust. Also included in the analysis was computer anxiety which, although not a survivor of the mediational analysis just discussed, is of considerable theoretical interest.

In the path analysis race was considered an exogenous variable which influenced the set of mediators (i.e., computer anxiety, loneliness, computer ownership, father's computer use, belief that computers help you to increase control in your life and the belief in the future importance of computer skills). These mediators in turn were hypothesized determinants of E-mail use, which in turn was a determinant of Web use. The basic model and results of the structural equations analysis of the covariance matrix for race is presented in Figure 1.

Insert Figure 1 about here.

The model is the result of several attempts using maximum likelihood estimation with LISREL 8.3 to model these data. It should be considered the result of an exploratory analysis rather than a confirmatory analysis of an a priori model. The general mediational effect of race on E-mail and Web use was hypothesized, but the precise mediators and the nature of some of the direct and indirect effects were not. In addition, to achieve a reasonable fit, relationships between the error covariances of: (1) computer anxiety and loneliness, Internet trust and computer ownership; and (2) computer ownership and father's computer use and belief that computers help you to increase control in your life, were included in the final model.

In evaluating alternative models, we used four indices (Joreskog & Sorbom, 1993; Tanaka, 1993). The chi-square test of model fit indicates whether the hypothesized model fits the data adequately, with a nonsignificant chi-square indicating adequate fit. Since the chi-square test is very powerful, almost all models are rejected with even relatively small sample sizes and researchers have typically depended on other indices of fit. The root mean square error of approximation (RMSEA, Steiger, 1990) reflects lack of fit per degree of freedom. Values under .05 are considered evidence of good fit while those between .05 and .10 are considered evidence of moderate fit. We also report the adjusted goodness of fit (AGFI) index and the non-normed fit index (NNFI). The theoretical upper limit of the latter two indices is 1.00 and values above .90 are considered evidence of good fit.

Aside from the cautionary statements made earlier about the exploratory nature of the analyses that produced Figure 1, the model fit the data quite well (χ^2 (23) = 83.18; RMSEA = .057; AGFI = .95; NNFI = .79). All parameters in the model were statistically significant ($p < .05$). Moreover, evaluation of models including direct effects from race to E-mail and Web use were not statistically better fitting models, indicating that the effect of race on these measures was completely mediated by the specified psychological variables.

We also evaluated a multiple groups model in which E-mail and Web use were regressed on the same set of predictors for both racial groups. Estimates of the two sets of regression coefficients were constrained to be equal. This model fit extremely well (χ^2 (8) = 10.95, $p > .05$; RMSEA = .04; AGFI = .99; NNFI = .99). This multiple groups analysis and the absence of direct effects of race on E-mail and Web use in the initial mediated model indicate that the nature of the relationships between psychological variables and E-mail and Web use is virtually identical across groups. However, there are mean race differences in the psychological variables and these differences influence the level of E-mail and Web use.

The model depicted in Figure 1 indicates a number of mediated effects. The two primary mediators of race on E-mail use are computer ownership and the belief that computers can help you to increase control in your life. Computer anxiety, loneliness, Internet trust, and a belief in the importance of computer skills in the future also mediate race effects on E-mail use. The primary mediator of the race to Web use relationship is the belief that computers can help you to increase control in your life, although computer anxiety and computer ownership also play relatively large mediational roles. As expected, E-mail use mediated Web use. R-square

associated with the structural equation for E-mail use was .11, while that for Web use was .25. To give meaning to the size of the effects being predicted, recall that the mean race difference was .16 for E-mail use and .08 for Web use.

Discussion

This research had three objectives: (1) To determine whether the racial digital divide exists when issues of access are minimal; (2) To examine motivational, affective, and cognitive correlates of Internet use; (3) To determine whether correlates of Internet use can explain the racial digital divide.

Our findings indicate that the racial digital divide exists among college students who presumably have equal access to the Internet, consistent with findings of the first racial digital divide study (Hoffman & Novak, 1998). However, our findings also give occasion for optimism. Race differences in Internet use were small, and limited to differences in e-mail use. African American students used the Web as frequently as did European American students. Moreover, they used it more than did European Americans to find personally relevant information, supporting the view that motivational factors are important in Internet use, specifically, the motivation for personally relevant information (Dertouzos, 1997).

Additional support for the importance of motivational factors in Internet use comes from the relationship between loneliness and use. African Americans, who were less likely to use e-mail than European Americans, were also more lonely. Although causality cannot be inferred, it seems more plausible that e-mail use reduces loneliness than that loneliness reduces e-mail use (Katz & Aspden, 1996). Recall that in the CMU HomeNet study (Kraut et. al., 1998), greater

Internet use was causally related to greater loneliness. Discrepancies in findings may be attributable in part to methodology differences, but also to differences in sample characteristics. Our participants were college students living away from home, a group for whom e-mail would likely facilitate more, rather than less family contact, and consequently less loneliness. Nevertheless, discrepancies in the findings encourage more research to examine the personal and interpersonal consequences of Internet use, e-mail and other uses.

Affective factors were related to Internet use and accounted for race differences in use. Computer anxiety, higher among African Americans than European Americans (Rosen & Weil, 1994), was negatively related to Web use. Again contrary to the CMU HomeNet finding of a causal relationship between Internet use and depression (Kraut et al., 1998), we found no relationship. African Americans were more depressed, but differences in depression did not account for differences in Internet use.

Cognitive factors played an important role in Internet use, and in explaining race differences in use. Among the strongest predictors of Web use was computer self-confidence. Unexpectedly, African Americans had higher computer self-confidence than did European Americans which, together with other findings, suggests that high self-confidence and motivation for personally relevant information (discussed earlier) were sufficient to "cancel out" factors that undermined Internet use, namely, affective factors (i.e., computer anxiety) and two cognitive factors, discussed next. Nevertheless, that African Americans were higher in both computer self-confidence and computer anxiety is puzzling. One explanation is that African Americans were responding to scale items more extremely than were European Americans. However, this

explanation is inconsistent with other findings in this research. Alternatively, African Americans may indeed be both more confident and more anxious about using computers. More research is needed to examine the relationship between these two factors, one cognitive and one affective, to better understand their influence on Internet use for African Americans.

African Americans had less trust in the privacy and confidentiality of both e-mail and the Web, and were more likely to believe that authorities could find out about your Web activities (Ervin & Gilmore, 1999). They were less likely than European Americans to believe that computers help you to increase control in your life, and that computer skills will be essential in the future. Moreover, race differences in e-mail trust and computer attitudes explained race differences in E-mail use.

Our findings suggest that if the goal is to increase the representation of African Americans on the Internet, then more must be done to increase their trust in the technology. This will be a formidable task, given that concerns about privacy and confidentiality on the Internet are widespread (7). A more productive approach might be to increase awareness of the value and importance of Internet use. African Americans in our research were less convinced of the personal value and importance of the Internet than were European Americans. Structural equations modeling indicated that the belief that computers can help you to increase control in your life was an important mediator of race differences in both E-mail and Web use. Changing attitudes that may be preventing African Americans from using the Internet to personal advantage may be an important step in changing levels of Internet use (Eagly & Chaiken, 1993).

Structural equations modeling for multiple groups revealed no direct effects of race on E-mail or Web use. Thus, the nature of relationships between psychological factors and E-mail and Web use is virtually identical across race. In other words, the same psychological factors that influence Internet use among African Americans influence use among European Americans. What distinguishes the races are mean levels of these psychological factors.

Limitations of the current research urge caution in generalizing the results. First, participants in our research are more likely to be Internet users than students and other adults in general. Despite survey options for nonusers, there was little incentive for them to complete a lengthy, anonymous survey about the Internet for no compensation, and with no penalty for refusal. Second, effect sizes in this research were quite small, which may be related to the nature of the sample, just discussed, but nevertheless suggest caution in generalizing the findings. Third, additional motivational, affective, and cognitive factors not measured in this research, but included in the model of Internet use (discussed nexr), may be more important and/or may interact with those considered here. All three limitations encourage additional research to address them.

Overall, our findings indicate the importance of motivational, affective and cognitive factors in understanding Internet use in general, and the racial digital divide in particular. A model of Internet use, presented in Figure 2, summarizes much of the preceding discussion and suggests directions for future research. In the model, motivational, affective and cognitive factors are both antecedents and consequences of Internet use. For example, computer anxiety is an affective factor that influences Internet use and is influenced by it. Demographic characteristics

such as race, gender and socioeconomic status are exogenous factors in the model, whose effects are mediated by motivational, affective and cognitive antecedents of Internet use. Internet use, in turn, influences motivation, affect, and cognition. These consequences of Internet use feed back to influence antecedents and subsequent use.

Insert Figure 2 about here.

Research in progress is testing the model. HomeNetToo is a project designed to examine antecedents and consequences of Internet use, and to develop strategies to reduce the racial digital divide. African American participants in the project are introduced to the Internet in ways that take into account the importance of interpersonal communication, personally relevant information, and self-expression as motivations for Internet use. Affective factors are addressed by interventions that minimize computer anxiety and stereotype threat by embedding Internet use in a supportive social context. Cognitive factors are considered by examining relationships between Internet use and computer self-confidence, computer attitudes, familiarity with technology, trust in technology, and cognitive style. HomeNetToo also examines the motivational, affective, and cognitive consequences of Internet use. Of particular interest are the effects of Internet use on personal and interpersonal outcomes, such as loneliness, depression, and social contacts.

Few doubt that the Internet is changing how ordinary people do everyday life (Newsweek, Sept. 20, 1999). These changes will have an impact on behavior well beyond the use of technology.

Even fewer believe that the Internet is an equal opportunity technology. Racial/ethnic group disparities in Internet use will have an impact on society well beyond the use of technology. Psychology has an important role in advancing understanding of why people choose to use or not use the Internet, and what effects Internet use has on their lives.

References

Anderson, R., Bikson, T., Law, S., & Mitchell, M. (1995). Universal access of E-Mail: Feasibility and Societal Implications. Rand Corporation, MR-650-MF. Santa Monica, CA.

Bandura, A.. (1986). Social foundations of thought and action: A social-cognitive theory. Englewood Cliffs, NJ: Prentice Hall.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51, 1173-1182.

Beamish, A. (in press). Approaches to community computing: Bringing technology to low-income groups. In D. Schon, B. Sanyal, & W. J. Mitchell (Eds.). High technology and low income communities: Prospects for the positive use of advanced information technology. Cambridge, MA: MIT.

Beck, A. T. (1978). Depression Inventory. Philadelphia, PA: Center for Cognitive Therapy.

Brown, R. P., & Josephs, R. A. (1999). A burden of proof: Stereotype relevance and gender differences in math performance. Journal of Personality and Social Psychology, 76, 246-257.

Cacioppo, J. T., Berntson, G. G., & Klein, D. J. (1992). What is an emotion? The role of somatovisceral afference, with special emphasis on somatovisceral "illusions." Review of Personality and Social Psychology, 14, 63-98.

Crocker, J., Luhtanen, R., Broadnax, S., & Blain, B. E. (1999). Belief in U.S. Government conspiracies against Blacks among Black and White college students: Powerlessness or system blame? Personality and Social Psychology Bulletin, 25, 941-953.

Croizet, J-C, & Claire, T. (1998). Extending the concept of stereotype threat to social class: The intellectual underperformance of students from low income socioeconomic backgrounds. Personality and Social Psychology Bulletin, 24, 588-594.

Csikszentmihalyi, M. (1977). Beyond boredom and anxiety (second printing). San Francisco, CA: Jossey-Bass.

DeParle, J. (1990, October 15). New York Times, p. B12.

Dertouzos, M. (1997). What will be: How the new world of information will change our lives. San Francisco: HarperEdge.

Eagly, A. J., & Chaiken, S. (1993). The psychology of attitudes. Orlando, FL: Harcourt, Brace, Jovanovich, Inc.

Ekman, P. (1994). All emotions are basic. In P. Ekman & R. J. Davidson (Eds.). The nature of emotion: Fundamental questions (pp. 15-19). New York: Oxford University.

Ervin, K. S., & Gilmore, G. (1999). Traveling the information superhighway: African Americans' perceptions and use of cyberspace technology. Journal of Black Studies, 29, 398-407.

Hoffman, D. L., & Novak, T. P. (1998). Bridging the racial divide on the Internet. Science, 280, 390-391.

Hoffman, D. L., Novak, T. P., & Venkatesh, A. (1997), "Diversity on the Internet: The Relationship of Race to Access and Usage." Paper presented at the Aspen Institute's Forum on Diversity and the Media , Queenstown, Maryland, November 5-7, 1997.

Hoffman, D.L., W.D. Kalsbeek, W. D., & Novak, T. P. (1996), Internet and Web Use in the United States: Baselines for Commercial Development, Special Section on "Internet in the Home," Communications of the ACM, 39 (December), 36-46.

Jackson, L. A. (1998). Race/ethnicity and the Internet: The vision-the reality-the vision. Second International Harvard Conference on Internet & Society, May 26-29, Cambridge, MA.

Jackson, L. A. (1999). Using the Internet for training and development. In E. Kossek and R. Block (Eds.) Managing human resources in the 21st century: From core concepts to strategic choice. Cincinnati, OH: South-Western.

Jansen, B. J., Spink, A., Baterman, & Saracevic, T. (1998). Searchers, the subjects they search, and sufficiency: A study of a large sample of Excite searches. Proceedings of WebNet98 - World Conference of the WWW, Internet & Intranet, p. 52. Orlando, FL, November 7-12.

Joreskog, K., & Sorbom, D. (1993). LISREL8: Structural Equation Modeling with the SIMPLIS Command Language. Hillsdale, NJ: Erlbaum.

Joreskog, K., & Sorbom, D. (1998). LISREL 8.2. Scientific Software International, Inc.

Katz, J., & Aspden, P. (1996). Motivations for the barriers to Internet usage: Results of a National Public Opinion Survey. Paper presented at the 24th Annual Telecommunications Policy Research Conference, Solomons, MD, October 6.

Kiesler, S. (1997). (Ed.). Culture of the Internet. Mahwah, New Jersey: Erlbaum.

Kraut, R., Scherlis, W., Mukhopadhyay, T., Manning, J., & Kiesler, S. (1996). The HomeNet field trial of residential Internet services. Communications of the AMC, 39, 55-63.

Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukopadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? American Psychologist, 53, 1017-1031.

Major, B., Spencer, S., Schmader, T., Wolfe, C., & Crocker, J. (1998). Coping with negative stereotypes and intellectual performance: The role of psychological disengagement. Personality and Social Psychology Bulletin, 24, 34-50.

Negroponte, N. (1995). Being digital. New York: Vintage Books/Random House.

Newsweek (September 20, 1999). E-life: How the Internet is changing American. Special Report. Pp. 38-79.

Rawlins, G. J. E. (1996). Moths to the flame: The seductions of computer technology. Cambridge, MA: MIT Press.

Rheingold, H. (1993). The virtual community: Homesteading on the electronic frontier. Reading, MA: Addison.

Rosen, L. D., & Weil, M. M. (1992). Measuring technophobia. California State University, Dominguez Hills, CA.

Rosen, L. D., & Weil, M. M. (1994, March). What have we learned from a decade of research (1983-1993) on "the psychological impact of technology?" Computers and Society, 3-8.

Rosen, L. D., & Weil, M. M. (1995). Adult and teenage use of consumer, business, and entertainment technology: Potholes on the Information Superhighway? Journal of Consumer Affairs, 29, 55-84.

Russell, J. A. (1994). Is there universal recognition of emotion from facial expression? A review of cross-cultural studies. Psychological Bulletin, 115, 102-141.

Russell, D., Peplau, L. A., & Cutrona, C. E. (1980). The revised UCLA Loneliness Scale: Concurrent and discriminant validity evidence. Journal of Personality and Social Psychology, 39, 472-489.

Schofield, J. W. (1995). Computers and classroom culture. Cambridge, England: Cambridge University.

Schofield, J. W. (1997). Psychology. Computers and classroom social processes - A review of the literature. Social Science Computer Review, 15, 27-39.

Schofield, J. W., Davidson, A., Stocks, J. E., & Futoran, G. (in press). The Internet in school: A case study of educator demand and its precursors. In S. Kiesler (Ed.). Research milestones on the information highway: Social scientists look at electronic communication. Hillsdale, NJ: Erlbaum.

Schon, D., Sanyal, B, & Mitchell, W. J. (Eds.). (in press). High technology and low income communities: Prospects for the positive use of advanced information technology. Cambridge, MA: MIT.

Shih, M., Pittinsky, T. L., & Ambady, N. (1999). Stereotype susceptibility: Identity salience and shifts in quantitative performance. Psychological Science, 10, 80-83.

Sproull, L., & Faraj, S. (1995). Atheism, gender, and databases: The Net as a social technology. In B. Kahin & J. Keller (Eds.). Public access to the Internet (pp. 62-81). Cambridge, MA: MIT Press.

Stangor, C., Carr, C., & Kiang, L. (1998). Activating stereotypes undermines task performance expectations. Journal of Personality and Social Psychology, 75, 1191-1197.

Steele, C. M. (1997). A threat in the air: How stereotypes shape the intellectual identities and performance of women and African Americans. American Psychologist, 52, 613-629.

Steele, C. M. (1999). Atlantic Monthly (1999, August). Thin ice: "Stereotype threat" and Black college students." Pp. 44-54.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. Journal of Personality and Social Psychology, 69, 797-811.

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. Multivariate Behavioral Research, 25, 173-180.

Stoll, C. (1996). Silicon Snake Oil: Second thoughts on the information highway. New York: Doubleday.

Tanaka, J. S. (1993). Multifaceted conceptions of fit in structural equation models. In K. A. Bollen & J. S. Long (Eds.), Testing structural equation models. Newbury Park, CA: Sage.

Tapscott, D. (1996). The digital economy. New York: McGraw-Hill.

Tapscott, D. (1998) Growing up digital: The rise of the net generation. New York: McGraw-Hill.

Thorndike, E. L. (1898). Animal intelligence: An experimental study of the associative processes in animals. Monograph Supplement, 2 (Whole No. 8).

Turkle, S. (1995). Life on the Screen: Identity in the age of the Internet. New York: Simon Schuster.

Turner, P. A. (1993). I heard it through the grapevine: Rumor in African American culture. Berkeley, CA: University of California Press.

Vitalari, N. P., Venkatesh, A., & Gronhaug, K. (1995). Computing in the home: Shifts in time allocation patterns of households. Communications of the ACM, 28, 512-522.

Walsh, J. P., & Bayma, T. (1997). Computer networks and scientific work. In S. Kiesler (Ed.) Culture of the Internet (pp. 385-406). Mahwah, New Jersey: Erlbaum.

Electronic References

1-United Nations Educational, Scientific, and Cultural Organization (UNESCO), International Project on Technical and Vocational Education, 1997 Report.
http://www.education.unesco.org/unesco/eduprog/lwf/do/portfolio/
2-National Science Foundation; Science and Technology Studies Program, Division of Computing and Information Sciences, Cross-Disciplinary Activities, 1997.
http://www.nsf.gov/pubs/1997/nsf97142.txt
3-Electronic commerce on the rise. CommerceNet/Nielsen Media Research Survey. December 11, 1997.
http://www.commerce.net/news/press/121197.html
4-Commerce on the Web: NUA Survey
http://www.nua.ie/surveys/index.cgi?service=view_survey&survey_number=597&rel=no
5-American Society for Training and Development
http://www.astd.org/techtraining/welcome
6-Intelliquest Information Group, Nasdaq:IQST, Internet Survey, February 1998
http://www.intelliquest.com/index2.html

7-Graphic Visualization and Usability Group (GVU), Georgia Institute of Technology, World Wide Web (WWW) User Survey, July 1998.
http://www.gvu.gatech.edu/user_surveys/survey-1998-04/graphs/graphs.html#general
8-Resident population of the United States: Middle Series Projections, 1996-2000, by Gender, Race, and Hispanic Origin, with Median Age. U.S. Bureau of the Census, Release Date March 1996.
http://www.census.gov:80/population/projections/nation/nsrh/nprh9600.txt
9-Graphic Visualization and Usability Group (GVU), Georgia Institute of Technology, World Wide Web (WWW) User Survey, Home Page.
http://www.gvu.gatech.edu/user_surveys/
10-Resident population of the United States: Middle Series Projections, 2035-2050, by Gender, Race, and Hispanic Origin, with Median Age. US Bureau of the Census, Release Date March 1996.
http://www.census/gov:80/population/projections/nation/nsrh/nprh3550.txt
11-Falling through the Net: A survey of the "have nots" in rural and urban America.
July 1995, U.S. Department of Commerce, National Telecommunications and Information Administration, Washington, DC.
http://www.ntia.doc.gov/ntiahome/fallingthru.html
12-The HomeNet Project, Homenet: A field trial of residential Internet services. Carnegie Mellon University, Pittsburgh, PA, April, 1995.
http://homenet.andrew.cmu.edu/progress/report.html
13-Homenet Overview: Recent results from a field trial of residential Internet use.
Carnegie Mellon University, Pittsburgh, PA, June, 1997.
http://homenet.andrew.cmu.edu/progress/ovrview8697.html
14-Falling through the Net II: New data on the digital divide. National Telecommunications and Information Administration (NTIA), 1997.
http://www.ntia.doc.gov/ntiahome/net2/falling.html
15-Racial Divide Continues to Grow. National Telecommunications and Information Administration (NTIA), July 1999.
http://www.ntia.doc.gov/ntiahome/digitaldivide/factsheets/racial-divide.htm
16-Schon, D., Sanyal, B, & Mitchell, W. J. (Eds.). (in press). High technology and low income communities: Prospects for the positive use of advanced information technology. Cambridge, MA: MIT.
http://web.mit.edu/sap/www/high-low/
17-Beamish, A. (in press). Approaches to community computing: Bringing technology to low-income groups. In D. Schon, B. Sanyal, & W. J. Mitchell (Eds.). High technology and low income communities: Prospects for the positive use of advanced information technology. Cambridge, MA: MIT.
http://web.mit.edu/sap/www/high-low/15beamish.html
18-Schuler, D. (1996). How to kill community networks: Hint: We may have already started... The Network Observer, January.
http://www.scn.org/ip/comment/kill-comments.html
19-What's going on: Losing ground bit by bit: Low-income communities in the information age. Benton Foundation.
http://www.benton.org/Library/Low-Income/
20-Impact of CTCNet Affiliates: Findings from a national survey of users of community technology centers.
http://www.ctcnet.org/impact98.htm

21-A brief history of the Internet (and related links)
http://www.isoc.org/Internet-history/
22-Brown Computer Solutions - Web Growth
http://www.browncs.com/growth2.html
23-Novak, T. P., & Hoffman, D. L. (1998, May). Project 2000: Measuring the flow construct in online environments: A structural modeling approach.
http://www2000.ogsm.vanderbilt.edu/papers...w.construct/measuring_flow_construct.html

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Footnotes

[1] Numbers in parentheses refer to electronic references, listed in the Reference section after traditional references.

[2] Other motives driving Internet use are self-expression, entertainment, and consumptive motives (44-47). Although not considered in this research they are included in the model of Internet use, offered here to encourage new research on this important topic.

[3] Loneliness was treated as a motivational rather than affective correlate of Internet use. Although loneliness clearly has an affective dimension, it is not considered a basic emotion in most taxonomies (Ekman, 1994, Cacioppo, Berntson & Klein, 1992; Frijda, 1986; Russell, 1994) and, in the context of the present research, is best viewed in relation to the motive to communicate with others.

[4] E-mail trust and E-mail privacy were retained as separate measures because the correlation between them (r=-36), though significant, it was sufficiently low to suggest discrete constructs.

[5] Web trust and Web privacy were retained as separate measures because the correlation between them (r=-.31), though significant, was sufficiently low to suggest discrete constructs.

Table 1: Race differences in Internet use and hypothesized correlates

	African Americans	Anglo Americans	t-value
n=	157	630	
E-mail use	4.09 (0.65)	4.25 (0.61)	2.85
Web use	3.31 (0.68)	3.39 (0.68)	1.34[ns]
Computer anxiety	1.89 (0.64)	1.73 (0.57)	-3.06
Computer self-confidence	3.96 (0.56)	3.77 (0.60)	-3.54
Loneliness	2.16 (0.73)	1.99 (0.64)	-2.83
Depression	1.39 (0.40)	1.26 (0.33)	-4.17
E-mail privacy	4.13 (0.77)	4.08 (0.72)	-0.86[ns]
E-mail trust	3.23 (0.86)	3.47 (0.75)	3.55
Web privacy	4.22 (0.75)	4.08 (0.72)	-2.08
Web trust	2.97 (0.76)	3.13 (0.73)	2.47
Web success	4.02 (0.95)	4.10 (0.83)	1.06[ns]
Attitude items			
Computers are taking over	2.36 (1.12)	2.95 (1.12)	5.58
Good jobs require computer skills	3.47 (1.10)	3.25 (1.07)	-2.25
Computers help you increase control	3.36 (1.07)	2.90 (1.03)	-4.74

Future importance of computer skills	2.88 (0.95)	2.61 (0.95)	-3.18
Gender stereotypes about computer skills	4.25 (1.00)	4.02 (1.12)	-2.26
Racial/ethnic stereotypes about computer skills	4.07 (1.14)	3.86 (1.12)	-1.97
Computers cause health problems	3.14 (1.10)	2.88 (1.06)	-2.60
Computers ruin relationships	3.58 (1.11)	3.17 (1.12)	-3.95

Note: All t-values are significant at $p < .05$, unless indicated by "ns." $765<df<785$. Numbers in parentheses are standard deviations. All measures except attitude items are reliable composites ($.60<\alpha<.90$). For the attitude items, higher values indicate stronger disagreement with the attitude statement.

Table 2: Mediational analyses: Race differences in E-mail use: Equations 1& 2.

Predictor = Race

	Standardized beta	t-value	p-value	F model	adjusted R^2	standard error R^2
Criterion						
E-mail use	-.069	-1.99	.047	28.28	.065	.60
Web use	-.013	-0.37	.708	26.73	.062	.66
Computer anxiety	.082	2.30	.022	20.64	.049	.57
Computer self-confidence	.160	4.53	.000	28.78	.068	.57
Loneliness	.089	2.45	.014	8.80	.020	.65
Depression	.130	3.62	.000	17.18	.041	.35
E-mail privacy	.035	0.96	.338	0.68	.001	.73
E-mail trust	-.123	-3.39	.001	6.55	.014	.78
Web privacy	.071	1.98	.049	2.51	.004	.72
Web trust	-.076	-2.11	.035	5.80	.012	.74
Web success	-.041	-1.07	.283	0.58	.001	.85

Computers are taking over	-.199	-5.09	.000	20.42	.058	1.12
Good jobs require computer skills	.092	2.30	.022	2.72	.005	1.08
Computers help you increase control	.165	4.21	.000	18.29	.052	1.03
Future importance of computer skills	-.127	-3.17	.002	5.04	.013	.95
Gender stereotypes about computer skills	.095	2.36	.019	3.01	.006	1.09
Racial/ethnic stereotypes about computer skills	.088	2.20	.029	3.04	.006	1.12
Computers cause health problems	.101	2.50	.013	3.38	.008	1.08
Computers ruin relationships	.152	3.81	.000	7.92	.022	1.12
Home computer	.161	4.77	.000	59.33	.130	.38
Father's college education	.228	6.40	.000	23.58	.056	.48
Father's computer use	-.185	-5.10	.000	24.36	.061	1.46
Mother's college education	.066	1.84	.066	4.02	.008	.50
Mother's computer use	-.036	-1.00	.371	17.37	.041	1.43
Socioeconomic status	-.227	-6.64	.000	46.25	.104	.71

Note: All analyses control for current computer ownership. $626 < df_{error} < 785$.

Table 3: Mediational analyses: Race differences in E-mail use: Equation 3.

Predictor = Race plus mediator

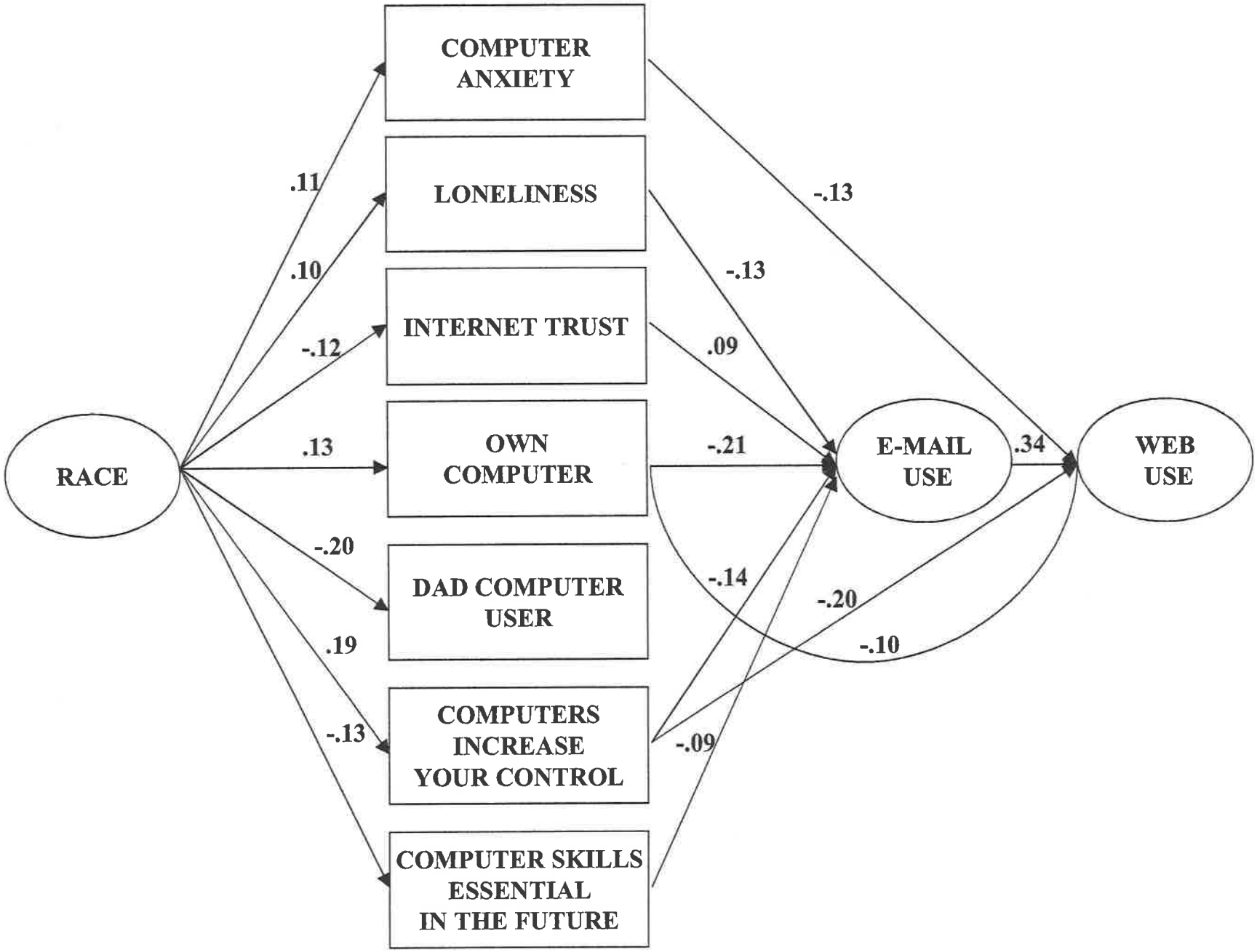
Criterion = E-mail use

Mediator	Standardized beta-mediator	t-value	p-value	Standardized beta-race	t-value	p-value	adjusted R^2
Computer anxiety	-.011	-0.31	.757	-.059	-1.67	.097	.064
Computer self-confidence	.222	6.25	.000	-.102	-2.91	.004	.110
Loneliness	-.137	-3.89	.001	-.054	-1.54	.124	.083
Depression	.005	0.14	.885	-.067	-1.88	.061	.064
E-mail trust	.095	2.72	.007	-.058	-1.63	.100	.073
Computers are taking over	-.027	-0.69	.490	-.050	-1.27	.205	.076
Good jobs require computer skills	-.004	-0.11	.911	-.044	-1.14	.256	.076
Computers help you increase control	-.146	-3.74	.000	-.024	-0.61	.344	.098
Home computer	-.023	-0.61	.544	-.066	-1.87	.062	.065
Father's college education	-.004	-0.11	.917	-.068	-1.86	.064	.068

Father's computer use	.080	2.16	.031	-.054	-1.47	.143	.077
Socioeconomic status	.015	0.42	.673	-.066	-1.83	.067	.064
Future importance of computer skills	-.123	-3.19	.002	-.062	-1.60	.111	.092
Gender stereotypes about computer skills	.041	1.05	.292	-.049	-1.26	.209	.079
Racial/ethnic stereotypes about computer skills	.021	0.54	.589	-.046	-1.19	.237	.077
Computers cause health problems	.067	1.74	.083	-.051	-1.31	.191	.081
Computers ruin relationships	.031	0.81	.421	-.049	-1.25	.213	.077

Note: All analyses control for current computer ownership. $622 < df < 777$.

$.59 < r^2_{SE} < .61$


COMPUTER ANXIETY
LONELINESS
INTERNET TRUST
OWN COMPUTER
DAD COMPUTER USER
COMPUTERS INCREASE YOUR CONTROL
COMPUTER SKILLS ESSENTIAL IN THE FUTURE
RACE
E-MAIL USE
WEB USE
.11
.10
-.12
.13
-.20
.19
-.13
-.13
.09
-.21
-.13
.34
-.14
-.20
-.10
-.09