



The social impact of Internet use on the other side of the digital divide¹

Linda A. Jackson, Alexander von Eye, Gretchen Barbatsis,

Frank Biocca, Hiram E. Fitzgerald and Yong Zhao

Does using the Internet undermine or benefit the social involvement and psychological well-being of low-income users? Does social impact depend on race? What factors influence the social impact of Internet use on the other side of the digital divide? Findings from the HomeNetToo project suggest answers to these questions.

In 1998, researchers at Carnegie Mellon University (CMU) found evidence of what they labeled "the Internet paradox" [5]. Greater home Internet use was associated with less social involvement and psychological well-being, considered paradoxical because the Internet presumably facilitates social contact and the psychological benefits associated with it [1]. To explain the Internet paradox, CMU researchers suggested that Internet use may replace other more beneficial social activities, such as face-to-face interactions. Later evidence from the HomeNet project was consistent with this view [3]. Many of the negative effects of Internet use on social and psychological well-being faded with time as the glamour of the Internet faded. Many of the benefits of Internet use were stronger for, but not limited to highly social people (i.e., extraverts), who were more likely to use the Internet to extend and strengthen social ties.

CMU researchers also suggested that changes in the Internet itself may be responsible for changes in social impact over time. The Internet has become a more hospitable place as more family and friends come online, and more services are available to facilitate strong social ties (e.g., buddy lists). The explosion of information on the Internet may also be having a positive social impact by providing a better integration of users' online and offline lives.

Other research examining the social impact of Internet use has produced mixed results. Some studies find that Internet use contributes to psychological well-being by providing opportunities for social connection and community, as well as convenient access to information [6][9][10]. Other studies find that Internet use undermines social and psychological well-being because on-line connections are weaker than real-life connections, or because on-line connections are often used to replace real-life connections and activities [8]. Thus, the social impact of Internet use remains controversial.

The HomeNetToo project was based in part on the original HomeNet project [4]. As in the original, we automatically recorded Internet use for an extended period of time and included multiple measures of social involvement and psychological well-being administered at multiple points in time. However, the HomeNetToo study was designed to address questions about the racial digital divide [2]. Thus, our sample was unique in consisting of low-income African Americans and White Americans who are using the Internet at home for the first time. Here we address the following questions about this unique sample:

(1) Does Internet use influence the social involvement of low-income adults? If so, is its influence dependent on race or other factors related to social involvement (e.g., extraversion)?

(1) Does Internet use influence the psychological well-being of low-income adults? If so, is its influence dependent on race or other factors related to psychological well-being (e.g., daily hassles)?

HomeNetToo participants

Participants in the HomeNetToo project were 117 adults residing in a low-income, medium-sized urban community in the mid-western United States.² They were primarily African American (67%), female (80%), and never married (42%). Almost half had family incomes of less than \$15,000 annually (49%). The majority had some college education or a college degree (62%). Average age was 38.6 years old.

Participants received free computers, Internet service and in-home technical support in exchange for allowing their Internet use to be recorded for 16 months, and for participating in home visits and completing surveys at pre-trial, three months, nine months and post-trial. Retention rate was 94%.

Internet use: Race differences, variability among participants, consistency over time

African Americans used the Internet less than did White Americans during the first year of home Internet access. Race differences in Internet use were not attributable to race differences in other demographic characteristics (e.g.,

income). Although African Americans had lower incomes than did White Americans, income was unrelated to Internet use in this sample of low-income users. The only demographic characteristic besides race that was related to Internet use was age. Older participants used the Internet less than did younger participants. However, both race and age differences in Internet use disappeared after one year of home Internet access.

On average, participants used the Internet 43 minutes a day, participated in 1 session, and visited 10 domains. They sent about 3 e-mails/week.⁵ There was considerable variability among participants in the extent of their Internet use.⁴ About 10% stopped using it altogether by six months, and this percentage increased to 22% by the end of the trial (16 months). On the other hand, 25% of participants spent more than 2 hours a day online.

To examine time-related changes in Internet use we divided the trial into 5 time periods that roughly corresponded to the administration of the 4 surveys, plus one additional time period (Time 2) to facilitate understanding of changes during the first year: Time 1: 1 to 3 months; Time 2: 4 to 6 months; Time 3: 7 to 9 months; Time 4: 10 to 12 months; Time 5: 13 to 16 months (Table 1). Analyses indicated that time online fluctuated, but was the same by post-trial as at pre-trial, contrary to some nationwide evidence indicating a decline in Internet use [8][10]. Consistent with national trends, people became more efficient in using the Internet, logging on less often (fewer sessions) but gathering more information during a session (i.e., more domains visited) [8][10]. Note that e-mail use remained remarkably and consistently low throughout the 16-month trial.

Table 1: Means levels of Internet use.

| Time online (minutes/day) | Number of sessions (per day) | Number of domains visited (per day) | Number of emails sent (per day) |
|---------------------------------|---------------------------------|--|------------------------------------|
| Mean | Mean | Mean | Mean |
| Time 1 (1 to 3 months): n=116 | | | |
| 41.51 | 1.00 | 9.05 | 0.39 |
| Time 2 (4 to 6 months): n=117 | | | |
| 43.53 | 0.74 | 10.94 | 0.36 |
| Time 3 (7 to 9 months): n=122 | | | |
| 37.73 | 0.62 | 10.36 | 0.39 |
| Time 4 (10 to 12 months): n=122 | | | |
| 41.51 | 0.62 | 11.12 | 0.40 |
| Time 5 (11 to 16 months): n=121 | | | |
| 48.03 | 0.60 | 12.54 | 0.35 |

Note: All measures were automatically recorded. n=sample size.

Social involvement: Race differences, high involvement, and stability over time

African Americans were more socially involved than were White Americans. They had more close friends, spent more time with friends, and spent more time talking on the phone with friends and relatives than did White Americans. They were also less likely to feel socially excluded. A single age effect indicated that older participants belonged to more groups than did younger participants.

On average, participants reported high levels of social involvement (Table 2). They had about 4 close friends, 4 relatives who were close friends, and belonged to 1 group. They spent the same amount of time with friends and relatives, and somewhat more time with family after having the Internet at home than before having it. They talked to friends and family on the phone for 1 to 2 hours each day. They felt included in their circle of family and friends, and believed they had all the instrumental support they needed. Number of close friends increased between nine months and post-trial. There was no change in any other measure of social involvement.

Participants rated themselves as more extraverted than introverted. Demographic characteristics were unrelated to extraversion.

Psychological well-being: Race differences, high levels of well-being, and stability over time

African Americans were less depressed and less stressed than were White Americans. Older participants were happier than younger participants (Table 2). Participants reported high levels of psychological well-being, regardless of whether well-being was measured as an absence of depression, stress and physical symptoms, or as the presence of happiness and self-esteem. Well-being changed very little over the 16-month trial, with 1 exception. Physical symptoms (e.g., anxiety, back tension) decreased over time.

Table 2: Means levels of social involvement and psychological well-being

| | Pre-trial | Three months | Nine months | Post-trial |
|--|-----------|--------------|-------------|------------|
| SOCIAL INVOLVEMENT | | | | |
| # of close friends | 3.29 | 3.63 | 3.38 | 3.88 |
| # of close relatives | 3.92 | 4.31 | 4.46 | 4.18 |
| # of groups | 1.62 | 1.57 | 1.32 | 1.34 |
| Time with friends ^H | X | 2.18 | 2.12 | 2.13 |
| Time with relatives ^H | X | 2.09 | 2.14 | 1.96 |
| Time with family ^H | X | 1.84 | 1.85 | 1.84 |
| Time on telephone ^o | X | 1.89 | 1.89 | 1.94 |
| Social support: Inclusion ^o | 3.84 | 3.85 | 3.80 | 3.75 |

| | | | | |
|---|------|------|------|------|
| Social support: Exclusion [°] | 2.06 | 2.13 | 2.06 | 2.14 |
| Social support: Instrumental [°] | 3.99 | 3.96 | 4.00 | 3.97 |
| PSYCHOLOGICAL WELL-BEING | | | | |
| Depression-1* | 1.51 | 1.45 | 1.49 | 1.46 |
| Depression-2* | 1.29 | 1.21 | 1.33 | 1.28 |
| Stress [°] | 2.98 | 2.87 | 2.87 | 2.82 |
| Physical symptoms* | 1.77 | 1.70 | 1.73 | 1.57 |
| Happiness* | 3.19 | 3.22 | 3.12 | 3.11 |
| Self-esteem [°] | 4.28 | 4.27 | 4.29 | 4.24 |

Note: 103<n(sample size)<117. "X" indicates that the variable was not measured at Pre-trial.

*4-point rating scales; higher values indicate more of the characteristic.

[°]5-point rating scales; higher values indicate more of the characteristic.

H3-point rating scales; higher values indicate less time after home Internet access was available.

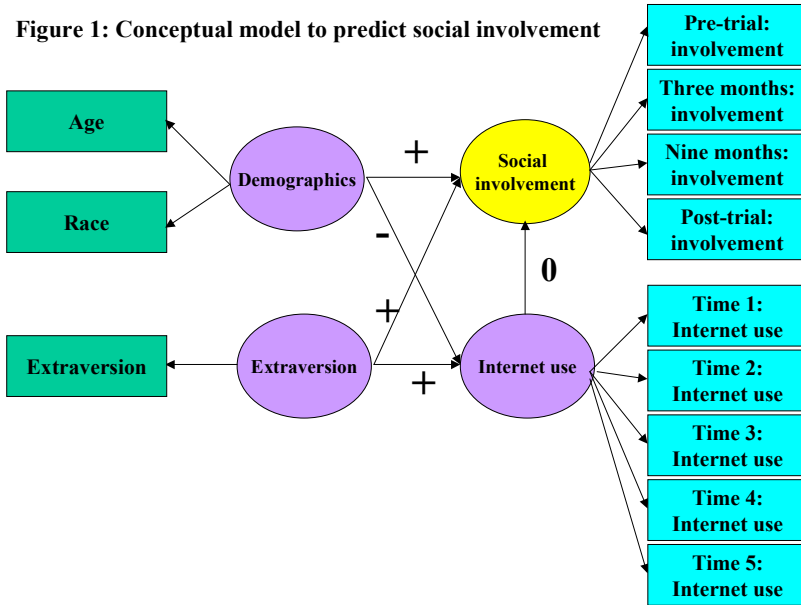
On average, participants experienced 6 hassles and 12 uplifts per week. Hassles decreased between nine months and post-trial. Uplifts increased steadily over the 16-month trial.

Modeling the effects of Internet use on social involvement and psychological well-being

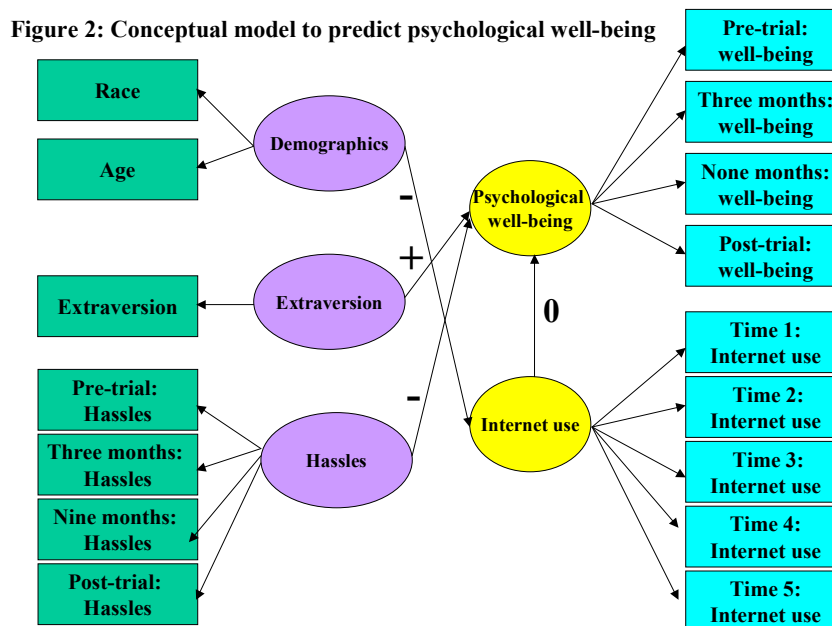
Structural equations modeling was used to model the effects of Internet use (4 measures) on social involvement (10 measures) and psychological well-being (6 measures) *after* controlling for factors that might influence these outcomes, namely, hassles, uplifts, race, age and extraversion [3]. Conceptual models for predicting social involvement and psychological well-being are presented in Figures 1 and 2 (respectively). These models were tested using each measure of Internet use, social involvement (Figure 1) and psychological well-being (Figure 2). In every case, conclusions based on the model were supported (i.e., Π^2 goodness of fit statistic was nonsignificant; root mean square error of approximation (RMSEA) was less than .05; adjusted goodness of fit index (AGFI) and non-normed fit index (NNFI) were above .90).

The conceptual model in Figure 1 to predict social involvement assumes 4 latent factors: social involvement, Internet use, demographic characteristics and extraversion. Path coefficients and tests of significance indicated that demographic characteristics and extraversion predicted social involvement. For most measures of social involvement, African Americans and more extraverted individuals were more socially involved than White Americans and less extraverted individuals, respectively. Demographic characteristics predicted Internet use. African Americans used the Internet less, especially e-mail, than did White Americans, and older participants used it less than did younger

participants. However, regardless of which measures were considered in the analysis, Internet use did *not* predict social involvement.



The conceptual model in Figure 2 to predict psychological well-being assumes 5 latent factors: psychological well-being, Internet use, demographic characteristics, extraversion, and hassles.⁶ Path coefficients and tests of significance indicated that extraversion and hassles predicted psychological well-being. For most measures of psychological well-being, more extraverted individuals and those with fewer daily hassles had higher levels of well-being than less extraverted individuals and those with more daily hassles, respectively. As before, demographic characteristics predicted Internet use. However, regardless of which measures were considered in the analysis, Internet



use did *not* predict psychological well-being.

Conclusions

Results of the HomeNetToo project suggest that Internet use has no effect on the social involvement and psychological well-being of low-income users, regardless of their race. No social impact was found regardless of how Internet use (e.g., time online, number of sessions), social involvement (e.g., number of close friends, time spent with family) or psychological well-being were measured (e.g., depression, happiness). Discrepancies between our findings and those of the original HomeNet study [3] are readily attributable to differences in sample characteristics and changes in the Internet itself. Of greater interest is why Internet use had neither a positive nor negative social impact for our sample of users.

An explanation for the absence of Internet use effects on social involvement and psychological well-being may lie in the low frequency of e-mail use by HomeNetToo participants. Recall that the average number of e-mails sent was a mere 3 a week, despite being online an average of 43 minutes a day. African Americans, who comprised 67% of our sample, were especially disinclined to use e-mail. Rather than using the Internet as a communication tool, they focused on its informational value. Ethnographic data collected in the HomeNetToo project speak to the importance of the Internet as an information tool:

“I can just sit here and you see how big it is, the inside; it’s like all this is knowledge and I want this knowledge and there’s so much in there and I just want to learn it.”

“It’s allowed us to access information we’d normally wouldn’t have, we’d have to go out of our homes for, so that helps us; it’s served a very good purpose.”

But why didn't HomeNetToo participants also use e-mail? The explanation is so obvious as to be elusive. E-mail is a valuable communication tool *only if* you have people to communicate with via email. In particular, family and friends who have home computers and Internet access, and/or coworkers with whom e-mail communication is desirable or required, are necessary for e-mail communication to be of any value. Participants in the HomeNetToo project likely had family and friends on the same side of the digital divide as they were. Those who had jobs were unlikely to have jobs that required or encouraged e-mail communication among coworkers. Thus, it is not really surprising that our participants never embraced e-mail.

Nor did HomeNetToo participants have much use for other communication tools available on the Internet. We measured the frequency of chat and newsgroup activities and found them to be essentially nil. Our participants were particularly wary of chat rooms, which some viewed as perilous places:

“This word right here scares me... ‘chat’...because I like to know who I’m communicating with. But at the same time they can never find out who I am, but still... Just watching the TV, things that have

happened...bad things. I don't see good things happen to them. I just rather for me and my family not to chat. Especially my girls."

Others could see no value in communicating with strangers:

"I don't talk to people I don't know. I have people I can talk to, so no, I don't go to the chat room."

Evidence that Internet use had no social impact for low-income users has implications for efforts to reduce the digital divide. It suggests that concerns about the potential negative impact of use are unwarranted for this group. While finding a positive impact would have been more supportive of efforts to reduce the divide, it may be that positive impact occurs in other domains. For example, Internet use may increase learning motivation and the development of cognitive skills, positive impacts that we are examining in other phases of the HomeNetToo project.

As the digital divide narrows the Internet may become more important as a communication tool for low-income users than it is today. A reassessment of the social impact of Internet use will be necessary as both the *typical* user and the Internet itself change over time.

References

- [1] Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin, 125*, 276-302.
- [2] Hoffman, D. L., & Novak, T. P. (1998). Bridging the racial divide on the Internet. *Science, 280*, 390-391.
- [3] Kraut, R., Kiesler, S., Boneva, B., Cummings, J., Helgeson, V., & Crawford, A. (2001). Internet paradox revisited. *Journal of Social Issues*. Available online; accessed 10/12/01, <http://homenet.hcii.cs.cmu.edu/progress/paradox-revisited-16%20-2.pdf>.
- [4] Kraut, R., Scherlis, W., Mukhopadhyay, T., Manning, J., & Kiesler, S. (1996). The HomeNet field trial of residential Internet services. *Communications of the Association for Computing Machinery, 39*, 55-63.
- [5] 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*, 1017-1032.
- [6] Pew Internet & American Life Project. (2000). Tracking online life: How women use the Internet to cultivate relationships with family and friends. Pew Foundation, 1100 Connecticut Avenue, Suite 710, Washington, DC. Accessed 11/05/01, www.pewinternet.org/.
- [7] Shapiro, J. S. (1999). Loneliness: Paradox or artifact? *American Psychologist, 54*, 782-783.
- [8] UCLA Internet Report: Surveying the digital future: Year 2. (2001). UCLA Center for Communication Policy. University of California, Los Angeles, CA. Accessed 01/23/02, www.ccp.ucla.edu.
- [9] Weiser, E. B. (2002). The functions of Internet use and their social and psychological consequences. *Cyberpsychology and Behavior, 4*, 723-743.
- [10] Wellman, B., Quan, A., Witte, J., & Hampton, K. (2001). Does the Internet increase, decrease or supplement social capital? Social networks, participation, and community commitment. *American Behavioral Scientist, 45*, 12-23.

Footnotes

¹This research was supported by a National Science Foundation/Information Technology Research Grant, #085348, titled "HomeNetToo: Motivational, affective and cognitive factors and Internet use: Explaining the digital divide and the Internet paradox" to the first author.

²Approximately 140 children also participated in the project.

³In total, 20 measures of Internet use were automatically recorded.

⁴Log transformations of Internet use measures were used in all analyses.

⁵We considered the possibility that participants were using other e-mail accounts to avoid monitoring. While we cannot rule out this possibility entirely, other evidence and diary reports from home visits suggest that our findings represent the actual level of e-mail use by our participants.