

Monitoring Student Internet Patterns: *Big Brother* or Promoting Mental Health?

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## ABSTRACT

*A study showing that student internet behavior differed significantly for students with high scores on a test of depression is thought to be the first to consider the relationship between internet use and depression that focuses on patterns of online behavior rather than content. Study findings have the potential for use in the human services as a way to assess and/or promote mental health. Although the data were collected anonymously with Institutional Review Board approval and participants' informed consent, objections have been raised suggesting this type of data collection represents "Big Brother" or the monitoring of individuals' behavior without their awareness as portrayed in George Orwell's famous novel, 1984. The importance of this type of research in furthering our understanding of the impact of internet use on human behavior is emphasized. Additionally, the role of the university is stressed as a location for conducting ethical research which disseminates findings via publication to inform and spur policymakers to develop appropriate guidelines to prevent misuse of new knowledge and technology.*

**KEY WORDS:** *monitoring internet behavior, Big Brother, technology and mental health*

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## INTRODUCTION

In a study to be published in a forthcoming issue of *IEEE Technology and Society Magazine* (Kotikalapudi, Chellappan, Montgomery, Wunsch, & Lutzen, 2012), we reported that students who scored higher on the Center for Epidemiologic Studies Depression Scale (Radloff, 1977) used the Internet differently than those who scored lower on this measure. Earlier studies examining the relationship between internet usage and depression have employed student-completed surveys about Internet usage which can be limited by respondents' poor and/or inaccurate memory and/or intentional or unintentional distortion of what they really did or did not do (Mitchell & Jolley, 2010). This study is thought to be the first to consider actual student behavior using the Internet, collecting usage data anonymously and unobtrusively with participants' consent, to explore this relationship.

For the study, 216 undergraduate volunteers at Missouri University of Science and Technology (Missouri S&T) signed a consent form and then completed a series of questionnaires that included the depression scale. Participants were enrolled in an introductory psychology class or one of two computer science classes taken by students from a variety of majors on campus. Next, the university's information technology department provided us with campus internet usage data for the participants for a one-month time period. In exploring the relationship between depression and Internet use, we did not examine what students were looking at or who they were e-mailing; we monitored *how* they were using the internet—including information about traffic flow that the university customarily collects for troubleshooting network connections.

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Statistical analyses comparing the depression scores and Internet usage patterns revealed a number of significant relationships between these variables. Significant Pearson  $r$  correlations between these Internet usage features and symptoms of depression are shown in Table 1. Also, the results of a Mann-Whitney  $U$  test on Flow Duration Entropy showed a significant difference

Table 1  
Pearson  $r$  Correlations of Internet Usage Features and Depressive Symptoms

Feature	Coefficient
P2p octets	.173*
P2p packets	.236**
P2p duration	.265**
Chat octets	.267**
Mail packets	.164*
Mail duration	.202**
Ftp duration	.267**
Remote file octets	.287**

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

between high and low scorers on the depression measure ( $U = 2339, p < .045$ ). In summary, these findings indicated that the following features of Internet usage were significantly related to higher depression scores:

- high Internet usage that included “p2p packets,” which suggests high levels of sharing files such as movies and music;
- high e-mail usage;
- high “flow duration entropy,” which suggests frequent switching among Internet applications such as e-mail, chat rooms and games and possibly indicating difficulty concentrating or an attempt to elevate mood; and

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- high amounts of video watching, gaming and chatting.

More research is needed to replicate and extend the validity of these results including establishing discriminant validity (e.g., distinguishing between online behavior associated with depression vs. other mental health problems such as anxiety and/or hyperactivity). However, the finding that monitoring online behavior revealed patterns associated with symptoms of a mental health problem is important for social science research in its focus on understanding human behavior and behavior problems. This research is particularly important given that more and more people are spending increasingly more time on-line. From the standpoint of advancing knowledge, this study suggests that further research could uncover a whole new source of information for assessing mental health problems including possible use of screening techniques and the development of ways to prevent the exacerbation of such problems and/or promote better mental health. For example, a smartphone or tablet app could track internet use and make suggestions to the user on possible ways to prevent problems associated with their internet patterns.

#### INITIAL REACTIONS

This research project has spurred an intense reaction from various media outlets since its acceptance in the *IEEE* journal. Shortly after its acceptance, information about the study released by the Missouri S&T Director of Communications resulted in media coverage by over 100 news outlets all over the world in the first week alone (A. Careaga, personal communication, May 23, 2012). Many reactions were positive regarding the possible health promotion applications of the technology, e.g., individuals or organizations like universities could install software on their computers or campus networks as a preventive measure to notify individuals or university counselors of students whose internet usage patterns are suggestive of depression.

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However, many reactions were negative including fears of privacy violations by *Big Brother*, the fictional entity in George Orwell's novel, *1984* (1949), about a totalitarian state in which the authorities have everyone in the society under complete surveillance, mainly by telescreens.

Several examples of these media reactions follow:

-*Forbes* (K. Hill), June 21, 2012: "In case you're feeling depressed after reading this article, go do something to cheer yourself up? Watch a cute baby YouTube video, make a move in Words with Friends, or Facebook chat someone up. Or wait, maybe don't."

-*American Civil Liberties Union* (C. Crump), June 18, 2012: "...any proposal that a computer algorithm be used to flag people for further scrutiny by a large bureaucracy raises red flags...how much do we trust the bureaucracy into which someone is being funneled? Will it make wise decisions and treat those who encounter it decently?"

-*Dailyplateofcrazy* (D. A. Wolf), June 20, 2012: "One more instance of Big Brother observing our (theoretically private) behavior."

-*TimeHealthland* (M. Szalavitz), June 22, 2012: "While it's creepy to think about all of the things computer scientists can figure out about us online, at least this particular type of surveillance might help us improve our mental health."

***BIG BROTHER IN TODAY'S SOCIETY***

Before addressing some of these issues raised by this university based research project, a case can be made that the monitoring of human behavior in society, represented by the term "Big Brother," has become a ubiquitous concept and a phenomenon of widespread fascination in our world today. In fact, there is an international television franchise called "Big Brother," which began in the Netherlands in 1999, and which is now broadcast in dozens of countries including

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the U.S. (Johnson-Woods, 2002). This show constantly monitors small groups of contestants isolated in a house to see who will be the last “housemate” standing.

Many examples of monitoring Internet behavior without an individual’s awareness have made the news in the U.S. With regard to the use of cell phones, the American Civil Liberties Union has collected documents showing that cell phone companies have traced movements, recorded conversations, and kept track of the people to whom a cell phone user talks (Watson, 2011). Moreover, while the widespread use of cell phones to take pictures of others without their permission is not illegal, taking pictures in situations in which one has a “reasonable expectation of privacy,” such as in a shower or gym, became illegal with the passage of the Video Voyeurism Act of 2004 (Ng, 2007). Social networking sites such as Facebook also must be considered. The news agency Reuters recently reported that Facebook is using technology to scan posts and chats and inform police of criminal activity (Menn, 2012). Although pulled the day after it was revealed, Facebook also recently unveiled a “stalking app” feature that used GPS devices in cell phones to show which of a person’s friends were nearby (Sutter, 2012). Additionally, employers today have access to a variety of software for monitoring their employees’ online activity while at work (Strohmeyer, 2011). Lastly, the recent resignation of CIA Director David H. Petraeus raised online privacy issues which showed how law enforcement investigators today can “plunge into the private territories of cyberspace looking for one thing can find something else altogether with astonishingly destructive results” (Shane, 2012). These are just a few examples of how the monitoring of personal behavior has already become a part of modern society.

Research by Houghton and Joinson (2010) examined the impact of internet use on human relationships. They investigated the experiences of a small group of individuals who used social

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network sites (SNS) such as Facebook. They concluded from their interview data that different boundary issues exist around different types of relationships and “privacy issues are ubiquitous with online SNS use” (p. 90). Additionally, it was apparent to them that “managing these boundaries, social spheres, aspects of information, and the relationships they entail may become increasingly difficult” (p. 90). These researchers also noted the need for Internet users to be aware of potential privacy issues before they use the Internet, including being educated enough about such issues to be able to make informed decisions similar to those they make to protect their privacy in their off-line environments.

## SCREENING CONCERNS

Such practical applications and their ethical implications, including issues of privacy violations, although beyond the scope of our initial study of student Internet behavior patterns, should not be ignored or minimized. However, their complexity also should not be a reason to avoid conducting additional research on the most effective use of new technologies for advancing our understanding of human behavior, especially with regard to the delivery of human services. In this regard, one is reminded of the complex issues associated with the major advances in the field of genetics that have led to the possibility of large scale and individual genetic screening for the prevention and improved treatment of many physical problems. With the completion of the Human Genome Project in 2003, major ethical, legal and social issues were raised regarding genetic testing and screening that resulted in national and international collaborative efforts to address these issues (“Human Genome Project Information,” 2011). In fact, in the U.S., the Genetic Information Nondiscrimination Act (GINA) was signed into law in 2008 to prohibit U.S. insurance companies and employers from discriminating against



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individuals on the basis of information derived from genetic tests and/or requiring that any individual take such a test. If further research does establish the reliability and validity of diagnosing mental health problems by monitoring Internet behavior, then there will be a need for similar national and international efforts by policy makers to protect individuals from any inappropriate use of such screening or assessment technology by any individuals, organizations, institutions, or governments.

Using Internet monitoring technology to screen for mental health problems can also involve more specific practical problems that must be addressed before applications are instituted in the real world. Some these problems include the best way to obtain informed consent, who will see the information gathered, what is to be done with high risk individuals, and the issue of whether or not there will be a duty to share information about high risk individuals.

**COMMUNICATION CONCERNS**

An additional issue of particular importance to practitioners who deliver mental health services that the genetics research and its applications raise is how this information is best communicated to individuals or to the parents of children who are found to have genetic mutations that put them at high risk for serious disease. Wagner (2005) described the nature of these issues for clinical hematologists indicating that hematologists now have an ever increasing list of new genetic-based tools for identifying an individual's risk of disease. He also noted that even with medical problems, the probability of having or developing a disorder is rarely 100%. This phenomenon of "false positives" can waste enormous time and resources as well as be extremely upsetting to individuals, as well as the families of individuals, mistakenly identified as having a disease or disorder. Also, whether to take a directive versus a more non-directive

approach when communicating this information to an individual and/or his/her child is still under debate. In this light, concerning possible mental health problems, Moreno, Grant, Kacvinsky, Egan and Fleming (2012) recently interviewed college students regarding their views about the use of social networking sites for screening or intervention efforts pertaining to their use of alcohol. Most participants stated that they did view alcohol content on social networking sites as indicative of alcohol use. However, the nature of the relationship the student had with an individual who might approach them about a possible problem, and how they were approached, seemed to be key factors in how acceptable they considered the monitoring of their Internet use for these purposes.

#### UNIVERSITIES AS ENGINES OF RESEARCH

The negative reactions to our study of student Internet behavior clearly demonstrate that this new technology raises important ethical issues regarding its applications. Policymakers in our society will have to address and resolve these issues in an appropriate manner consistent with U.S. laws and cultural values. Even so, many of the negative reactions appeared to ignore, or minimize the importance of, the longstanding, critical role of universities as engines of research. Since the 1970's, research universities in the U.S. "have been widely recognized as the core of this nation's science and technology system" and situated "at the forefront in the search for knowledge" (p. 30, Atkinson & Blanpied, 2008). Moreover, it is our view that research universities are perhaps the *best* place for this research to be conducted because they must follow ethical guidelines when conducting research that involves human or animal participants and they generally disseminate their methods and results to a wide array of audiences including other professionals who can further raise important ethical issues. Before a single piece of data can be

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collected on such research campuses, all projects must be reviewed by an Institutional Review Board (IRB) that critiques all aspects of a proposed project in order to insure protection of *every participant's* rights and well-being. Moreover, all participants must freely give their fully informed consent including being able to withdraw it at any time and also be informed of how confidentiality of records identifying any individual participant will be maintained (<http://www.hhs.gov/ohrp/humansubjects/index.html>). Organizations and businesses in the private sector, which do not use federal research grant dollars, are not required to follow these guidelines, including widely disseminating their findings and focusing on the protection of the rights of all individuals being studied.

## CONCLUSIONS

We conclude with a series of questions that researchers need to consider about internet monitoring technology.

1. Does the use of modern technology today mimic Big Brother as portrayed in the book *1984*? With regard to privacy issues, given the pervasiveness of the Internet in many peoples' lives today, it is our view that the personal monitoring of the individual behavior aspect of *1984* is already here. Moreover, further development of these technologies is inevitable and certainly will create additional ways to assess information about many aspects of human life. We believe that technology for monitoring Internet use can indeed enhance efforts for the assessment and prevention of mental health problems.
2. Should research investigating the monitoring of student Internet behavior be avoided because of ethical issues? We additionally believe that "putting our heads in the sand" and refusing to do any research on the use of this technology because of complex ethical implications will not

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advance knowledge or keep humans protected from any individual or group mis-using this technology or the knowledge gained from it.

3. What is the best approach for conducting research involving the monitoring of student Internet behavior? We believe that it is important to continue conducting ethical research on student internet behavior that gets widely disseminated and that continually calls on policymakers to address psychological, legal and ethical issues associated with the application of results by developing appropriate guidelines for its use in the real world. More, not less, ethical research must be conducted, and research universities are very good sites for such research activities.

4. What should future research efforts examining patterns of Internet behavior consider? There are clearly legitimate ethical concerns regarding use of this type of rapidly developing technology as laws protecting individuals appear to not be keeping up with the use of these new applications. Moreover, these issues are of particular concern with regard to projects examining possible mental health problems. Certainly, as a necessary first step, careful attention should be paid to all IRB principles and procedures in all phases of research design and implementation. And again, researchers should be sure to assert the need for policymakers to develop ways to protect individuals from inappropriate use of any technology based screening by any individuals, organizations, institutions, or governments. Lastly, an important specific topic for future research to address would be what are effective ways to communicate with individuals who have been identified as having psychological problems via this technology including how to handle the possibility of having obtained a false positive identification.

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