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Build a Better Mouse: Directly-Observed Issues in Computer Use for Adults with SMI

Anne C. Black,

Yale University School of Medicine, New Haven, CT, USA

VA Connecticut Healthcare System, 950 Campbell Avenue, 116A-4, West Haven, CT 06516, USA

Kristin L. Serowik,

Yale University School of Medicine, New Haven, CT, USA

VA Connecticut Healthcare System, 950 Campbell Avenue, 116A-4, West Haven, CT 06516, USA

Jean J. Schensul,

The Institute for Community Research, Hartford, CT, USA

Anne M. Bowen, and

University of Wyoming, Laramie, WY, USA

Marc I. Rosen

Yale University School of Medicine, New Haven, CT, USA

VA Connecticut Healthcare System, 950 Campbell Avenue, 116A-4, West Haven, CT 06516, USA

Abstract

Integrating information technology into healthcare has the potential to bring treatment to hard-to-reach people. Individuals with serious mental illness (SMI), however, may derive limited benefit from these advances in care because of lack of computer ownership and experience. To date, conclusions about the computer skills and attitudes of adults with SMI have been based primarily on self-report. In the current study, 28 psychiatric outpatients with co-occurring cocaine use were interviewed about their computer use and opinions, and 25 were then directly observed using task analysis and think aloud methods as they navigated a multi-component health informational website. Participants reported low rates of computer ownership and use, and negative attitudes towards computers. Self-reported computer skills were higher than demonstrated in the task analysis. However, some participants spontaneously expressed more positive attitudes and greater computer self-efficacy after navigating the website. Implications for increasing access to computer-based health information are discussed.

Keywords

Technology; Computer use; Psychiatric

Introduction

Adults with serious mental illnesses (SMI) including schizophrenia, schizoaffective, bipolar, and major depressive disorders (MDD) are more likely to have poor physical health, suffer severe medical problems, and die at a younger age than adults without mental illness [1, 2]. Recent estimates indicate individuals with SMI die 25 years earlier than the general population *largely from preventable problems* [3]. Inadequate medical care, caused in part by limited access to services, is one of many factors contributing to such health disparities [4]. Educating patients about their conditions is a critical step toward increasing active engagement in healthcare and promoting use of potentially lifesaving services [2, 3].

Federally-supported initiatives to increase the use of information technologies in healthcare are designed to narrow the existing gap in healthcare access by making health information and communication more widely available and increasing patients' involvement in their own care [5, 6]. The efficacy of health information technology for improving health outcomes and increasing patient engagement has been demonstrated empirically [6]. Individuals with SMI, whose cognitive, affective, and behavioral deficits impair communication [7] and limit access to care [2], may particularly benefit from the ability to access and exchange health information remotely. In fact, individuals with a stigmatized psychiatric illness *who used the internet* were significantly more likely to seek health information and communicate with healthcare providers on-line than individuals without a stigmatized illness [8]. However, adults with disabilities are significantly less likely than non-disabled adults to have access to the internet [9]. Thus, if individuals with SMI are unable to access and use relevant technologies, the benefits of such advances in healthcare may not be fully experienced by this group [5].

Studies have sought to describe the computer use, skills, and attitudes of adults with mental health issues, assessing rates of computer ownership, access to computers and internet, nature and extent of computer use, and barriers to successful use.

Computer Access and Experience

In a sample of 100 adults with SMI receiving outpatient psychiatric services, reported rates of computer ownership and internet access were far below the national average, with only about one-third of participants reporting availability of these resources. Among those who used the internet, most reported infrequent use, and the need to access the internet in a public setting [10]. In a separate study of 319 patients with psychiatric disorders, home computer and internet access differentiated internet users from non-users; individuals without a computer in their homes were significantly less likely to use the internet [11]. Even among psychiatric patients who had internet access, use and experience was significantly less likely for individuals who had lower incomes, less education, more psychiatric hospitalizations, and/or more disabling mental health conditions [12]. Among individuals who accessed computers outside of their home, they did so at libraries, mental health centers, schools/universities, family members' homes, community centers, and employment settings [10, 12]. Across studies, younger and more educated participants reported more computer experience. Predictably, these subgroups also reported greater confidence in using computers, whereas more disabled and less educated participants reported significantly higher computer anxiety. Participants who had used the internet previously reported greater interest and intentions to continue use [10], but in one study, across all levels of experience, participants reported at least moderate interest in receiving computer training [13].

Use of Internet for Health Information

Across studies, participants who used the internet reported seeking general and mental health information on-line, including information about psychiatric diagnoses and treatment, medication, and substance use. Studies reported small proportions of internet users had read blogs, message boards and only a minority had participated in online chats with others who had mental illness, or with health providers [10, 14]. Nevertheless, the potential of computer-based health education was suggested by a study testing the feasibility of a web-based health informational portal. Investigators in that study employed “thinking aloud”, a data collection technique used to study cognitive processes that involves asking people to verbalize their thoughts while performing a task, and documenting the verbalizations. [15, 16]. Adults with SMI, who verbalized aloud while navigating the web portal, expressed enthusiasm about collaborating with healthcare providers and seeking health information on-line [17].

Barriers to Computer Use

Patient-reported barriers to computer and internet use across studies included lack of computer access and skills, reading difficulty, cognitive difficulties, mental health problems, and fear and mistrust of technology. Nurses identified patients’ mental status, IT capacities and negative computer attitudes as barriers to implementing an educational internet-based program in a psychiatric hospital [18].

Across studies, themes emerged of computer inexperience, lack of computer access, and negative computer attitudes among adults with SMI [10, 18, 19]. However, despite barriers, adults with SMI also expressed interest in seeking health information on-line. A limitation of the current studies is that only one [17], “thinking aloud” method] assessed skills or attitudes directly. Conclusions about individuals’ computer experiences were almost exclusively based on survey response data, either from patient participants themselves, or (in one study) mental health clinicians. Thus, to date it is unclear to what extent adults with SMI have and can utilize their skills, and how negative computer attitudes might affect experiences with computer use. Direct-observational assessments are critical for identifying specific skills and deficits, and describing reactions and attitudes in situ. Information obtained through direct observation can be combined with self-report data to provide a more comprehensive assessment of computer use.

Purpose of Study

The goal of this study was to describe computer access, skills, and attitudes among adults in outpatient psychiatric treatment with co-occurring cocaine use. Although cocaine use was not a variable analyzed in this study, individuals with co-occurring disorders are especially unlikely to access needed medical services and thus may particularly need and benefit from remote access to services. This was demonstrated in a randomized clinical trial in which adults with co-occurring major depression and substance use maintained better abstinence outcomes with a telephone-based aftercare intervention than standard aftercare in-person counseling [20].

Our two-session study involved first identifying patients’ self-reported computer skills and opinions, and then directly observing abilities and thoughts in real time while participants navigated through a health-informational website.

Method

Recruitment and Enrollment

We enrolled individuals who were receiving psychiatric services at an urban-situated, state-operated mental health clinic in Connecticut, reported cocaine use within the past 60 days, were unemployed, and received Social Security disability benefits. Study fliers were displayed in the clinic and interested individuals could self-refer by contacting research staff directly, or were referred by treating clinicians. All participants provided informed consent, and were reimbursed with \$80 in gift cards for two study sessions.

Computer Use and Attitudes Assessment

Participants' computer attitudes, access, and skills were assessed over two study sessions, approximately one week apart. In session 1, participants were interviewed individually using a semi-structured questionnaire to determine the extent and purpose of their computer use. Questions focused on computer access and ownership, skills, use of computers, and opinions about using computers ("Appendix 1" section).

In session 2 participants logged into an internet site related to healthy eating and menu planning [21]. The site was selected because it is informational, geared to adults, and offers multiple options to access information. A combination of text, menu drop-down options, pictures, and links were available for additional information and thus provided a multi-faceted test of internet facility. Following "think aloud" methodology [15, 16], participants were asked to say aloud any thoughts, feelings, or observations they had while navigating and interacting with the website. The think aloud method was used because it permits rich description and analysis of techniques that people employ when interacting with information, including computer-based applications [16]. A research assistant hand-recorded participants' comments, and also documented the level of independence for completion of each step of website navigation using a 4-point ordinal scale anchored by "0" (unable to do, even with assistance) and "3" (independent) ("Appendix 2" section). Steps in the task analysis included typing a website address, using a mouse to point and click on options, using arrows to advance pages in the website, using drop-down menus, scrolling, and reading and responding to questions on a self-administered web-based quiz.

Data Analysis

Descriptive statistics were used to characterize the sample and to summarize computer task performance and quantifiable interview responses (e.g., proportions endorsing dichotomous items). Based on review of the literature, [e.g., 10, 13], participants were divided into groups by age (<40 years vs. 40 years), and education (<12 years vs. 12 years), and were compared on computer experience using χ^2 tests. For task analysis (computer skills) items, we calculated the proportion of the entire sample performing at each level of independence.

Three of the authors (ACB, KLS, JJS) independently reviewed qualitative interview responses and anecdotal comments recorded during the Think Aloud task. Responses were grouped into general themes describing participants' attitudes and opinions.

Results

Sample

Twenty-eight adult outpatients with co-occurring psychiatric disorders and cocaine use completed the first study session and 25 (89 %) returned for the second session. In the full ($n = 28$) sample, 57 % of participants were male, and mean age was 45 years (range 22–58 years). Participants reported diagnoses of Schizophrenia (37 %), Schizoaffective Disorder

(25 %), Bipolar Disorder (22 %), MDD (21 %), and PTSD (13 %). Four participants (17 %) had more than one Axis I diagnosis. Sixty-three percent of participants were African-American, 25 % were Caucasian, and 12 % were Hispanic. Participants averaged 11 years of education (range 7–14 years) and all received Social Security benefits, with monthly income ranging from \$303 to \$1297 ($M = 933$; $SD = 212$). Income did not differ significantly by educational status or age group.

Attrition

Two of the three participants lost to follow up were female. The mean age of the three participants was 46 years, and mean education was 11 years. One participant had diagnoses of Schizophrenia and Bipolar Disorder, one was diagnosed with MDD and one with Schizoaffective Disorder.

Computer Use

Of the 28 participants, 17 (61 %) reported having regular access to a computer, but only 3 (11 %) owned their own computers, and 19/27 (70 %) reported not using a computer at all in a typical week (Table 1). Only four participants used a computer for social networking and one reported shopping on-line. The most popular use of the internet was to conduct web searches (39 %), and participants reporting searching for employment opportunities, worker's compensation information, apartment rentals, music, horoscopes, and retail sites.

Participants with 12 or more years of education were significantly more likely to report regular computer access, and to use the internet for email. Younger participants were more likely than older participants to use computers to create documents, and to use the internet for email, news, social networking, and web searching.

Computer Skills

Despite irregular computer use, participants reported having some fundamental computer skills. Sixty-eight percent reported being able to use a keyboard, 79 % said they could use a mouse to “point and click”, 57 % knew how to scroll along a page to navigate content, and 43 % indicated they knew how to use links to open new screens. Self-reported skills did not differ significantly by years of education. Younger participants were more likely to report using links to access information.

In contrast to their self-reported skills, over 60 % of participants required instructional prompts to type in a website address, or a word in a search bar during the task analysis (Table 2). For other navigation options, 56 % of participants needed help managing drop-down menus, 52 % required verbal or gestural prompts to use a scroll bar, and 56 % needed some help using arrows. Participants were more independent using a mouse to select response options on the website's “Food Personality” quiz, with only 28 % needing prompts to complete that step. Participants were independent in reading quiz questions.

Computer Opinions

Eight themes emerged from participants' opinions about using computers: suspicious, insecure, awe, motivated/interested, experienced, capable, lack of exposure/ignorance, and willing (Table 3). Individuals who expressed motivation also tended to indicate capability to use computers, and these themes co-occurred for seven respondents. Similarly, five participants who were insecure about their computer abilities also expressed willingness to learn.

Think Aloud

During the think-aloud session, participants expressed difficulty navigating the website. The most common problem was managing the mouse. Other problems included difficulty scrolling, reading small font, and eye strain. Some participants' comments suggested frustration, such as, "It's easy because you (research assistant) are here. It's a mess. I don't know how to mess with computers" and, "My eyes don't blink and they burn looking at the computer."

Nine participants expressed enlightenment and more positive attitudes about computers after the experience of navigating the Meals Matter website. When asked, one participant admitted, "It was easy—easier than I thought. Makes me want to use them more." Another expressed regret saying, "I didn't know it was that easy. I would have tried already. It was fun. I liked it." A participant who initially thought she would need to take a course to learn to use computers remarked "(They're) easy to understand. There is so much that I would like to take a class." Initially declaring his aversion to computers, one participant was able to identify specifically what was difficult for him, saying "I like this website. I don't like the mouse—I'm not good at clicking things. (It's) hard to get the mouse where I want it."

The remaining participants expressed no change in their opinions after using the website. One participant who said he wasn't smart enough to use computers had difficulty managing the mouse, became frustrated, and facetiously stated, "Whoever made this thing should be shot... I don't like computers." A participant with prior computer experience said the website was "easy to go through" and was "fun".

Several participants focused more on the website content than on the mechanics of navigating through it, saying the information was interesting, and commenting on the website options. One participant stated, "This is interesting, I like this kind of stuff. If I knew what I was doing, I would probably use the computer more...this is all new to me." A lack of interest in the website topic detracted from enjoyment for one participant who indicated the task was "boring", "I'm not interested in food."

Discussion

The study suggested a number of important trends. First, only a small proportion of participants used computers in their daily lives and those who did tended not to use them for email, social networking or to seek health information on-line. Most participants did not own their own computers, and many could not access computers on a regular basis. Direct observation revealed that participants needed more help navigating a website than they self-reported in a previous session. The majority of participants required prompting to successfully utilize all website features, and difficulty with navigation created frustration for some participants. Many participants could not independently use a mouse, type words in designated areas, or use scrolling or menu options to access information.

Individuals' over-estimating their computer skills might be explained by their desire to give more socially desirable responses [22] or by the overconfidence bias observed in behavioral economics and other domains [23]. It is likely that published surveys of computer use among people with SMI similarly have over-estimated participants' actual facility with computers.

For many participants, inexperience was the basis for negative computer attitudes and expressions of insecurity. After a single assisted trial with an interactive website, some individuals spontaneously expressed more positive opinions and greater self-efficacy about their potential for computer use.

Integrating computer technology into health treatment by providing informational websites, web-based intervention, and on-line patient-provider communication may offer the benefits of increased treatment accessibility, privacy, individualization, and cost effectiveness. However, convenient access has been identified as a significant factor in the success of health information technology use among disadvantaged individuals [24]. Thus, to achieve these outcomes for adults with SMI, access and utility of such services must be ensured.

The results of this study have a number of implications for making computer- and internet-based health education more feasible and acceptable for adults with SMI:

1. Free and convenient computer access should be provided.
2. Basic computer operation skills should be observed initially, and instruction to navigate the program should be provided. Participants who report having computer skills may nevertheless require assistance navigating a website.
3. To minimize frustration, several options should be available for navigating the program and entering data (e.g., mouse, keyboard arrows, touch screen). Navigation requirements should be minimal.
4. Font size, buttons, and links should be sufficiently large to ensure usability.
5. Specific participant feedback about usability and acceptability of programs and sites should be solicited early in development and should inform design.
6. Computer/internet-based treatment efficacy and satisfaction should be assessed routinely, with consideration of the effect of computer facility on these outcomes.

The purpose of this study was to describe computer use and attitudes in a sample of adults with SMI using multiple assessment methods. Although the design does not permit inferences about characteristics of the population more generally, this study contributes to a growing literature identifying the unique support needs of individuals with serious mental illness who use computers, and the provisions that may be necessary to ensure this population's access to modern healthcare technologies. Future studies of this type should assess whether these results describe the attitudes, experiences, and skills of other subgroups of individuals with SMI, including individuals living in rural settings, and those who are employed.

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Appendix 1: Computer Experience Questionnaire

Semi-Structured Interview

1. Do you own a computer?
2. Do you have regular access to a computer?
3. How many times do you use a computer each week?
4. What things do you use a computer for?
5. Do you use the internet?
6. Do you have an e-mail account?
7. Do you have a contact list?
8. When was the last time you sent an e-mail? (days)

9. Have you ever purchased anything on the internet? What?
10. Have you ever signed up for a free offer on the internet?
11. Have you ever been taken advantage of, ripped off, or tricked on the internet? How?
12. Do you have a page about yourself (e.g. on Facebook, MySpace)?
13. Which (types of) websites do you visit most often?
14. Do you use a keyboard to type?
15. Do you use a mouse to “point and click” at things on a computer screen?
16. Do you know how to scroll up and down a page?
17. Do you know how to use “links” to open up new screens?
18. What is your opinion about using computers?
19. If you want to find something on the internet, how do you search for it?

Appendix 2: Computer Use Skills Assessment

Directions: Ask the participant to go to the “Meals Matter” website for this computer skills assessment (<http://www.mealsmatter.org>).

Ask participants to say all their thoughts and opinions out loud as they navigate through the site. Document “think aloud comments” below.

Prompt the participant to perform each of the skills listed. Score each skill according to the codes provided:

3: Independent

2: With no more than verbal assistance

1: With physical assistance

0: Unable to do, even with assistance

Skill	Score
Type in website address accurately	
Open website	
Use mouse to select items/links	
Use backward and forward arrows to page back/forward	
Use drop-down menus to view pages of interest	
Use scroll bar to scroll up/down page	
Use scroll button on mouse to scroll up/down page	
Type a word in Search bar to search page	
TAKE FOOD PERSONALITY TEST (Click on “What’s your Food Personality?” link on left side of home page and click on “Take Quiz”)	XXX
Read questions	

Skill	Score
Respond to questions by clicking on response selections	
Click "Continue" to advance to next page	

Think-Aloud: Record participant comments about the website/computer experience below. Use back of page if needed.

Think-Aloud: Record participant comments about the website/computer experience below. Use back of page if needed.

Biography

Anne C. Black, PhD is an Associate Research Scientist in the Department of Psychiatry at Yale University School of Medicine. She is a quantitative methodologist working on studies evaluating the efficacy of behavioral interventions for individuals with co-occurring substance use and psychiatric disorders. Dr. Black's research interests include impulsivity and risk behavior among adults with mental illness, and the application of statistical methods to answer substantive questions in psychology and education.

Kristin L. Serowik, MA is a Rehabilitation Counselor in the Department of Psychiatry at Yale University School of Medicine and a Certified Co-Occurring Disorders Professional. Within a randomized clinical trial, she provides money management, drug and HIV risk reduction counseling to dually diagnosed clients receiving services through the Connecticut Department of Mental Health and Addiction Services. Kristin's research interests include homelessness, substance abuse, community prevention, and treatment outcomes in forensic and severe mentally ill populations.

Jean J. Schensul, PhD is founder (1987–2004) and currently senior scientist full time, at The Institute for Community Research, an independent research institute conducting prevention research in communities in the United States, India and China, and based in Hartford, CT. She is a medical anthropologist with three decades of experience in the conduct of HIV prevention and other health-related research in urban areas of the United States and in developing countries. Her areas of expertise include mixed research methods, drug research, sexuality and HIV, and school and community based structural approaches to intervention across the lifespan.

Anne M. Bowen, PhD is professor in the Fay W. Whitney School of Nursing and Director of the Nightingale Center for Nursing Scholarship. Dr. Bowen is a licensed clinical psychologist with interest in Health Promotion and interventions for people with chronic illness. Her research focuses on reducing risks for acquiring and transmitting the HIV virus. She is especially interested in developing interventions for rural people. She recently completed an Internet intervention for rural MSM with exciting results and is currently developing an Internet intervention to reduce depression among rural men who have sex with men. The intervention will be innovative in that the approach utilizes the techniques of Acceptance and Commitment Therapy and Mindfulness to help men live the life they want to live.

Marc I. Rosen, MD is Associate Professor of Psychiatry at Yale University and is a staff psychiatrist at VA Connecticut. Dr. Rosen conducts research on behavior change. His current research directions involve: (1) therapeutic money management for people with comorbid psychiatric and substance abuse disorders, (2) adherence to antiretroviral medication by people with substance use disorders, and (3) counseling for veterans

presenting for Comp and Pension evaluations. His group's research materials are available at <http://www.behaviorchange.yale.edu/>.

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Table 1Computer use ($n = 28$)

Question	<u>Age in years % "yes"</u>		<u>Years of education % "yes"</u>	
	<40 ($n = 6$)	40 ($n = 22$)	<12 ($n = 10$)	12 ($n = 18$)
Do you own a computer?	0	14 [*]	0	17
Do you have regular access to a computer?	83	55	30	78 [*]
Do you use the Internet?	83	27 [*]	20	50
Do you have an email account?	67	18 [*]	10	39
Have you ever purchased anything on the internet?	33	5 [*]	0	17
Do you have a page about yourself (Facebook, MySpace)?	33	5 [*]	0	17
Use computer for				
Email	67	9 [*]	0	33 [*]
Creating documents	33	0 [*]	0	11
Photographs	17	0	0	6
Dating	17	0	0	6
News	33	0 [*]	0	11
Web information search	83	2 [*]	20	50
Shopping	17	0	0	6
Social networking	50	5 [*]	0	22

* Significant difference at ($n = .05$)

Table 2Task analysis ($n = 25$)

Item	<u>Level of independence</u>			
	Unable to do (%)	Verbal prompts (%)	Gestural/physical prompts (%)	Independent (%)
Type in website address	00	28	40	32
Open website	00	16	48	36
Use mouse to select items/links	00	16	32	52
Use arrows to page back/forth	00	20	36	44
Use drop-down menus	00	20	36	44
Use scroll bar	00	20	32	48
Use scroll button on mouse	00	16	32	52
Type a word in search bar	00	24	40	36
Read questions	00	04	00	96
Respond to questions/clicking on response options	00	08	20	72
Click "Continue" to advance to next page	00	04	40	56

Table 3Computer opinion themes ($n = 28$)

Theme	<i>n</i>	Exemplary statement
Suspicion	4	Smaller (computers) are more dangerous, like concealed weapons with microphones and video cameras. Easy to spy with
Insecure	9	They're hard. I'd probably have to take a course
Awe	4	They're the best thing man ever brought out, like the Bible
Motivated/interested	7	I would like to learn
Experienced	4	They're nice, usable, feasible. I use (computers) to type up poetry and go to school on-line
Capable	6	They're easy and fun
Ignorance	3	I don't know anything about (computers)
Willing	6	I'm interested in getting comfortable (with computers)