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Smoking cessation via the Internet: A randomized clinical trial of an Internet intervention as adjuvant treatment in a smoking cessation intervention

Sandra J. Japuntich, Mark E. Zehner, Stevens S. Smith, Douglas E. Jorenby, José A. Valdez, Michael C. Fiore, Timothy B. Baker, David H. Gustafson

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Internet interventions for smoking cessation are ubiquitous. Yet, to date, there are few randomized clinical trials that gauge their efficacy. This study is a randomized clinical trial ($N=284$, $n=140$ in the treatment group, $n=144$ in the control group) of an Internet smoking cessation intervention. Smokers were randomly assigned to receive either bupropion plus counseling alone, or bupropion and counseling in addition to 12 weeks of access to the Comprehensive Health Enhancement Support System for Smoking Cessation and Relapse Prevention (CHESS SCRP; a Web site which provided information on smoking cessation as well as support). We found that access to CHESS SCRP was not significantly related to abstinence at the end of the treatment period (*OR*=1.13, 95% *CI* 0.66–2.62) or at 6 months postquit (*OR*=1.48, 95% *CI* 0.66–2.62). However, the number of times participants used CHESS SCRP per week was related to abstinence at both end of treatment (*OR*=1.79, 95% *CI* 1.25–2.56) and at the 6-month follow-up (*OR*=1.59, 95% *CI* 1.06–2.38). Participants with access to CHESS SCRP logged in an average of 33.64 times (*SD*=30.76) over the 90-day period of access. Rates of CHESS SCRP use did not differ by ethnicity, level of education or gender (all $p>.05$). In sum, results suggest that participants used CHESS SCRP frequently, CHESS SCRP use was related to success, but the effects in general did not yield intergroup effects.

Introduction

Smoking is a major public health concern that warrants a large-scale public health intervention. The Internet may provide a vehicle for such a public health approach. Last year, 60% of Americans had Internet access in their homes; 70%–75% had access at home, school, or work (Nie, Simpser, Stepanikova, & Zheng, 2004). Of those who have Web access, 80% have used the Internet to search for health information (Taylor & Leitman, 2003). Internet Web sites have the potential to be uniquely beneficial as a treatment mechanism because they are anonymous, able to handle a virtually unlimited volume of participants, available 24 hr a day, available for repeat use, and able to tailor information to users' needs (Cline & Haynes, 2001). A recent Google search revealed numerous smoking cessation Web sites; entry of the term *quit smoking* resulted in 10,400,000 hits (based on authors' research). The number of Web sites available to help smokers quit implies that public and private smoking cessation organizations are already trying to address this need, and that smokers are responding.

The number of cessation Web sites and smokers' apparent use of such sites underscore the need to

Sandra J. Japuntich, Center for Tobacco Research and Intervention, University of Wisconsin School of Medicine and Public Health, Department of Psychology, University of Wisconsin-Madison; Mark E. Zehner, Center for Tobacco Research and Intervention, University of Wisconsin School of Medicine and Public Health; Stevens S. Smith, Center for Tobacco Research and Intervention & Department of Medicine, University of Wisconsin School of Medicine and Public Health; Douglas E. Jorenby, Center for Tobacco Research and Intervention and Department of Medicine, University of Wisconsin School of Medicine and Public Health; José A. Valdez, Department of Industrial and Systems Engineering and Center for Health Systems Research and Analysis, University of Wisconsin-Madison; Michael C. Fiore, Center for Tobacco Research and Intervention and Department of Medicine, University of Wisconsin School of Medicine and Public Health; Timothy B. Baker, Center for Tobacco Research and Intervention, University of Wisconsin School of Medicine and Public Health, Department of Psychology, University of Wisconsin-Madison; David H. Gustafson, Department of Industrial and Systems Engineering and Center for Health Systems Research and Analysis, University of Wisconsin-Madison.

Correspondence: Sandra Japuntich, Center for Tobacco Research and Intervention, 1930 Monroe Street, Suite 200, Madison, WI 53711, USA. Tel: +1 (608) 262-8673; E-mail: sjj@ctri.medicine.wisc.edu

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evaluate the efficacy of Internet interventions. A prominent stop-smoking Web site, both because of its longevity and because it is consistently among the first hits in an Internet search, is QuitNet. QuitNet is based on the Public Health Service Clinical Practice Guideline for Treating Tobacco Use and Dependence (Fiore et al., 2000). Last year, more than 1 million people logged onto QuitNet (personal communication). Although some portions of QuitNet are free for public use, a premium package is available for a fee. Six states already sponsor QuitNet use for their citizens (personal communication). Despite the fact that QuitNet has been available since 1995, only one published study documents its effectiveness (Cobb, Gaham, Bock, Papandonatos, & Abrams, 2005). That study was not a randomized controlled clinical trial, but rather an analysis of survey data. Surveys can be unreliable because of low response rates (e.g., Cobb et al. reported that only 26% of their surveys were returned). In addition, the lack of a control group undercuts the determination of efficacy. Finally, people who search for smoking cessation on the Internet and subscribe to an Internet Web site may be more motivated to quit than the average smoker or may differ in other respects (e.g., level of education). Therefore, it seems vital to determine the efficacy of Internet cessation strategies via randomized clinical trials. Such trials could constitute the best evidence that Internet interventions can be efficacious, and could identify which features are most highly associated with efficacy.

The majority of articles that address smoking cessation via the Internet present information on the development of Web sites (e.g., Escoffery, McCormick & Bateman, 2004; Meis et al., 2002) or pilot studies of Web sites (Feil, Noell, Lichtenstein, Boles, & McKay, 2003; Lenert et al., 2003). Authors typically decry the lack of randomized controlled trials, but such trials remain rare.

In sum, smokers appear to be willing to use Internet cessation services, and some government entities have already begun to expend financial resources on such services. Ideally, smokers should make decisions to use a cessation intervention based upon informative research data. In addition, government funding decisions should also be informed by research evidence. Unfortunately, the best evidence regarding treatment efficacy comes from randomized controlled trials (RCTs), and in this area such trials are hard to find. The one randomized clinical trial that does compare an Internet intervention group with a control group (Schneider, Walter & O'Donnell, 1990) is informative, but is dated, given the advances in the Internet since its publication. Schneider et al. recruited smokers on the CompuServe computer network to participate in an online smoking cessation program. They then randomly assigned users to the whole program, the whole program plus a support group, placebo program plus support group, or placebo program. They found no significant differences among the groups.

Two additional published studies have considered the effectiveness of Internet interventions for smoking cessation (Strecher, Shiffman & West, 2005; Etter, 2005). Both studies test whether Internet programs that tailor information for the user work better than programs that give the same information to every user. Etter (2005) found an adverse effect of tailoring such that after 2.5 months of access to the intervention, participants who did not receive tailored information quit smoking at higher rates. Strecher et al. (2005) found the opposite. After 2.5 months of access to a tailored or nontailored intervention, participants in the tailored intervention had higher 3-month abstinence rates than those in the nontailored intervention. These conflicting findings raise two questions. First, neither study evaluated whether Internet intervention is, in fact, an effective intervention for smoking cessation. Perhaps Internet interventions do nothing, and tailoring is actually detrimental. Second, neither study provided biochemical confirmation of abstinence. Perhaps one intervention made participants more prone to overstating abstinence. While these clinical trials provide useful data in a field where data are scarce, more research is needed to determine the efficacy of Internet cessation interventions.

The current study is a randomized clinical trial of the efficacy of an Internet intervention, the Comprehensive Health Enhancement Support System for Smoking Cessation and Relapse Prevention (CHESS SCRP), as an adjuvant to standard of care, smoking cessation treatment. The CHESS SCRP program was intended to prevent relapse as well as promote cessation (e.g., it was available to participants well after the quit day; it encouraged users to practice relapse prevention skills).

The present study was designed to evaluate the impact of the CHESS SCRP program in an efficacy evaluation context. That is, the CHESS SCRP service was tested using (a) highly motivated participants, (b) prompts designed to promote intervention use, and (c) an extensive assessment battery. In addition, we designed a strong, Internet-based intervention in which users had access to treatment providers via the Internet. An efficacy evaluative context (vs. an effectiveness context) was selected, since a chief interest was determining whether a powerful, intensive Internet intervention would prove beneficial in the context of high experimental control (with high use rates in motivated quitters and with biochemical confirmation). Thus, this research is not intended to evaluate the reach, real-world utilization, or effectiveness of the CHESS SCRP intervention.

The tested intervention was not evaluated in isolation, but rather as an adjuvant to standard of care smoking cessation treatment comprising brief counseling and bupropion pharmacotherapy. We chose to test our intervention in this context for several reasons. First, it addressed the question of whether the CHESS SCRP intervention could increment the impact of a treatment package known to be efficacious. Thus, this research addressed the question of whether the CHESS SCRP intervention would add benefits of intervention components recommended by the 2000 PHS Clinical Practice Guideline (Fiore et al., 2000), components that might be provided by managed care or other health providers. Second, the use of the standard cessation treatment (brief counseling and pharmacotherapy) no doubt increased initial cessation and permitted a test of the relapse prevention impact of the intervention. In sum, this research addresses whether a particular cessation intervention delivered over the Internet would be used by smokers under conditions of high experimental control (e.g., with prompts, at no cost, computers provided), and whether their access to that intervention yielded a benefit (in smoking cessation or in relapse prevention) beyond that produced by brief face-to-face counseling and pharmacotherapy treatment.

Method

Participants

Participants were 284 smokers motivated to quit smoking (see Table 1 for demographics), the majority of which are female (54.9%) and Caucasian (79.1%). 134 participants were recruited in our research center in Milwaukee, Wisconsin; 150 participated in our research center in Madison, Wisconsin. Participants were given free study medication in exchange for their participation and were given up to US$100 to return for biochemical confirmation of abstinence. This study was approved by the Human Subjects Committee at the University of Wisconsin.

Design and procedure

Recruitment. Recruitment took place from October 2001 to July 2002. Participants were recruited via billboards, bus interior posters, flyers, television advertisements, and press releases. Recruitment materials did not state that the study focused on testing an experimental computer program. Interested individuals called a central telephone number.

Those who responded to the advertisements were screened over the telephone for inclusion/exclusion criteria. Inclusion criteria included being at least 18 years old, smoking at least 10 cigarettes per day, having a traditional telephone line, and being literate in English. Exclusion criteria included current depression, current use of psychiatric medication, medical conditions contraindicating bupropion SR use (e.g., history of seizure disorder), current use of a smoking cessation product or treatment, or being pregnant or likely to become pregnant during the treatment phase of the study.

Procedure. Participants who passed the telephone screen were invited to the study site for an individual orientation session. At this session, they were given a formal presentation about the study and study requirements. All interested participants signed an informed consent form. Consenting participants received a physical exam by a registered nurse, completed an inclusion/exclusion interview, took a breath carbon monoxide (CO) test, and completed a variety of assessment instruments before being accepted for randomization into the study. All

Table 1. Demographics of study participants.

	Experimental condition		
Variable	CHESS SCRP	Control	Total
Number of participants	140	144	284
Gender (percent female)	55.0	54.9	54.9
Race (percent White)	75.4	82.6	79.1
Age, *M* (*SD*)	40.6 (12.4)	41.0 (11.8)	40.8 (12.1)
Cigarettes per day, *M* (*SD*)	21.1 (9.5)	22.1 (10.2)	21.6 (9.9)
Years smoking, *M* (*SD*)	22.7 (12.1)	23.3 (12.3)	23.0 (12.2)
Number of quit attempts, *M* (*SD*)	5.4 (12.5)	6.1 (11.1)	5.8 (11.8)
FTND, *M* (*SD*)	5.4 (2.1)	5.5 (4.4)	5.4 (2.1)
CES-D, *M* (*SD*)	5.2 (4.7)	5.5 (4.4)	5.4 (4.6)
Education, highest level completed			
Less than high school	5 (3.6%)	4 (2.8%)	9 (3.2%)
High school or GED	41 (29.5%)	40 (27.8%)	81 (28.7%)
Some college or tech school	72 (51.8%)	68 (47.2%)	140 (49.6%)
College or graduate school	21 (15.1%)	31 (21.5%)	52 (18.4%)

Note. CHESS SCRP, Comprehensive Health Enhancement Support System for Smoking Cessation and Relapse Prevention; CES-D, Center for Epidemiologial Studies Depression Scale; FTND, Fagerström Test for Nicotine Dependence

participants were given 20 min of individual counseling focused on increasing motivation and preparing for the quit attempt. Participants set a quit day and received a supply of bupropion SR 150 mg (provided by GlaxoSmithKline), which they began taking 7–10 days prior to their quit day. Recommended dosage was bupropion SR 150 mg once each morning for 3 days followed by bupropion SR 150 mg twice daily for 9 weeks.

A quit day session occurred approximately 1 week after the prequit visit. During this visit, all participants received 20 min of one-on-one smoking cessation counseling focused on relapse prevention, coping skills, and handling withdrawal. Participants then completed a questionnaire packet. A resupply of bupropion SR 150 mg was dispensed.

Two days after the quit day, all participants returned for a postquit session. During this session, participants again received 20 min of one-on-one counseling. This counseling focused on encouraging success and planning for long-term threats to abstinence. Participants were told that they could contact the treatment center at any time with questions about their medication or its potential side effects. Participants then completed a questionnaire packet. Finally, participants were given a 2-week supply of bupropion SR 150 mg.

Participants came to follow-up visits 2, 4, 6, 8, and 12 weeks after their quit date (the number and frequency of these visits were arranged, in part, to detect emergent hypertension possibly related to bupropion SR use). These follow-up visits assessed tobacco use, use of therapeutic aids for smoking cessation (e.g., bupropion SR, nicotine replacement, and Internet cessation services), and vital signs. In addition, participants completed a variety of questionnaire measures at each visit. No counseling occurred during these visits. Participants were followed up by telephone monthly from 4 months to 12 months after their quit date. At both the 6- and 12-month telephone follow-ups, abstinent participants were asked to come to the study site for CO measurement. Follow-up telephone calls assessed cigarette smoking, other tobacco use, smoking cessation treatment use, depression and suicidality, withdrawal and motivation to quit.

Randomization. During their first clinic visit, participants were randomized to receive either a control condition, which included 9 weeks of twice daily bupropion SR (150 mg), three brief individual counseling sessions, and five follow-up visits; or the experimental condition, which included the same Bupropion, counseling, and follow-up, as well as a study computer, a dial-up Internet connection, and 12 weeks of access to the CHESS SCRP Web site, which they were encouraged to access once per day.

Computer distribution and use. All participants assigned to the CHESS SCRP group received a study-furnished desktop computer to use; participants were not instructed as to how to access CHESS SCRP from any computer except the study-furnished computer, although accessing CHESS SCRP from other computers was not forbidden. A trained staff member installed dial-up Internet access in the home of each participant.

Participants randomized to the CHESS SCRP treatment group received a phone call after their orientation session to schedule an appointment for a staff member to install a study computer in their home. We attempted to schedule this session as soon as possible, at least 3 days before the quit day. During the installation visit, a study staff member set up the computer and the Internet account and provided training to participants on general computer use and how to use CHESS SCRP. The training was designed for the novice computer user and explained basic computer skills such as how to turn the computer on and how to work the mouse. Participants with more advanced computer skills could opt to skip instruction about basic computer use. After instructing participants about basic computer use, the study staff member oriented the participant on how to use CHESS SCRP. The staff member demonstrated all of the CHESS SCRP services and showed where they were located within the Web site, as well as explained some of the special features within each module.

Participants in the CHESS SCRP condition received CHESS SCRP access for 90 days. Participants were instructed to log onto CHESS SCRP daily. If participants went a week without logging onto CHESS SCRP, staff telephoned them (up to three times per week) and reminded them to log in. When participants had been abstinent for more than 1 month, they were no longer reminded to log onto CHESS SCRP. A study staff person scheduled an appointment with each participant to retrieve each study computer shortly after the 90 days elapsed.

Measures

Smoking status. Smoking status was the main outcome measure in this study. A participant was considered abstinent at a given time point if he or she reported not smoking during the week prior to the assessment. Thus, the measure of smoking status was 7-day point prevalence. Biochemical verification of smoking status, using an expiratory breath CO test, was collected at all in-person visits. A CO value of less than 10 ppm was considered verification that the participant was not smoking. A participant was considered smoking if his or her carbon monoxide level was greater than 9 ppm, regardless of their

self-report. Participants who did not respond to follow-up contacts were considered smokers.

FTND. The Fagerström Test for Nicotine Dependence (FTND) is a six-item self-report measure of nicotine dependence (Heatherton, Kozlowski, Frecker & Fagerström, 1991). The scale yields scores ranging from 0 to 10, with higher numbers indicating stronger dependence on nicotine.

CES-D. The Center for Epidemiological Studies Depression Scale (CES-D) is a 20-item self-report measure designed to measure symptoms of depression in the general population (Radloff, 1977). Participants rate how often they have felt each of the items (such as, *I felt depressed*) in the previous week on a 4-point frequency scale from rarely (<1 day) to most or all of the time (5–7 days).

CHESS SCRP. CHESS SCRP is a guided universe of information, emotional support, and problem-solving assistance in a password-protected environment on the World Wide Web. The CHESS SCRP service contains organized information from various sources screened for accuracy. CHESS SCRP resolves many of the problems of unguided Internet access: It is user-friendly, organized, written at an eighth-grade reading level, and designed by experts to include information only on clinically validated treatments for smoking cessation. The CHESS SCRP Web site has several key components described below (see Figure 1 for CHESS SCRP display).

Check-in. Participants logging onto CHESS SCRP completed a brief entry (check-in) assessment taking about 3 min. CHESS SCRP then produced a graph of the user's smoking history and withdrawal levels over the course of the quit attempt. Finally, the CHESS SCRP program recommended different articles or other services to the user based on his or her responses to the check-in (e.g., smokers reporting depression were encouraged to use the Cognitive Behavioral Therapy service).

Organization of CHESS SCRP. The CHESS SCRP Web site was organized into four sections. The first section provided information about quitting smoking. The second section was a support center

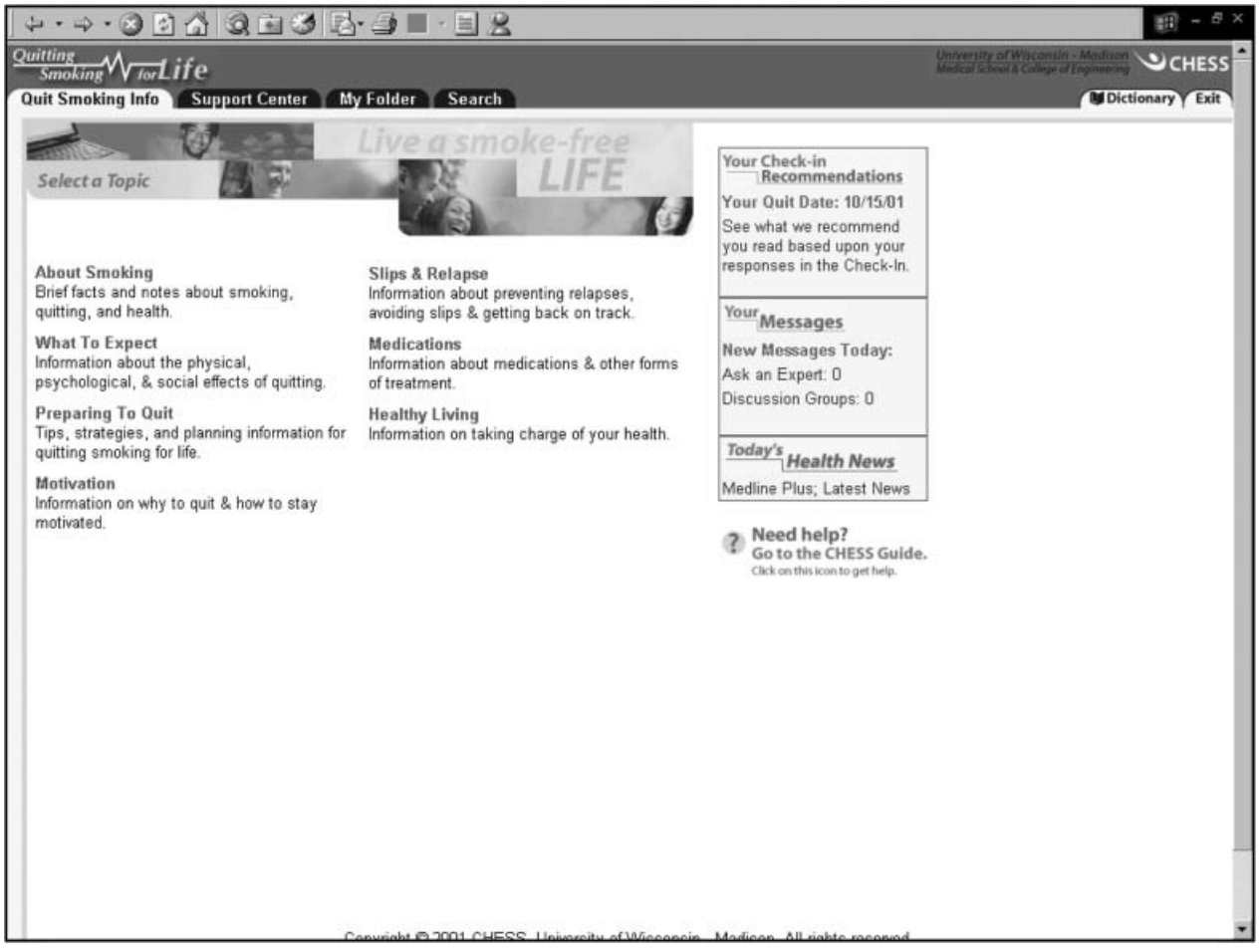

Figure 1. Screen Capture of the main menu of the CHESS SCRP program.

that provided a variety of chat programs as well as a cognitive behavioral therapy intervention for negative emotions. The third section was an information repository that allowed the participant to save CHESS SCRP documents in an easy-to-find folder, provided access to information generated during check-in, and provided both a structured and unstructured journal. The final section allowed participants to search for information within CHESS SCRP, provided a list of recommended Web sites, and offered tips on evaluating Web sites participants may have found on their own.

Quit smoking information. The quit smoking information section provided information on seven smoking-related topics and several subtopics. The smoking-related topics included facts about smoking, smokers and cigarette companies (e.g., how many people smoke, what chemicals are in cigarette smoke); what to expect while quitting smoking (e.g., withdrawal, weight gain, negative emotionality); advice on preparing to quit (setting a quit date, using pharmacotherapy); slips and relapse (e.g., how to get back on track after a slip); medications (e.g., what medications are available, and whether they work); and others. Each of the topics provided a list of frequently asked questions, brief articles on the topic, links to specific articles contained in other non-CHESS SCRP Web sites, and personal stories associated with the topic.

Support center. The support center provided four types of support: A discussion group, a chat room, an ask-an-expert service, and a module of self-therapy for bad moods. The discussion group allowed participants to post questions and comments as well as to respond to others' postings. The chat room service was accessible only for 2 hr a day, in the evening, when a trained counselor was available to consult with participants in real time. The ask-an-expert service allowed participants to ask questions confidentially and get an answer within 2 business days. The experts answering questions were clinical psychologists with an interest in smoking cessation treatment. The module of self-therapy for bad moods was based on cognitive behavioral therapy techniques.

My Folder. An area of the Web site called My Folder had two functions: It allowed participants to save information generated for or by them or that they found other places in CHESS SCRP, and it provided a place to keep a journal. Participants could save articles from other areas of CHESS SCRP into their personal library so that they could easily find articles that they wanted to access again. My Folder contained two journal exercises. The first was a structured journal exercise based on Francis & Pennebaker's (1992) writing paradigm, which participants were instructed to use for 20 min per day for 3 consecutive days. The second journal module was called My Diary. In My Diary, participants first were given the option of completing a few questions and then could choose to write from a list of topics or to pick their own topic. Participants could choose to save their entries and read their previous entries.

Search. The search service provided two ways to search the CHESS SCRP Web site—by keyword or by specific service. In addition, the site included links to CHESS SCRP-approved Web sites designed by other smoking cessation experts and provided advice on how to evaluate Web sites that users may have found on their own.

Results

Recruitment

We screened 610 people for eligibility, of whom 284 passed the screening requirements and were randomized to a treatment condition. A total of 140 were randomized to the CHESS SCRP condition, and 144 were randomized to the control condition. Of participants in the CHESS condition, 19 did not receive access to CHESS because of missed appointments and thus did not receive the treatment they were allocated. All participants in the control condition received at least one counseling session and some bupropion SR, so all participants in the control condition received at least some of the treatment allocated to them. Some 63 participants withdrew from the study between randomization and the 1-year follow up (21 from CHESS SCRP, 32 from control). A total of 57 people were lost to follow-up (27 from CHESS SCRP, 30 from control). All analyses were based on all the randomized participants (284), and dropouts were considered smokers.

Hypothesis testing

Cessation rates. Logistic regression was used to test the first hypothesis, namely, that participants with access to CHESS SCRP would quit smoking at a higher rate. Treatment condition did not predict abstinence at either 3 months (OR=1.13, 95% CI .64–1.98) or 6 months postquit (OR=1.48, 95% CI .66–2.62). At 3 months postquit (end of the treatment phase), 32 people (22.9%) in the CHESS SCRP group and 30 people (20.8%) in the control group were abstinent. At 6 months after the quit date, 21 people (15.0%) in the CHESS SCRP group and 17 people (11.8%) in the control group were abstinent (Figure 2).

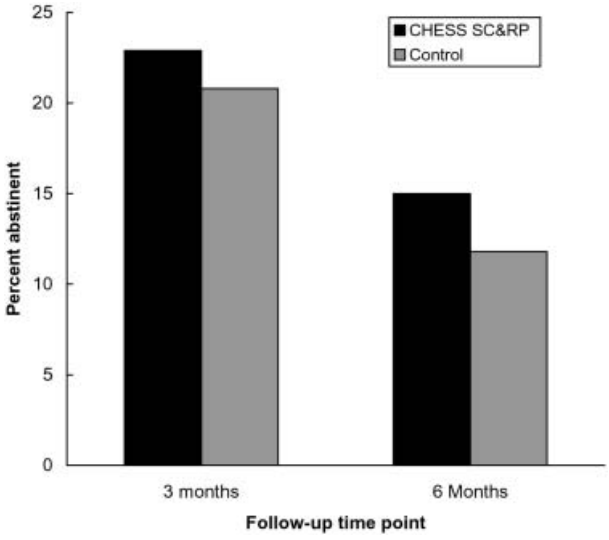

Figure 2. Percentage abstinent by treatment condition at end of treatment and at 6 months post-quit.

Logistic regression was used to analyze whether the average number of times users logged in per week was related to point prevalence abstinence at 3 or 6 months postquit. To remedy the finding that logit was nonlinear, *use* was transformed into four categories of use per week (0–0.99 uses, 1–1.99 uses, 2–2.99 uses, 3 or more uses). Use per week and abstinence status at 3 months were related significantly (*OR*=1.79, 95% *CI* 1.25–2.56) and at 6 months (*OR*=1.59, 95% *CI* 1.06–2.38), such that those with greater use were more likely to be abstinent (Figure 3). Because individuals were not randomly assigned to levels of use, it is undetermined whether more use caused participants to quit at higher rates. It is possible that a third variable such as quitting history, past quitting success, or success expectations caused both CHESS SCRP use and cessation success. To control for potential third variables relating to use and outcome, a second set of logistic regressions was conducted using number of logins per week to predict smoking status at 3 and 6 months postquit, controlling for number of past quit attempts, longest period of abstinence in the past, how much success the participant expected in this quit attempt, age, and dependence as measured by the FTND. Controlling for these variables, analyses indicated that extent of use per week was still significantly related to abstinence (3 months: *OR*=2.10, 95% *CI* 1.36–3.25; 6 months: *OR*=2.13, 95% *CI* 1.25–3.61).

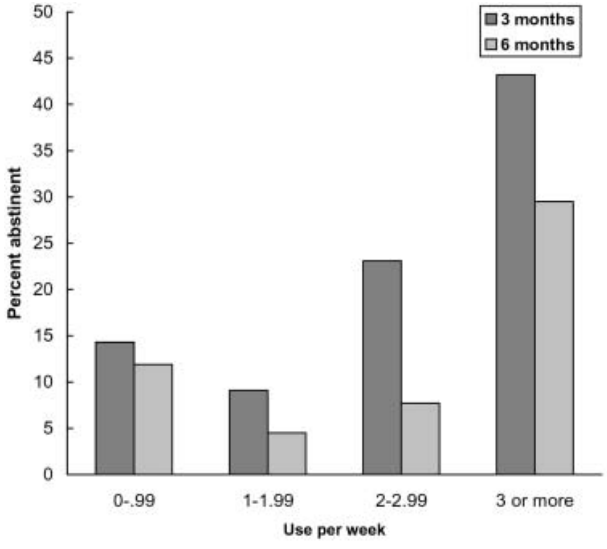

Figure 3. CHESS SCRP use per week by percent abstinent at 3 and 6 months post-quit.

Cessation rates did not differ by gender, education, or race/ethnicity. Cessation rates differed by age 3 months postquit, but not at 6 months (*OR*=1.026, 95% *CI* 1.002–1.05), such that older participants were more likely to be abstinent.

To test relapse prevention, we analyzed data only from those participants who were not smoking at the first follow-up visit 2 days after the quit day (*n*=134). In a logistic regression, treatment group was used to predict abstinence. Access to CHESS SCRP did not predict abstinence at 3 months postquit (*OR*=1.07, 95% *CI* .54–2.14) or at 6 months postquit (*OR*=1.66, 95% *CI* .76–3.63). Thus, there was only a nonsignificant trend for CHESS SCRP users to maintain abstinence.

Use of Web site. Our second research question regarded how much participants would use CHESS SCRP. Participants logged into CHESS SCRP a mean of 33.6 times (*SD*=30.8) with a median of 24 times over the course of the intervention period. This amounted to an average of 486.4 min logged on (*SD*=638.9) with a median of 202.9 min. The most popular services were the support tools, with a mean use time of 43.29 (*SD*=109.81) min. The least popular services were the information tools (*M*=7.98 min, *SD*=18.41). On average, participants spent 24.70 (*SD*=116.13) min reading discussion group postings. In general, use tapered over time, with more use during the beginning of the intervention period, and less use toward the end of the intervention period. CHESS SCRP use was not correlated with gender, race, or education, but it was correlated with age, such that older people used CHESS SCRP more frequently (Table 2).

Discussion

Although Internet interventions for smoking cessation are readily available, adequately controlled, randomized clinical trials testing the efficacy of these interventions are rare. The present research

Table 2. Mean number of Comprehensive Health Enhancement Support System for Smoking Cessation and Relapse Prevention (CHESS SCRP) logins, categorized by selected demographic variables.

Variable	*M* (*SD*) logins per week
Gender	
Female	2.52 (*2.41*)
Male	2.50 (*2.33*)
Ethnicity	
White	2.52 (*2.27*)
Black	2.97 (*2.85*)
Other	2.27 (*2.32*)
Education (highest completed)	
Less than high school	2.81 (*2.40*)
High school	2.06 (*2.04*)
Some college or tech school	2.71 (*2.35*)
College or graduate school	2.94 (*2.83*)
Age	
18–35	2.02 (*1.53*)
34–45	2.18 (*2.54*)
⩾46	3.35 (*2.57*)

attempted to address whether or not one such intervention is efficacious and whether or not people would use it.

A primary question addressed by this research was whether an Internet-based smoking cessation intervention could significantly augment the abstinence rates produced by a treatment comprising brief smoking cessation counseling and pharmacotherapy. No significant effects were found in this comparison. Our results were similar to the 6-month outcomes of Schneider et al. (1990). However, the effect sizes (i.e., $OR=1.59$, 1.66) yielded by the comparisons were similar or larger in magnitude to odds ratios in this type of research (Strecher et al., 2005, found a 3-month *OR* of 1.34). If similar effect sizes were found in population-based applications of Web-based cessation interventions, it is possible that such interventions would yield meaningful public health impacts. Also, abstinence rates increased among participants using the Web site the most frequently. While it is possible that heavier Web site use helped individuals maintain abstinence, other variables may have accounted for the relation between program use and abstinence rates. However, the significant relation between use and abstinence remained after individual history and individual difference variables were used as covariates. These variables might not have assessed other variables in a thorough or sensitive manner. Therefore, the results of the present research should encourage further exploration of Internet interventions, although the findings, by themselves, do not permit strong inferences regarding efficacy.

Our second study aim was to determine whether or not participants would use CHESS SCRP if they had access. In the reported study, participants used CHESS SCRP multiple times per week, averaging about more than 6 hr of use per participant. This shows clearly that smokers will, under highly controlled circumstances, use an Internet cessation treatment. It is uncertain, however, whether less motivated individuals, such as those who would not sign up for a cessation research program, would use an Internet intervention to the same degree. Also, intervention use in this research program may have been enhanced by reminder telephone calls urging participants to use the system; the protocol allowed a maximum of three such calls per week, for every week the participant did not log in at least once. The intervention also may have been enhanced by the fact that computer hardware, Internet access, and access to the cessation Web site were provided at no cost to participants.

We did not find any correlations between use and ethnicity, gender, or education level. This suggests that the intervention provided information and services that were useful and accessible across gender, race, and education level. The finding that older participants used CHESS SCRP more than younger participants may reflect a greater seriousness regarding quit attempts among older smokers, who may be experiencing more health problems as a result of smoking.

The results of this study are encouraging but demonstrate a need for more rigorous investigation into the area of Internet interventions for smoking cessation. In particular, future studies should employ larger samples that are suitable for interventions intended to be used on a population-wide basis. In addition, future studies might provide access to the Internet intervention over much longer time periods. It may be that the benefits of an Internet intervention are cumulative and occur when individuals can use it, when they choose to, over extended periods of time.

This research was done in the context of an efficacy study. Therefore, formal participant recruitment was used, an intensive adjuvant treatment was offered, and subject contact was relatively intense. This not only limits generalizability to real-world contexts, but also may have produced a ceiling effect in abstinence rates. An additional limitation to the generalizability of this study is that Internet connections were slow. Finally, this study was intended to test a strong Internet intervention. Some of the features of this intervention, such as access to advice from clinical psychologists via chat rooms and e-mail, may be difficult to replicate in real-world Internet interventions.

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