Running Head: INTERNET-BASED SMOKING CESSATION INTERVENTION

Evaluation of an Internet-based Smoking Cessation Program:

Lessons Learned from a Pilot Study

Edward G. Feil, John Noell, Edward Lichtenstein, Shawn Boles, and H. Garth McKay

Oregon Research Institute

Page Count: 16

Word Count: 3,052

IN PRESS: Nicotine & Tobacco Research (2003) 5, 189–194

Author correspondence and reprint requests to:

Edward Feil, Ph.D.

Oregon Research Institute

1715 Franklin Blvd.

Eugene, OR 97403

Ph: 541/484-2123; Fax: 541/484-1108

email**:** edf@ori.org

Footnote: The authors would like to acknowledge the support of this research by grant RO1-CA-79946 from the National Cancer Institute. The authors would like to give special thanks to Ron Williams, Ann Terrell, Philip Bayles, and Connie Key for their invaluable contributions to the project.

Evaluation of an Internet-based Smoking Cessation Program:

Lessons Learned from a Pilot Study

Edward G. Feil, John Noell, Edward Lichtenstein, Shawn Boles, and H. Garth McKay

Abstract

The potential contribution of the Internet to smoking cessation seems huge, given that a majority of Americans now have both computers and telephones. Despite the proliferation of Internet web sites offering smoking cessation support, there is little empirical evidence regarding the efficacy of Internet-delivered cessation programs. We developed and a conducted a short-term evaluation of a cessation web site, examining recruitment approaches, web site use patterns, alternative retention incentives and re-contact modes, satisfaction, and cessation rate. The intervention included modules on social support and cognitive-behavioral coping skills configured to take advantage of the interactive and multimedia capabilities of the Internet. Cessation and satisfaction data were obtained from a subsample of 370 subjects followed for three months. The program was rated as "easy" to use and the social support group component was used most frequently. The cessation rate (abstinence for the previous seven days) at three months was 18% with non-respondents (N=161) considered to be smokers. Among a variety of traditional and Internet-based recruitment strategies, the most successful were via the Internet user groups and search engines. Methodological and procedural issues posed in conducting research on the Internet are discussed.

KEY WORDS: Smoking cessation, Internet-based interventions, peer support, computer-mediated interventions

Evaluation of an Internet-based Smoking Cessation Program:

Lessons Learned from a Pilot Study

Improvements in Internet technologies and their availability, paired with a dramatic drop in the cost of connecting to the Internet, have created the potential to provide 24-hour "on-demand" comprehensive smoking cessation support to the more than 100 million households with computers and telephone lines (NTIA, 2000; Nielsen Netratings, 2000). The degree to which this potential will result in abstinent smokers remains in question. Nonetheless, a large number of websites now offer smoking cessation support, with many sites, such as QuitNet.org, QuitSmoking.com, and QuitSmokingSupport.com, being devoted entirely to cessation. There is evidence that such sites can attract large numbers of smokers. For example, one site, QuitSmokingSupport.com, reported that from 1994 through 2001 they had over 50 million visitors and had achieved over 1,000,000 page views per month (QuitSmokingSupport.com, 2001). However, no data are available as to the effectiveness for smoking cessation these visits have had.

Aims

We felt that a first logical investigative step was to see if those smokers who access a specific smoking cessation intervention web site have cessation rates high enough to indicate some degree of effectiveness. In the absence of such evidence, there is little reason to pursue a more in-depth investigation. We also wanted to investigate the feasibility of recruiting and maintaining contact with subjects via the Internet, testing e-mail versus US postal mail follow-up contact, and the effects of two different levels of response incentives.

Design

We developed a smoking cessation web site and conducted a series of pilot tests to test recruitment and retention strategies. To test for the influence of incentives, the follow-up subjects were randomly assigned to receive either $10 or $20 for completing the three-month follow-up assessment. In addition, in order to determine if those subjects who did not respond to electronic prompts at three months could be reached more effectively by US Postal mail rather than repeated e-mails, we randomly assigned those subjects who did not respond to an e-mail prompt at three months to receive further follow-up prompts by either e-mail or US Postal mail. See Figure 1 for a flow diagram of enrollment and subject disposition.

Insert Figure 1 about here

The three-month survey was initiated with an email request to access a website and provide follow-up information. Participants who failed to respond to the e-mail, but who subsequently accessed the web site, automatically received an automatic prompt at sign-in, asking them to complete the survey. If a participant did not complete the three-month assessment within three weeks of the due date, the survey was sent within either an e-mail message or US mail letter, depending on the follow-up condition to which the subject had been assigned. Upon completion of the follow-up assessment, subjects were mailed checks for either $10 or $20, depending on the condition to which the subject had been assigned.

Setting

The web server was mounted on the open Internet at Oregon Research Institute via a shared T1 (high bandwidth) connection that was accessible throughout the world. People with

Internet access (e.g., home, work, or community setting such as library) and web browser software could view the homepage.

Participants

The four criteria for participation were (a) age 18 years or older, (b) being at least in the contemplator stage (i.e., "interested in quitting in the next six months") based on the Transtheoretical Model of Prochaska and colleagues (Prochaska, 1994; Prochaska & DiClemente, 1983, 1984, 1985; Prochaska & Velicer 1997), (c) having a valid e-mail address, and (d) being a resident of the United States or Canada (to facilitate payment, which was in US dollars only, for convenience). Anyone who (a) arrived at the website, (b) asserted that they fulfilled the four participation criteria, (c) provided us with a valid address in the United States or Canada (to which participation-incentive checks were mailed), and (d) provided an e-mail address was accepted for enrollment. Qualified participants were then asked to provide informed consent via a web-based process, which previously had been reviewed and approved by the Institutional Review Board of Oregon Research Institute. Access to the web site was controlled through the use of unique log-in names and passwords but participants were free (and encouraged) to access the site as much and as often as desired.

Recruitment was accomplished by using a wide variety of methods. Internet recruitment included (a) submitting our website to major web search engines (e.g., http://www.lycos.com/, http://excite.com/, and http://www.yahoo.com/) and confirming its appearance in searches; (b) purchasing banner advertisement displays at a major commercial search engine site; and (c) postings to Internet discussion groups related to smoking cessation (e.g., alt.quit.smoking.support and an AOL support group for smoking cessation). Non-Internet recruitment methods included announcements of our website address with supporting information via a newspaper display

advertisement, a newspaper feature article, brochures distributed at community dental clinics and doctors' offices, and a radio interview.

A total of 606 smokers were enrolled in a period of six months, 72% female and 81% Caucasian. Seventy-seven percent smoked 16 or more cigarettes per day. Eighty-five percent were between 25 and 54 years old and most had either some college (46%) or were a college graduate (34%). The initial 370 subjects enrolled were followed for a period of three months, at which time we attempted to re-contact all of them to ask them to complete a follow-up assessment. These participants were not significantly different demographically than the overall sample.

Website Design and Intervention Development

The website we developed (the Quit-Smoking-Network; http://QSN.ORI.ORG) included several major components: a structured intervention that guides development of a cessation quit plan, interpersonal support (both peer-peer and professional-peer support in both postings forum and e-mail response formats), and a "library" with a wide variety of cessation resources (e.g., on-line pamphlets, motivations materials, and links to other sites). The intention was to create a reasonably full-featured and extensive web site, based on theoretically-grounded and empirically-validated intervention approaches (see Lichtenstein & Glasgow, 1992).

Formative research suggested that the website needed to be accessible and functional for a wide variety of users (i.e. both Mac and PC users with differing Internet browsers and varying bandwidth connections). Therefore, use of audio and video was kept to a relative minimum. Based on reviews of the literature (e.g. U. S. Department of Health and Human Services, 1996, AHCPR Publication No. 97-N004) and direct experience in other smoking cessation projects, specific components were identified for inclusion: a personalized quit-plan, a social support

component with a bulletin board service and chat feature, informational resources for quitting (e.g. an HTML version of "Clearing the Air," a smoking cessation pamphlet from the National Cancer Institute NIH, 1993, Publication No. 94-1647), links to other relevant websites (e.g., American Cancer Society), tobacco related news, and anti-tobacco "entertainment" (e.g., puzzles and videos of 1950's cigarette advertising, featuring stars who later died of smoking related causes).

The quit plan consisted of five key elements, beginning with a motivational introduction designed to emphasize benefits. The subsequent sections of the program offered guidance in avoiding cravings while quitting, dealing with cravings that do occur, and the value of enlisting social support while quitting. The last major section encouraged setting a specific quit date with a quit calendar. The program concluded with motivational messages designed to increase self-efficacy. The social support component was "hosted" (i.e. moderated) by a paraprofessional ex-smoker. Our "forum host" welcomed new members and provided encouragement for cessation efforts via e-mail. The "Ask-an-Expert" option provided responses from a team, including one of the authors, a psychologist (E.L.) with extensive clinical and research experience in smoking cessation and counseling.

Measurements

Assessment was accomplished on the web site at baseline and, for the initial 370 enrollees, also at the three-month follow-up. Both baseline and follow-up surveys were kept brief to minimize response burden (and presumably reduce attrition). After the baseline survey was completed, participants received immediate access to the entire web site. Baseline measures included smoking behaviors (e.g., frequency and time of first use in day), cessation self-efficacy, prior use of cessation aides (e.g. NRT), current social support, and how they heard about the web

site. The mean times for completing the baseline and follow-up assessments were 5 and 6 minutes, respectively. All subjects who completd the baseline survey were mailed checks for $10.

Findings

The analyses of recruitment and website use are based on the entire set of 606 subjects over the six-month pilot test. Outcome analyses (sample retention, cessation rate, incentive impact, contact mode response, and satisfaction) are based on data from the 370 follow-up subjects (participants enrolled for three months by the end of the pilot test); these subjects did not differ significantly from the overall sample on any demographic variable.

Recruitment results and website use

The total number of persons recruited through each method is shown in Table 1. The most successful recruitment strategies, as reported by participants upon registration, were via the Internet search engines and user groups (i.e., Table 1 groups a and b). The newspaper recruitment methods brought in a number of users but were very effective for a short time period (i.e., occurring on only 25 out of the 180 days duration of the pilot test).

Insert Table 1 about here

There were 24,252 log-ins (i.e., participants used their username and password to gain access to the website) with an average of 108 log-ins per day over the six-month period for all 606 participants. Most activity occurred immediately after completion of baseline assessment and on weekdays rather than weekends. Sixty-three percent of the 606 participants accessed the personalized Quit-Plan segment. The social support group component was used most frequently;

the library resource area was the second most popular. Women (log-ins mean of 8.3, SD = 39.2) tended to participate more frequently than men (mean of 6.7 log-ins; SD = 41.5), with female participation most pronounced for messages posted in social support (mean of 4.4 postings; SD = 34.6) compared to men (mean of 1.8 postings, SD=14.2). There was great variation in the number of log-ins, with 10% of the participants accounting for 79% of log-ins. While these gender differences and participation rates are suggestive, these results were not statistically significant.

Sample Retention

In response to the 370 three-month follow-up assessment reminders, 209 subjects (56%) completed 3-month assessments (see Figure 1). Fifteen percent (56) of the messages 'bounced' (i.e., were returned due to now invalid e-mail addresses) and 29% (107) did not result in any response (and may or may not have been received by the addressee). Of the 209 subjects completing the survey, 81% did so via the web, 5.5% via e-mail, and 13.5% by US mail. There were no significant differences at baseline on any demographic or smoking behavior variable between those who completed the follow-up assessment and those who did not.

Insert Figure 1 about Here

Cessation

Of the 209 participants who provided follow-up data, 67 subjects reported abstinence (i.e., "no cigarettes, not even a puff, in the last 7 days"), for a cessation rate of 32% (30% for women and 34% for men). Using an "intent-to-treat" criterion (i.e. non-respondents are considered to be smokers), the cessation rate was 18%. There was no significant difference by

gender. The only baseline variable predictive of cessation was the way in which the participant learned of the website (i.e., via the Internet versus some other method). Participants recruited over the Internet (i.e., Table 1 groups a and b who responded to the follow-up questionnaire) were significantly more likely to quit than those recruited through other means (N=140 [67%] vs. N=69 [33%], X^2=9.60,df=1, p<. 01). None of the remaining baseline or process variables, including gender, smoking rate, or frequency of participation were significant predictors of cessation.

Incentive and Contact Mode Response

Although the group offered the $20 survey completion incentive had a higher completion rate (60%) than those receiving the $10 incentive (55%), the difference was not significant. Similarly, there was no significant difference in the response rate for the contact modes, with 55% responding to repeated e-mails and 60% responding to letters sent via US Postal mail.

Convenience

Overall, participants rated the intervention components highly. On a six-point scale from "very easy" (value of 0) to "very difficult" (value of 5), 63% rated the web site as “easy” or “very easy” to use (mean=1.11, SD=1.00). The Ask-An-Expert section was rated most highly (.80, SD 1.30). All other components had an overall rating of “easy,” except the Information Sections, which received a rating of 1.97 (SD 1.38), or “somewhat easy.”

Conclusion

The rate of smoking cessation reported by users of the web site, even on an intent-to-treat basis, is encouraging. Recruitment was most successful via the Internet and incentives did not ameliorate attrition for a 3-month follow-up. Smoking cessation outcomes were assessed only by self-report, but the “demand characteristics” for false reporting in this context are limited

(Velicer, Prochaska, Rossi, & Snow, 1992). We conclude that these results provide reason for further evaluations of comprehensive Internet-based smoking cessation interventions. However, given the lack of a control condition, we cannot conclude that quitting was a function of our website, rather than other factors. Determining the relative contribution of a specific web site will require facing some very difficult challenges, given that typical Internet users appear to 'sample' various sites.

Although we were able to recruit hundreds of subjects via the Internet itself, it is not clear that this will continue to be a viable approach. The largest single group came to our site via search engines. Indeed, the typical Internet user appears to access numerous sites when searching for information or support pertaining to a specific topic (Pastore, 2001). If one artificially restricts access to a single site, it raises questions about the impact of that site under more typical conditions, where the user accesses a number of sites for the same reason. Unless the participant is somehow prevented from using any other computer, there is no way to be assured that the participant did not use alternative sites, even if monitoring software is used to track which web sites have been accessed from a specific computer. In a true open-Internet sample there is a high degree of anonymity. That may well be part of the appeal of web-based programs. However, that means that it can be difficult to track participants. It also can be difficult to be certain that participants are who they claim to be. While asking for postal addresses or social security numbers or driver's license numbers may provide alternative means of validating identity, they also are likely to result in many people not participating and a biased sample. "Electronic identities" (e.g., e-mail addresses) are not particularly stable. The fact that 15% of the previously valid e-mail addresses were not valid three months later and that we were able to track and elicit responses from only 56% of our sample at three-months poses a distinct threat to interpretations

of results. We suspect that a telephone follow-up would be more productive in reducing attrition since we have found this method useful in other outcome studies (e.g., Lee, Lichtenstein, Andrews, Glasgow, & Hampson, 1999). These methodological issues will require consideration when conducting research on behavior change web sites.

Future research on web-based interventions also must include component-level analyses to determine which aspects of web-based intervention are effective for specific kinds of people. In our study the social support module, in particular, was heavily used, and many positive comments about it were received. We believe that the popularity of the social support module was due in large part to the ex-smoker staff member assigned to moderate the bulletin board and chat room. Does an effective program require such human moderation or can it be fully automated (thus potentially having a much lower cost)? The large proportion of women in our sample (72%) seems to follow current Internet use trends with increasing numbers of women on-line (Richart & Sakarow, 2000). Indeed, the shifting demographics of the Internet user base may also pose a threat to the long-term validity of research findings. However, the potential to reach into the homes of millions of smokers with a program they can use any time, night or day, will continue to be attractive. The challenges of making certain that effective programs are available must be met.

References

American Cancer Society. http://www.cancer.org.

Lee, M.E., Lichtenstein, E., Andrews, J.A, Glasgow, R.E, & Hampson, S.E. (1999). Radon-smoking synergy: A population-based behavioral risk reduction approach. *Preventive Medicine: An International Journal Devoted to Practice and Theory, 29(3),* 222-227.

Lichtenstein, E. & Glasgow, R.E. (1992). Smoking cessation: What have we learned over the past decade? *Journal of Consulting and Clinical Psychology, 60(4),* 518-527.

National Cancer Institute (1993). *Clearing the air: How to quit smoking and quit for keeps* [Publication No. 94-1647]. Washington D.C.

National Telecommunications and Information Administration (2000). *Falling through the net: Defining the digital divide.* U.S. Department of Commerce.

Nielsen NetRatings. (January 2000). Internet Usage Statistics. Website available at: http://209.249.142.16/nnpm/owa/NRpublicreports.usagemonthly.

Pastore, M. (April 30, 2001). *Online Health Consumers More Proactive About Healthcare. CyberAtlas.* Retrieved January 7, 2002 from http://cyberatlas.internet.com/markets/healthcare/print/0,,10101_755471,00.html.

Prochaska, J. O. (1994). Strong and weak principles for progressing from precontemplation to action on the basis of twelve problem behaviors. *Health Psychology*, *13*, 47-51.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, *51*, 390-395.

Prochaska, J. O., & DiClemente, C. C. (1984). *The transtheoretical approach: Crossing the traditional boundaries of therapy*. Homewood, IL: Dow-Jones/Irwin.

Prochaska, J. O., & DiClemente, C. C. (1985). Common processes of self-change in smoking, weight control, and psychological distress. In S. Shiffman & T. A. Wills (Eds.), *Coping and substance use* (pp. 345-363). San Diego, CA: Academic Press.

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion, 12*, 38-48.

Quit Smoking Network. http://qsn.ori.org.

Quitsmokingsupport.com (1994-2001). Home page. Retrieved October 22, 2001, from http://www.quitsmokingsupport.com/home.htm

Rickert , A & Sacharow, A. (2000, August) *It's a Woman's World Wide Web: Women's Online Behavioral Patterns Across Age Groups and Lifestages*. Media Metrix & Jupiter Communications. Retrieved July 2, 2001, from http://us.mediametrix.com/data/MMXI-JUP-WWWW.pdf.

U. S. Department of Health and Human Services, Public Health Service (1996) *Clinical practice guideline; no. 18, October 1996.* (AHCPR Publication No. 97-N004).

Velicer, W., Prochaska, J., Rossi, J. & Snow, M.G. (1992) Assessing outcome in smoking cessation studies. *Psychological Bulletin, 111(1),* 23-41.

Table 1.

Recruitment Method (as Reported by Participants at Enrollment)

MS # 2002-006-R1

(See Separate File, "Table 1")

Figure 1.

Quit Smoking Network Enrollment and Subject Disposition Flow Diagram

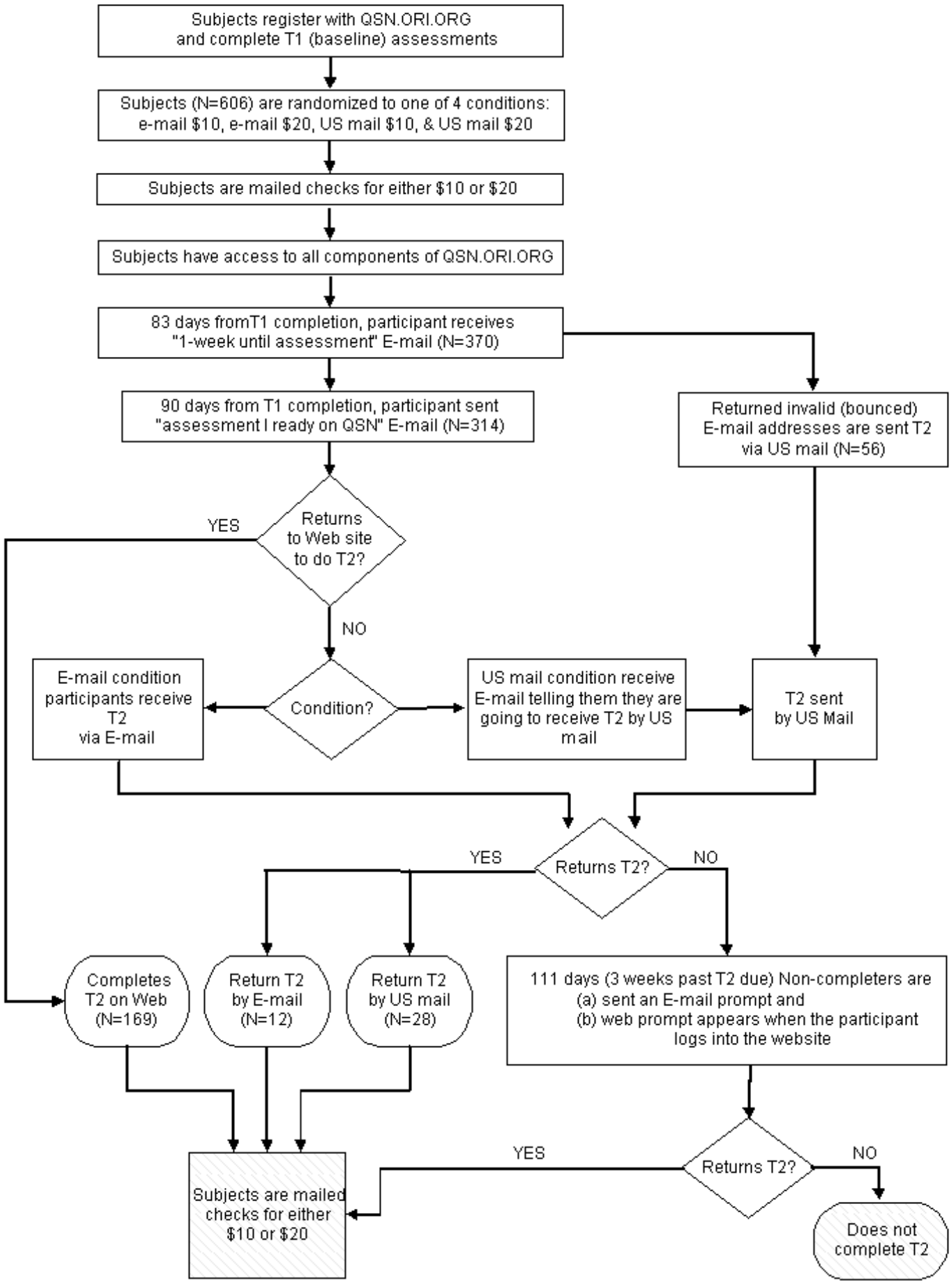
MS # 2002-006-R1

(See Separate File, "Figure 1")

Table 1. MS # 2002-006-R1

Recruitment Method (as Reported by Participants at Enrollment)

Recruitment Method	Persons recruited
Internet search	325 (53.7%)
Internet group	113 (18.7%)
"Other" (unspecified)	91 (15.0%)
Newspaper	67 (11.0%)
Pamphlet from Doctors' office	3 (0.5%)
National organization referral	3 (0.5%)
Radio interview	2 (0.3%)
Pamphlet in other location	2 (0.3%)
Total	606(100%)


Subjects register with QSN.ORI.ORG and complete T1 (baseline) assessments
Subjects (N=606) are randomized to one of 4 conditions: e-mail $10, e-mail $20, US mail $10, & US mail $20
Subjects are mailed checks for either $10 or $20
Subjects have access to all components of QSN.ORI.ORG
83 days fromT1 completion, participant receives "1-week until assessment" E-mail (N=370)
90 days from T1 completion, participant sent "assessment I ready on QSN" E-mail (N=314)
Returned invalid (bounced) E-mail addresses are sent T2 via US mail (N=56)
Returns to Web site to do T2?
YES
NO
Condition?
E-mail condition participants receive T2 via E-mail
US mail condition receive E-mail telling them they are going to receive T2 by US mail
T2 sent by US Mail
Returns T2?
YES
NO
Completes T2 on Web (N=169)
Return T2 by E-mail (N=12)
Return T2 by US mail (N=28)
111 days (3 weeks past T2 due) Non-completers are (a) sent an E-mail prompt and (b) web prompt appears when the participant logs into the website
Returns T2?
YES
NO
Subjects are mailed checks for either $10 or $20
Does not complete T2