

Original Investigation

Reaching young adult smokers through the Internet: Comparison of three recruitment mechanisms

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Abstract

Introduction: While young adults have the highest prevalence of cigarette smoking of any adult age group, studies of tobacco and other substance use have reported challenges in recruiting this age group. The Internet may be a useful tool for reaching young adult smokers. The present study compared three Internet-based recruitment methods for young adult smokers to complete a survey about tobacco and other substance use: Craigslist advertisements, other Internet advertisements, and E-mail invitations through a survey sampling service.

Methods: Recruitment campaigns invited young adults aged 18–25 years who had smoked at least one cigarette in the past 30 days to complete an online survey. Recruitment methods were compared across recruitment numbers, costeffectiveness, and demographic and smoking characteristics of recruited participants.

Results: In 6 months, 920 people gave online consent to determine eligibility to complete the survey, of which 336 (36.5%) were eligible, and 201 (59.8%) completed the survey. While Internet advertisements yielded the largest proportion of recruited participants and completed surveys overall, Craigslist and sampling strategies were more successful at targeting young adult smokers who went on to complete the survey and were more costeffective. Participants differed in demographic and substance use characteristics across the three recruitment mechanisms.

Discussion: We identified success at reaching young adults who have smoked cigarettes recently through the Internet, though costs, participant eligibility, proportion of completed surveys, and respondent characteristics differed among the three methods. A multipronged approach to Internet recruitment is most likely to generate a broad diverse sample of young adult smokers.

Introduction

Although the prevalence of cigarette smoking has declined among adults in the United States since 1983, the smoking prevalence

among young adults aged 18–25 years has remained stable, with current past month cigarette use rates as high as 35.7% (Substance Abuse and Mental Health Services Administration, 2009). Compared with other age groups, young adults are less likely to use behavioral or pharmacotherapy interventions for smoking cessation (Curry, Sporer, Pugach, Campbell, & Emery, 2007), and studies of tobacco use and other health behavior have reported great challenges in recruiting young adults (Bost, 2005; Davies et al., 2000). The Internet may be a useful tool for reaching this age group.

The Internet is increasingly used as a method to target and survey individuals about health risk behaviors. Compared with face-to-face interviews, Internet-based surveys are believed to reach more potential respondents; allow inclusion of low incidence or “hidden” population groups; allow rapid convenient input by respondents; and reduce bias in response to sensitive potentially stigmatizing topics (Cantrell & Lupinacci, 2007; McCabe, Boyd, Couper, Crawford, & D’Arcy, 2002; Rhodes, Bowie, & Hergenrath, 2003; Schonlau, van Soest, & Kapteyn, 2007; Schonlau et al., 2004). A recent telephone survey of young adults aged 18–29 years in the United States indicates that almost all (93%) use the Internet, and over the past decade, young adults have remained the age group most likely to go online (Lenhart, Purcell, Smith, & Zickuhr, 2010).

Internet-based surveys have been conducted with college students recruited by E-mail and have yielded valid and reliable estimates of tobacco, alcohol, and other drug use (Kypri, Gallagher, & Cashell-Smith, 2004; McCabe, 2008; McCabe et al., 2002). E-mail recruitment is useful for directly targeting a known population (e.g., students at a college). However, there is a need to develop Internet-based recruitment methods that reach a broad audience of young adults since tobacco is concentrated among lower educational levels (Centers for Disease Control and Prevention, 2009).

Few examples exist of specific strategies to recruit young adult smokers over the Internet. Studies of Internet-based tobacco cessation treatment have demonstrated high enrollment among general-aged adult participants through advertisements on Google or other search engines (Muñoz et al., 2009).

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An intervention for smokeless tobacco used advertisements on Google.com and generated 9,155 clicks and 511 intervention participants at a cost of \$6.70 per participant; advertisements on other search engines generated 363 participants (mean age 34.5 years) in 15 months (Chewfree.com; Gordon, Akers, Severson, Danaher, & Boles, 2006). In another online smoking cessation intervention (QuitNet; Graham, Bock, Cobb, Niaura, & Abrams, 2006), advertisements on Google resulted in 28,296 clicks, 5,557 were determined eligible, 1,489 gave informed consent, and 764 (mean age 35.1 years) completed a baseline assessment in 6 weeks. Thus, while there is limited research in this area, Internet marketing likely represents a cost-effective means of reaching a wide audience quickly and may be useful for targeting young adult smokers.

Web sites such as social networking Web sites (e.g., Facebook, MySpace)—online communities where individuals create a profile and become linked to friends and others to establish relationships and communicate—may be an important tool to recruit young adults. Nearly three quarter (72%) of online 18- to 29-year olds use social networking Web sites, with 45% doing so on a typical day (Lenhart et al., 2010). Currently, Facebook and MySpace are the second and sixth most popular Web sites in the United States, respectively (Alexa, 2010), and hold promise to survey young adult smokers. The national youth smoking prevention campaign of American Legacy Foundation (2006, December 18) called truth targets social networking sites as a means of reaching young people. Between 2005 and 2007, targeting social networking sites resulted in an estimated 810,000 total visitors to the truth campaign's Web site (Duke, 2007, May). Marketing campaigns on social networking and other Web sites represent a way to directly target only those who have identified within a certain age range (e.g., 18–25 years), making them a particularly promising mechanism to target a wide audience of young adult smokers. Whether this can be expanded to the completion of surveys is unknown.

Craigslist.org, a free classified advertisement service for all goods and services, is a cost-effective mechanism to recruit participants to online surveys. It is currently the 11th most popular Web site in the United States (Alexa, 2010). Preliminary evidence suggests that it can be used to recruit young adult smokers to complete surveys about tobacco use and related cognitions (Sporer, Curry, Emery, & Mermelstein, 2007). While cost-effective and reaching a wide audience, Craigslist is not able to directly target any specific age group, which may result in inefficient recruitment and invalid data if surveys do not have a way to validate participant characteristics.

A third potential mechanism not yet well studied is online survey companies that recruit and maintain a panel of potential survey respondents through advertising and other strategies. Participants are prescreened to ensure validity of demographic information. Their answers to lifestyle questions allow researchers to target by demographic and behavioral characteristics (e.g., smoking). Recruitment for individual surveys takes place through E-mail, and respondents are offered rewards to compensate them for their time. The present study explored the use of the Internet as a recruitment tool for young adult smokers to complete a survey about tobacco and other substance use by comparing three different methods: Craigslist advertisements, other Internet advertisements, and E-mail invitations through a survey sampling service. We sought to compare the strategies

across three domains: (a) the extent that each successfully reached study eligible young adult tobacco users, (b) cost-effectiveness, and (c) demographic and smoking characteristics of recruited participants.

Methods

Participants

This cross-sectional survey study used three Internet-based recruitment methods to survey young adult cigarette users, aged 18–25 years old, about their smoking and other substance use. Individuals had to be English literate and smoke at least one cigarette in the past 30 days to be eligible for participation.

Procedure

Internet-based advertisements invited young adults to participate in a 20-min online survey with a chance to win a prize in a drawing. The campaign ran for 6 consecutive months, between 1 April 2009 and 1 October 2009. Advertisements contained a hyperlink that directed potential participants to the study's Institutional Review Board (IRB)-approved consent form and secure online survey with data encryption for added security protection.

Upon entry to the survey Web site, participants were asked to provide online informed consent to complete the study (whether or not they were eligible). The online consent process was approved by the University of California (UC) San Francisco Committee on Human Research, provided that the Principal Investigator (first author) obtained a Federal Certificate of Confidentiality from the National Institutes of Health to protect the data from subpoena. The consent form informed participants that the survey collected Internet Protocol (IP) addresses; they would be asked but not required to provide an E-mail address to be notified if they win a prize and that all identifying information would be separated from survey responses.

The next page included questions to determine study eligibility (age, birth date, and number of cigarettes smoked in the past month). If participants were not eligible based on their age (younger than 18 or older than 25 years) or smoking status (had not smoked at least one cigarette in the past 30 days), then they were redirected to a page that did not allow them to complete the survey.

Once participants consented and were deemed eligible, they were asked to complete a demographic questionnaire, followed by a series of measures of smoking and other substance use behaviors and thoughts about use. Participants were required to answer all questions before they could continue to the next page of the survey and could quit the survey at any time. Computer IP addresses were tracked to determine whether multiple entries were made from the same computer. Data were deemed invalid and excluded from analyses if (a) multiple entries were made from the same computer within a short period of time, with the first entry not being eligible for participation or (b) there was a discrepancy in data from duplicate questions (e.g., date of birth, zip code).

Respondents were given the opportunity (but not required) to provide a valid E-mail address to be contacted if they won a prize in the drawing. At the end of the recruitment

period, each completed survey entry that was associated with a valid E-mail address was entered into a drawing to win a \$400 gift certificate to Apple stores or a \$25 gift certificate to a national or online store. A drawing was chosen over individual incentives based on pilot data we collected with a sample of young adults ($n = 8$), suggesting that participants would be more likely to complete the survey if they had a chance to win a large prize than if they were guaranteed a smaller compensation.

Recruitment

Recruitment used three Internet-based methods: (a) advertisements on Craigslist.org; (b) paid advertising on a variety of Web sites through Adbrite, an Internet marketing company; and (c) purchased completed surveys through Survey Sampling International (SSI), an online survey sampling company. The recruitment strategies are discussed in more detail below.

- Craigslist advertising: Craigslist allows the placing of one single advertisement in any one geographic location for 7 days. For the current study, we placed one advertisement each week in the “volunteer opportunities” section of Craigslist.org in major metropolitan areas across the United States. We identified cities with a high number of adult smokers (Centers for Disease Control and Prevention, 2001; U.S. Census Bureau, 2008) and targeted a total of 23 metropolitan areas over 6 months. Advertisements were not limited in size, so they included two cartoon pictures of cigarettes, large text that read “Do you smoke cigarettes?” and invited young adults to participate in a UCSF survey about smoking for a chance to win a \$25 or \$400 prize in a drawing. Craigslist does not charge a fee to post advertisements for research opportunities.
- Adbrite advertising: We launched a paid advertising campaign with Adbrite to target social networking and other lifestyle-based Web sites where young adults frequent. Our campaign included three online advertisements—two banner advertisements and one two-line text advertisement. Text advertisements were limited to 95 characters in length, had text that read “Ever smoke cigarettes? Take a UCSF research survey and get entered to win a \$400 Apple gift card” and included a link to the survey Web site. For text advertisements, we incurred a charge every time a user clicked on one of our advertisements. Banner advertisements included one or two pictures and the same text as the text ads. We incurred a charge for every 1000 impressions our advertisements made. Adbrite used software that conducts auctions to bring together buyers and sellers of advertising space, which, based on a preset maximum amount that an advertiser agrees to pay for each advertisement, determines whether an advertisement will be shown on a given Web site. For each advertisement, we specified a daily budget (range \$5–\$20) and a maximum bid we would be willing to make for each auction, which were adjusted throughout the 6-month campaign based on recruitment rates and costs.
- SSI: We launched an E-mail campaign through SSI, an online sampling service that recruits and maintains a panel of individuals who have indicated that they are willing to complete online surveys. SSI authenticates registered respondents to avoid duplicate survey entries and misrepresentation and allows for targeting by age and various behavioral characteristics, including smoking status. While a fee is traditionally

charged to pay each respondent for their participation, SSI agreed to forgo this extra charge and allow project staff to conduct a drawing for prizes as approved by our IRB. For the present study, young adults registered with SSI were sent an E-mail invitation for our online survey of tobacco use for a chance to win a prize. We incurred a charge of \$19.24 for each completed survey and no charge for any incomplete responses through this process. Text of the E-mailed invitations was similar to the Craigslist ads, including a first line that read: Do you smoke cigarettes? mention of a UC San Francisco research study, and the chance to win a raffle prize worth either \$25 or \$400.

Evaluation of recruitment methods

We used various criteria to evaluate our recruitment methods. First, number of views of the survey was tracked through both the Internet advertising campaign and the survey sampling company but not through Craigslist. In addition, during the screening and enrollment process, each user was asked to indicate how they heard about our survey. Options included (a) survey sampling company, (b) Craigslist, (c) Facebook, (d) MySpace, (e) another social networking site, (f) a friend told me about it, and (g) “other.” From this, we were able to track the proportion of individuals by recruitment method that reached the survey, signed consent, met survey criteria, and completed the survey. Second, number of invalid responses was tracked, including those due to inconsistent data (e.g., birthdate did not match age) or duplicate IP addresses that had an ineligible entry and then repeat entry. Third, average cost per registered participant was computed for each method by totaling all the recruitment costs associated with using the method and dividing by the number of participants whose eligible status or completion status could be directly attributed to that method. Fourth, for Internet advertisements, we determined which Web sites and the types of advertisements (banner or text) were most effective at recruiting eligible participants and those who completed the survey in entirety.

Measures

A 10-item smoking questionnaire assessed participants’ smoking history, prior quit attempts, cessation treatment strategies, and other tobacco use (e.g., cigars, bidis, hookah, blunts; Hall et al., 2006). The Fagerström Test of Nicotine Dependence (Heatherton, Kozlowski, Frecker, & Fagerström, 1991) assessed level of nicotine dependence. The smoking stages of change questionnaire assessed motivation to quit (Prochaska & DiClemente, 1983), categorizing smokers into one of three preaction stages of change (precontemplation: no intention to quit within the next 6 months; contemplation: intention to quit within 1–6 months; and preparation: intention to quit within 1 month and a quit attempt in the past year). Lastly, participants indicated whether they had used alcohol, cigars, or any form of marijuana at least once in the past 30 days (yes/no). The survey included additional measures not of focus to the current study and took between 10 and 30 min to complete depending on the extent of substance use involvement. A demographic questionnaire assessed age, gender, race/ethnicity, education, occupational status, yearly income, and residential zip code. Zip codes were used to compute region of residence according to the four U.S. Census Regions: Northeast, Midwest, South, and West (U.S. Census Bureau, 2010).

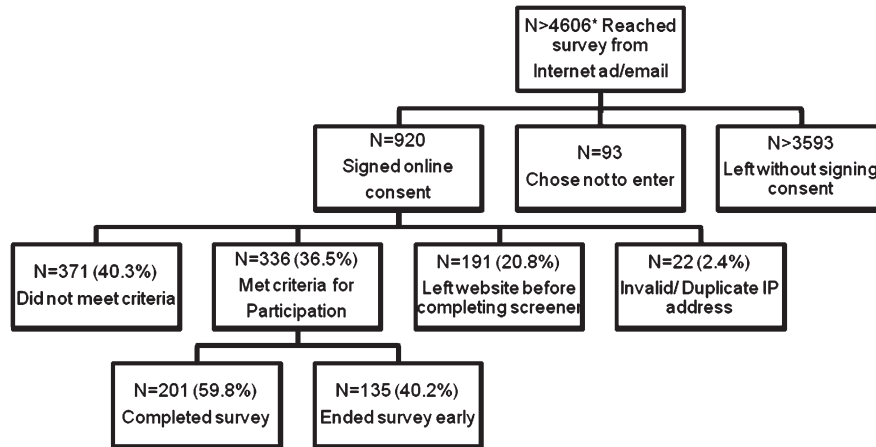


Figure 1. Recruitment characteristics for entire sample.

Results

Overall recruitment

Recruitment numbers for the three sources are shown in Figure 1. During the 6-month recruitment period, our online survey received 4,606 hits that could be tracked to either an Internet advertisement or the survey sampling company. Tracking of hits on the survey homepage from Craigslist was limited to participants' self-reports ($n = 140$).

Nine hundred and twenty people gave online consent to determine eligibility to complete the survey, of which 336 (36.5%) individuals were eligible, 562 (61.1%) were ineligible or left the survey Web site without consenting, and 22 (2.4%) were deemed invalid due to duplicate IP addresses entered in succession ($n = 11$, 1.2%) or inconsistent data ($n = 11$, 1.2%).

Of those who were ineligible, 57.7% ($n = 214$) indicated that they were older than 25 years, 13.3% ($n = 49$) were younger than 18 years, and 47.7% ($n = 176$) had not smoked cigarettes in the past 30 days. Of the 336 eligible participants, 280 provided demographic and smoking characteristics (83.3%) and 201 (59.8%) completed the survey in entirety.

Recruitment by method

Table 1 shows the number of participants recruited by each method. The largest proportions of valid signed consents (63.6%), those meeting criteria (59.5%), and those completing

the survey (45.3%) were recruited through the Adbrite Internet advertisements. For Adbrite, the campaign made 19,198,963 impressions on the Internet, which resulted in 4,424 clicks and 450 participants who completed the screener. Of those, 44.4% ($n = 200$) met criteria to complete the survey and 46% of those ($n = 91$) completed the survey. Of the 129 people who reported learning about the study through an E-mail from SSI, 58.8% ($n = 76$) met criteria to complete the survey and 88.2% of those ($n = 67$) completed the survey. Of the 128 individuals who reported learning about the study through Craigslist, 46.9% ($n = 60$) met criteria, and of those who met criteria, 72% ($n = 43$) completed the survey. Thus, while Internet advertisements yielded the largest proportion of recruited participants and completed surveys overall, Craigslist and SSI were more successful at targeting young adult smokers who went on to complete the survey.

Validity of cases

Of the 66 original IP addresses that found the survey through Craigslist and met criteria for participation in the survey, 6 (9.1%) were deemed invalid due to inconsistencies in data (e.g., reported different birthdates, answered tobacco, or other substance use questions inconsistently). Of the 204 IP addresses from an Adbrite advertisement that met criteria for participation in the survey, 4 (2%) were found to be invalid, and of the 77 IP addresses that found the survey through SSI and met criteria for participation, only 1 (1.3%) was found to be invalid.

Table 1. Participants by recruitment method

Recruitment method	Number who reached survey	Number valid signed consents/screened (% of total)	Number meeting criteria (% of total)	Number providing smoking data (% of total)	Number completing surveys (% of total)
Survey sampling	182	129 (18.2)	76 (22.6)	72 (25.7)	67 (33.3)
Internet advertising	4424	450 (63.6)	200 (59.5)	156 (55.7)	91 (45.3)
Craigslist	— ^a	128 (18.1)	60 (17.9)	52 (18.6)	43 (21.4)
Total	>4606	707	336	280	201

Note. ^aIt was not possible to track how many individuals reached the survey homepage through Craigslist but did not indicate whether they consented or did not consent to participate in the survey.

Costs

Advertisements on Craigslist were free to post and, once created, incurred about 5 min of staff time to post online weekly. For the present study, the cost for this mechanism averaged out to \$4 per week total, which was \$0.66 per eligible participant. For the Internet advertisement campaign, the total budget over 6 months was \$5,000. The average cost per eligible participant who began the survey was \$20.86: \$19.98 for banner advertisements and \$22.61 for text advertisements. The cost per eligible participant to complete the survey was \$42.77. For the survey sampling campaign, costs were incurred only for completed surveys and were \$19.24 per participant.

Considering compensation for participants' time, the total amount spent on prizes was \$2,625 for 30 prizes. The average cost of compensation per completed participant was \$13.06 and per participant who began the survey was \$7.81.

Internet advertisement types

In our Internet marketing campaign, there were two banner advertisements and one text advertisement consistently running for 6 months. The two banner advertisements made 3,410,523 impressions, resulting in 2,885 clicks, and 160 eligible participants (5.5%). The text advertisement made 15,788,440 impressions resulting in 1,539 clicks and 80 eligible participants (5.2%). Banner advertisements were more successful at generating both interested (63% of enrolled participants vs. 37%) and eligible (59% vs. 31%) participants to the survey. Internet Web sites that were the most successful at generating eligible participants were Facebook (7.4% of enrolled participants), MySpace (10.8%), other social networking Web sites (31.4%), Google (5.3%), and other lifestyle-based Web sites (44.1%), including filesharing (17.2%), entertainment streaming (e.g., YouTube, online radio, podcast; 13.5%), informational (e.g., online news, wikis, cooking Web sites; 2.9%), and celebrity (1.6%) Web sites.

Participant characteristics

Demographic and substance use characteristics for the full sample and by recruitment source are presented in Table 2. The recruitment strategies attracted somewhat different subsamples of young adult smokers. Compared with Craigslist and SSI, Adbrite advertisements recruited significantly younger participants, $F(2, 279) = 8.69, p < .01$, and fewer females, $\chi^2(4, n = 280) = 34.48, p < .01$. There also were education differences, such that Internet advertisements attracted a larger proportion of young adults who had begun college and a lower proportion of those who had completed more education compared with the other two methods, $\chi^2(14, n = 280) = 59.35, p < .01$. There were ethnic differences such that Craigslist attracted a greater proportion of Blacks and Asian or Pacific Islanders than the other two methods, $\chi^2(16, n = 280) = 31.34, p < .05$. There were no differences in either employment status, $\chi^2(10, n = 280) = 14.21, p = .16$, or geographic region, $\chi^2(6, n = 280) = 10.27, p = .11$, by recruitment source. Those who were recruited from Adbrite advertisements were significantly less nicotine dependent than those recruited from Craigslist or SSI, $F(2, 279) = 4.28, p < .05$. Finally, there were differences in the proportion of people who used other substances by recruitment source such that those who were recruited from Craigslist were less likely to have used cigars in the past 30 days, $\chi^2(2, n = 280) = 10.27, p < .01$, and

those recruited from Adbrite advertisements were more likely to have used marijuana in the past 30 days, $\chi^2(2, n = 280) = 31.03, p < .01$, compared with those found through the other recruitment methods.

Discussion

This study of three Internet-based recruitment methods identified a high degree of success at reaching young adults who have smoked cigarettes recently, though costs, participant eligibility, proportion of completed surveys, and respondent characteristics differed among the three methods. Advertisements on Craigslist, a free classified advertisement service, were easy to post and affordable, however, attracted a large proportion of individuals who were ineligible due to age or smoking status. The survey sampling strategy was more successful at targeting eligible survey respondents than the Internet advertising (59% vs. 44% of those who signed online consent) and was also more affordable than advertising through Abrite, especially for completed surveys. SSI did not charge for incomplete surveys. Overall, the Internet advertisement campaign generated the most eligible and enrolled participants; however, the survey sampling method was more affordable and better able to target the population of interest. Online surveys that target young adults anonymously should take into account that while cost-effective, it is harder to target young adults directly through Craigslist, and Internet advertising may not be as cost-effective as E-mail sampling.

The sample of young adult smokers presented here differed from other samples in a few important ways. The proportion of nondaily smokers in the sample was 32.9%, which is higher than national estimates of nondaily smoking among young adults (24% in 2005; Husten, 2007). Since nondaily smokers may be less likely to identify as smokers than daily smokers (Husten, McCarty, Giovino, Chrismon, & Zhu, 1999), it is particularly important that online recruitment strategies targeting young adults take this into account. This sample also was highly motivated to quit, with over half of the young adults recruited reporting that they would be willing to quit smoking in the next 6 months. This number is higher than some other studies that have examined stage of change among young adults (Pallonen, Murray, Schmid, Pirie, & Luepker, 1990) and suggests that the Internet may be an important mechanism to develop and implement interventions targeted to young adult smokers ready to quit.

Past month alcohol and marijuana use rates in our sample were greater than those reported in other samples of young adult smokers (e.g., Foldes et al., 2010). Young adult smokers who tend to use multiple substances may be more reachable through the Internet (particularly Craigslist.org advertising and paid advertising campaigns) compared with more traditional strategies, such as telephone surveys. In addition, those who use illicit substances may feel more comfortable disclosing these behaviors in the context of a confidential Internet survey compared with face-to-face or telephone-based survey methods.

The samples recruited through the three online strategies differed from one another demographically. More women started the survey who were recruited from SSI or Craigslist methods compared with Adbrite advertisements. Studies looking to

Table 2. Demographic and tobacco and other substance use characteristics of the smoking sample by recruitment source (n = 280)

Characteristic	Craigslist (n = 52)	Internet ads (n = 156)	Survey sampling (n = 72)	Total sample (n = 280)
Gender (% female) ^a	60.8	30.1	58.3	43.0
Age (years) ^b	22.9 (3.6)	21.2 (2.4)	22.19 (2.17)	21.8 (2.7)
Ethnicity (%) ^a				
Hispanic/Latino	11.5	12.8	12.5	12.5
Non-Hispanic White	55.8	72.4	81.9	71.8
Black	15.4	1.9	4.2	5.0
Asian/Pacific Islander	15.4	7.7	7.0	9.0
Other or multiple ethnicities	1.9	5.2	2.8	1.7
Education (%) ^b				
<High School	3.8	7.1	9.8	7.1
Completed High School	13.5	23.1	31.9	23.6
Some college	34.6	57.1	29.2	45.7
Completed college	38.5	9.0	19.4	17.1
Some graduate work	3.8	1.3	8.3	3.6
Graduate degree	5.8	2.6	1.4	2.9
Employment status (%)				
Full-time student	23.1	30.8	18.1	26.1
Full-time job	40.4	35.3	33.3	35.7
Part-time job	15.4	7.7	13.9	10.7
Unemployed	17.3	22.4	23.6	21.8
Homemaker	3.8	3.2	11.1	5.4
Region				
Northeast	26.7	15.0	23.7	19.0
Midwest	20.0	23.5	18.4	21.7
South	28.3	29.0	38.2	31.0
West	25.0	32.5	19.7	28.3
Cigarettes/day, <i>M</i> (<i>SD</i>)	7.9 (7.0)	9.7 (8.3)	9.9 (8.9)	9.5 (8.3)
% Daily smokers	57.7	68.6	70.8	67.1
Nicotine dependence (FTND total score of 7) ^a	3.3 (1.0)	3.0 (1.0)	3.5 (1.2)	3.2 (1.1)
Lifetime quit attempts (% ≥1)	75.0	72.2	81.4	77.9
Motivation				
Precontemplation	32.7	44.9	51.4	44.3
Contemplation	30.8	22.4	20.8	23.6
Preparation	36.5	32.7	27.8	32.1
Past month substance use				
Cigar ^b	18.2	55.0	35.7	37.6
Alcohol	86.5	86.4	77.5	84.1
Marijuana ^b	31.3	58.0	20.0	42.9

Note. FTND = Fagerström Test for Nicotine Dependence.

^aChi-square or *F* significant at *p* < .05 level.

^bChi-square or *F* significant at *p* < .01 level.

target a specific gender may have more success with a sampling service (which had more women registered with their service) or the free service Craigslist rather than purchasing Internet advertising. Craigslist attracted an ethnically diverse group of young adult smokers, which is not surprising given that the campaign targeted major metropolitan areas that were more likely to have diverse populations. Since Whites are more likely to be daily Internet users than other ethnic groups (Lenhart et al., 2010), studies looking to recruit ethnically diverse samples could benefit from making use of Craigslist. There also were education differences such that the sample from Craigslist was somewhat more likely to have completed college or have post-graduate work, while the Internet advertisements appeared to reach out to those who were currently in college.

There were no differences in proportion of respondents who were eligible and began the survey by region of residence. Rates of smoking among young adults in the United States do vary by region. The National Survey of Drug Use and Health indicates that in 2008, prevalence rates of past month cigarette use by region among those aged 18–25 years were 35.0 (Northeast), 40.8 (Midwest), 36.3 (South), and 30.6 (West; Substance Abuse and Mental Health Services Administration, 2009). The distribution of our sample by region indicates that the Internet-based strategies used to recruit young adults may be particularly successful in the West and relatively less successful in the Midwest.

Compared with Craigslist and Adbrite advertising, the SSI strategy found young adults who demonstrated a slightly heavier

smoking pattern (greater nicotine dependence) and slightly lower likelihood of use of other substances. Studies that attempt to target young adults who are heavier smokers (e.g., cessation intervention trials) may be more successful with a sampling strategy than Internet advertising. However, the Internet advertisements (including Craigslist, social networking, and other Web sites) may be useful at surveying young adults about multiple substance use.

This study had some limitations. First, the use of the Internet as a recruitment source limits the pool of individuals to those who have online access (93% of the young adult population), and since frequency of an adult's internet use is positively correlated with both educational attainment and household income (Lenhart et al., 2010), samples may not be representative of the entire population of young adult smokers in the United States. Second, the Internet, while particularly useful to those who want an anonymous forum to share information, could pose some challenges to generating valid data. It is important to incorporate methods of validating data collected anonymously online and, if possible, to compare these data with data collected by other methods (e.g., telephone surveys, in-person surveys). As with any Internet-based study, there was also the potential for participants to dropout early. It is important to incorporate strategies to increase the number of completed surveys into the survey design. For example, in the current study, moving the page that requested participants to provide an E-mail address to be notified of drawing results from the end of the survey to the beginning increased completed surveys from 59% to 66%. Comparing strategies to compensate participants for their time (e.g., a chance to win a large prize compared with a guaranteed compensation of lesser value) would have better evaluated whether our strategy was most effective. Finally, the present study was focused only on recruitment of young adults living in the United States. While the exact Web sites, costs, and participant characteristics reported here may be vastly different than those found in other countries, the Internet would likely be a successful recruitment strategy in other countries, and future studies should examine this further.

Overall, our Internet-based recruitment strategy for young adult smokers went quickly and smoothly and was successful in attracting young adults who have had recent cigarette use. Findings suggest that a multipronged approach to Internet recruitment is most likely to generate a broad diverse sample of young adult smokers. Further, the young adults reached through this study were particularly motivated to quit smoking in the future, suggesting that an Internet-based intervention could be particularly useful for this group. Internet-based strategies serve as an important mechanism to reach a widespread diverse group of young adults to understand and eventually reduce smoking behavior.

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Declaration of Interests

None declared.

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