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Getting young adults to quit smoking: A formative evaluation of the X-Pack Program

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The lack of promising smoking cessation interventions targeting young adults is a recognized public health problem. This study was designed to determine the feasibility of a young-adult-oriented program, the X-Pack Program, when administered to college student smokers, and to estimate its effect on smoking cessation. Participants (N=83) were randomized after enrollment to receive either a moderately intensive, E-mail-based, young-adult intervention (the X-Pack group) or a less-intensive program aimed at a general adult audience (the Clearing the Air group). Participants were assessed at baseline and at 3 and 6 months after enrollment. Participants in the X-Pack group rated their treatment more favorably overall, were more engaged in program activities, and quit for more consecutive days at the 3- and 6-month follow-ups, compared with the Clearing the Air group. Differences in quit rates favored the X-Pack group at the two follow-ups, but the differences were not significant. These findings offer some support for the X-Pack Program when administered to college smokers.

Introduction

An estimated 23.6% of young adults aged 18–24 years are current smokers (Centers for Disease Control and Prevention [CDC], 2005). Whereas smoking rates continue to decline for adults, they have remained steady for young adults and have increased for some subgroups (CDC, 2005; Lantz, 2003; Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998). The high level of smoking among young adults has been partially attributed to the targeted marketing of tobacco products to young adults (Ling & Glantz, 2004; Sepe, Ling, & Glantz, 2002).

Few smoking cessation programs are aimed at young adults (Abrams et al., 2003; Curry et al., 2007). In a nationally representative survey of smoking cessation programs that serve adolescents and young adults, only 5.6% were found to serve primarily young adults (Curry et al., 2007). Of young adult programs that have been evaluated (Ames et al., 2005; Escoffery, McCormick, & Bateman, 2004; Klesges et al., 2006; Obermayer, Riley, Asif, & Jean-Mary, 2004; O'Neill, Gillispie, & Slobin, 2000; Rutter, 1990), a handful have been successful in promoting smoking cessation (Klesges et al., 2006; Obermayer et al., 2004; Rutter, 1990). These studies are limited in their reliance on informal designs that lack randomization or a control group (Obermayer et al., 2004; Rutter, 1990) and in their use of self-report of smoking status without biochemical validation (Klesges et al., 2006; O'Neill et al., 2000). These studies also are limited in their generalizability, as participants consist largely of college students (exceptions include Ames et al., 2005, and Klesges et al., 2006). The lack of promising interventions targeting young adults is a recognized public health problem (Abrams et al., 2003; Backinger, Fagan, Matthews, & Grana, 2003; Curry, 2003; Lantz, 2003; Orleans et al., 2003).

Young adulthood represents a distinct developmental period of the life course (Arnett, 2000). Young adults face unique challenges associated with the transition to independent living, job and career selection, partner selection, and parenthood (Arnett, 2000; Goldscheider & Goldscheider, 1999). Young

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adulthood is also marked by being a period in the life course when risk behaviors tend to increase, including an increase in cigarette smokers (Johnston, O'Malley, & Bachman, 2003).

Young adults are distinct in their smoking patterns and characteristics. Compared with younger smokers, young adults have a higher prevalence of smoking and are more likely to be regular smokers and to smoke more cigarettes per day (CDC, 2003; Johnston et al., 2003). Compared with older adult smokers, young adults smoke at a similar rate, although they smoke fewer cigarettes per day, are less addicted to nicotine, and are more likely to express interest in quitting and have tried to quit recently (CDC, 2003). Despite their higher level of quit attempts, young adults are less likely to succeed in a given quit attempt compared with older adults (CDC, 2006a; Garvey, Bosse, Glynn, & Rosner, 1983).

These differences in stage of development and smoking characteristics suggest that young adults might benefit from smoking cessation programs developed around their own needs and preferences (Andreasen, 1995). This belief motivated the development in 2001 of a smoking cessation kit aimed at young adult smokers called the X-Pack (Abroms, Winickoff, Lowell, & Mobley, 2003; Population Services International, unpublished). To date, more than 20,000 X-Packs have been distributed to young adult smokers in the United States. This study was designed to determine the feasibility of a young-adult-oriented program based on the X-Pack and to estimate its effect on smoking cessation. Specifically, this study investigated whether, for a college population, the X-Pack Program—which included the X-Pack kit and a series of counseling E-mails—would result in higher levels of program participation and engagement, higher levels of participant satisfaction, and more favorable smoking cessation outcomes compared with a less-intensive generic program.

Method

Sample

Participants were 83 smokers, who were 18–23 years old and undergraduate students at a university in the Washington, D.C., metropolitan area. Eligibility for this study included being a student (full or part time), smoking at least 1 cigarette/day in each of the past 7 days, being aged 18–24 years, and being interested in quitting smoking in the next 6 months. College students were selected because they represent a significant proportion of young adults (Lantz, 2003), their smoking prevalence is high (28%; Wechsler et al., 1998), and they have nearly universal access to E-mail (Escoffery et al., 2005).

Recruitment was conducted in the fall and spring of 2004–2005, after the study received institutional review board approval from George Washington University and the National Institutes of Health. Recruitment included the use of flyers and ads in the college newspaper and a study-staff table outside the student center. A total of 243 students expressed some interest in participating and provided contact information. Of those, 135 students (55.6%) were able to be recontacted. Of those recontacted, 83 enrolled (61.5%), 44 (32.5%) were no longer interested in participating, and 8 (5.9%) were ineligible (two for being too old, four because of smoking less than 1 cigarette/day, and two for not being students).

Participants were offered financial compensation for completing the 3-month and 6-month assessment surveys (US$10 and $15, respectively) but not for completing the baseline survey. Participants who reported 7-day abstinence at the 6-month follow-up were paid an additional $10 for a saliva sample for cotinine analysis.

Procedures and measurement

Participants were randomized after enrollment to receive either a moderately intensive, young-adult-oriented intervention (the X-Pack Program) or a less-intensive program aimed at a general adult audience (the Clearing the Air [CTA] Program). Counselors were assigned a list of identification numbers for enrolled participants, each of which was randomly assigned to a participant's condition. Enrolled participants were assessed in-person at baseline and over the phone at 3- and 6-months postenrollment. Participants who reported during the 6-month follow-up interview that they had quit smoking met with research staff in the 2 weeks following the interview to provide a saliva sample.

The primary smoking cessation outcome of this study was past 7-day abstinence from smoking at 6 months, which was measured by self-report and verified by salivary cotinine analysis ($\leqslant 10$ ng/ml of cotinine; Etzel, 1990). Secondary outcomes included self-report of reductions in the quantity and frequency smoked. Nicotine dependence was measured with the Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991). Depression was measured with the Center for Epidemiologic Studies Depression (CES-D) scale (Radloff, 1991).

Process measures—which were assessed as part of the 3-month survey—included measures of treatment rating (e.g., "I liked the program"), rated on a 5-point Likert scale from "strongly disagree" to "strongly agree," and measures of participation in the quitting process (e.g., "Did you call a friend or family member to help with urge?"), rated on a

4-point scale from "never" to "always." Several process measure items were specific to the X-Pack Program (e.g., "How many of your E-mails did you read?") and therefore were asked only of participants in the X-Pack group. Also specific to the X-Pack Program was a measure of E-mail responses received by counselors. These responses were tabulated from computer records by counting the number of instances each participant replied to his or her counselor after receiving a counseling E-mail.

Data were analyzed by calculating means and percentages of our key measures for the X-Pack and CTA groups; *t*-tests and chi-square tests were used to determine whether differences between groups were statistically significant.

Intervention

X-Pack Program. The X-Pack Program consisted of an in-person counseling session lasting 15 min, a self-help kit (the X-Pack), and a series of counseling E-mails. The goal of the in-person counseling session, which took place in public spaces around the college campus, was to introduce the participant to the X-Pack kit, review key information related to smoking cessation presented in the kit, and to encourage the participant to set a quit date in the next month. Over the course of 6 months following the in-person counseling session, each participant was sent 10–12 counseling E-mails. The intervention components—the in-person counseling, the kit, and the E-mails—promoted a common five-step cognitive–behavioral program for quitting smoking based on social–cognitive theory (Bandura, 1986). These steps involved (a) increasing positive outcome expectations associated with quitting, (b) enlisting a QuitPal, a friend for social support, (c) setting a quit date, (d) developing the skills for overcoming cravings, and (e) quitting and preventing relapse.

The X-Pack kit resembles an oversized pack of cigarettes and includes a smoking cessation guidebook, wallet-sized quitting cards; a motivating slide rule, and various products for use as a substitute to cigarettes (gum, toothpicks, and putty; Figure 1). The X-Pack kit was developed specifically for young adults and involved an intensive year of formative research with young adults (Abroms et al., 2003; Population Services International, unpublished).

The counseling E-mails were written by staff counselors for each participant based on a set of templates developed from the content of the X-Pack guidebook and tailored to the participant's reasons for smoking, smoking triggers, chosen quit date, and other information collected at baseline. Participants were encouraged to reply by E-mail to their counselors with questions and comments, and to update their counselors on their cessation progress.

Figure 1. The X-Pack Smoking Cessation Kit. Contents of X-Pack: (a) Quitting booklet, (b) X-Pack Quit Cards, (c) Success-O-Meter/Ick-U-Lator (slide card showing the harmful chemicals in cigarettes on one side and the money saved and health benefits of quitting on the other side), (d) Wrigley's Orbit chewing gum, (e) Hotlix cinnamon toothpicks, (f) Preoccupation Putty.

E-mails were sent out weekly for the first month and then monthly for the following 5 months. Additional E-mails were sent out around the participant's quit date (1 day prequit, on the quit date, 4 days postquit, and 2 weeks postquit). E-mail counseling was seen as preferable to phone counseling because young adults consistently rank phone counseling as low on their list of preferred assisted options (Abroms et al., 2003; Lawrance, 2001) and because of the nearly universal access to E-mail among college students (Escoffery et al., 2005). Results on the feasibility of the E-mail component of the X-Pack intervention are reported elsewhere (Abroms, Windsor, & Simons-Morton, unpublished).

Counselors, who were undergraduates and masters of public health students, underwent an 8-hr training course in smoking cessation counseling. They were also required to write a series of E-mails for a hypothetical participant, which were reviewed by the study supervisor for accuracy of content and conformance to the study protocol. For their first month of counseling participants, counselors were required to first get supervisor approval of E-mails before sending them out. Counselors met on a weekly basis with the supervisor to discuss issues pertaining to participant counseling.

Clearing the Air Program. The CTA Program consisted of an in-person counseling session lasting 15 min and self-help materials (*Clearing the Air*, developed by the National Cancer Institute; U.S. Department of Health and Human Services, 2003). Similar to the X-Pack Program, the goal of the in-person counseling session was to introduce the participant to the materials, go over key information

related to smoking cessation as presented in the materials, and encourage the participant to set a quit date in the next month. After the in-person counseling session, the participant was not provided with additional assistance in quitting.

Results

Preliminary analyses were conducted to identify preexisting differences between the two groups. No significant differences were found between the two groups at baseline in demographic characteristics or smoking characteristics (Table 1). Participants were on average 19.8 years old, the majority (77.1%) were of White ethnicity, they smoked on average 9.1 cigarettes/day, and they had relatively low levels of nicotine dependence. Slightly more males (54.2%) enrolled than females. Follow-up rates for the sample were 86.7% at 3 months and 68.7% at 6 months. Fifty-nine percent of the 17 self-reported quitters at 6 months provided cotinine samples. We found no significant differences in follow-up rates between groups at either time point or for the cotinine sample.

One of our hypotheses was that the X-Pack Program would result in higher levels of program participation and engagement than the CTA Program. We found this to be true for several participation variables examined in both groups at the 3-month follow-up (Table 2). Although participants in both groups reported having made a quit attempt at high levels, those in the X-Pack group were more likely to report having made a quit attempt ($p<.05$). The X-Pack group also was more likely to use a range of cognitive–behavioral techniques for coping with urges to smoke. They were more likely to have called up a friend or family member for help with an urge or a craving ($p<.05$), to have used the 4D's technique for dealing with a craving (delay from smoking, deep breathing for 10 breaths, drop a piece of gum in mouth, and distract yourself; $p<.001$), and to have read over their own reasons for quitting smoking ($p<.01$). No significant differences were found for setting a quit date, use of nicotine replacement therapy, or readership of the guidebook.

In addition to these activities, which cut across both groups, participation was assessed for activities specific to the X-Pack Program. At the 3-month follow-up, the vast majority of participants (91.6%) indicated that they had read most or all of their E-mails from their X-Pack counselor. In addition, almost half had replied to their counselor's E-mails three or more times during the intervention period. More than half of participants reported using the components of the X-Pack kit regularly, with gum being the most popular, follow by hand putty, toothpicks, and, last, the slide rule.

Participants also rated the X-Pack intervention more favorably. On a 5-point Likert scale, participants from both groups rated themselves between "neutral" to (3) and "agreeing" with (4) the statement that they had liked their program and that they would recommend their program to friends. However, participants in the X-Pack group gave higher ratings of their program liking (3.8 for X-Pack vs. 3.3 for CTA; $p<.05$) and willingness to recommend the program to friends (4.1 for X-Pack vs. 3.5 for CTA; $p<.01$).

Table 3 presents cessation outcomes at 3 and 6 months postenrollment. An intent-to-treat analysis was conducted, and those lost to follow-up were imputed to still be smoking or to have no days without smoking. Overall, the smoking cessation outcomes favored the X-Pack condition, although only some of the results were significantly different. At 3 months, based on self-report of past-7-day smoking, 31.3% of the X-Pack group and 20.0% of the CTA group had quit smoking. The odds of self-reported quitting were nearly twice as great in the

Table 1. Baseline characteristics of participants.

Characteristic	Total participants ($N=83$)	X-Pack group ($n=48$)	CTA group ($n=35$)
Mean age, years (*SD*)	19.8 (1.3)	19.8 (1.3)	19.8 (1.2)
Gender (%)			
Female	45.8	47.9	42.9
Male	54.2	52.1	57.1
Race/ethnicity (%)			
White	77.1	72.9	82.9
Asian	3.6	4.2	2.9
Black	2.4	0.0	5.7
Hispanic	1.2	2.1	0.0
Other	15.7	20.8	8.6
Lives with smoker (%)	37.4	37.5	37.1
Mean cigarettes/ day (*SD*)	9.1 (6.2)	9.9 (6.5)	8.0 (5.6)
Mean past quit attempts (*SD*)	2.4 (1.5)	2.5 (1.6)	2.3 (1.4)
Mean depression total score (CES-D) (*SD*)	11.4 (7.4)	11.8 (8.5)	10.9 (5.6)
Mean baseline nicotine dependence (FTND) (*SD*)	1.9 (1.8)	2.1 (1.8)	1.5 (1.6)

Note. No significant differences were found between groups for variables included in the table.

Table 2. Exposure to and participation in cessation program (%).

	All	X-Pack group (n=41)	CTA group (n=31)	p value[a]
Set a quit date	91.7	95.1	87.1	
Made at least one quit attempt	87.5	95.1	77.4	*
Called friend or family member to help with urge[b]	40.3	53.7	22.6	**
Used the 4D's to deal with craving[b]	57.0	78.1	29.0	***
Used nicotine replacement therapy	15.3	19.5	9.7	
Read over reasons for quitting[b]	77.8	90.2	61.3	**
Read most/all of the guidebook	58.3	56.1	61.3	
Read most/all of the E-mails		91.6		
Replied to three or more E-mails[c]		48.0		
Used contents of X-Pack regularly				
Gum		80.7		
Hand putty		65.1		
Toothpicks		63.9		
Slide rule		59.0		

Note. [a]Calculated with chi-square tests. [b]Percent ever vs. never. [c]Tabulated from computer records of E-mail responses received by counselors. *p<.05; **p<.01; ***p<.001.

Table 3. Smoking cessation outcomes at 3 and 6 months by group.

	3-Month follow-up			6-Month follow-up		
Outcome	X-Pack group (n=48)	CTA group (n=35)	p value[a]	X-Pack group (n=48)	CTA group (n=35)	p value[a]
Quit rate (self-report of past-7-day smoking)[b]	31.3	20.0		25.0	14.3	
Quit rate (cotinine verified)[b]				10.2[d]	5.7	
Days since last cigarette (SD)[c]	13.7 (22.9)	4.5 (9.1)	*	20.0 (47.6)	7.7 (23.1)	
Consecutive days quit (SD)[c]	16.3 (17.7)	8.1 (10.0)	*	34.0 (49.3)	13.4 (24.4)	*
Change in number of cigarettes smoked/week from baseline (SD)	−41.9 (45.0)	−29.8 (35.8)		−35.9(36.4)	−23.0(28.2)	

Note. [a]Calculated with t tests and chi-square tests. [b]Missing assumed to still be smoking. [c]Missing assumed to have no days without cigarettes. [d]59.0% of self-reported quitters provided saliva samples for cotinine analysis. *p<.05; **p<.01; ***p<.001.

X-Pack group (OR=1.81, 95% CI 0.65–5.09). At 6 months, 25.0% of the X-Pack group and 14.3% of the CTA group had quit smoking (OR=2.00, 95% CI 0.63–6.32). Based on biochemical verification of cotinine levels of the self-reported quitters who provided saliva samples at 6 months (58.8% of self-reported quitters), and using an analysis in which those lost to follow-up were assumed to be smoking, quit rates were reduced to 10.2% for the X-Pack group and 5.7% for the CTA group (OR=1.92, 95% CI 0.35–10.52; ns). Based on the cotinine analysis, the deception rate was found to be 28.6% for the X-Pack group and 33.3% for the CTA group (ns).

At 3 months, participants in the X-Pack group had quit for twice as many consecutive days compared with the CTA group (p<.05). At 6 months, participants in the X-Pack group had quit for almost three times as many consecutive days compared with the CTA group (p<.05). Participants in the X-Pack group also reported at 3 months that three times as many days had passed since their last cigarette, compared with the CTA group (p<.05). At 6 months, the difference had declined to just under three times as many days since smoking their last cigarette, a difference that was not statistically significant. Whereas individuals in the X-Pack group also experienced greater declines in cigarettes smoked per week between baseline and the 3- and 6-month follow-ups, these results did not reach significance.

Discussion

This study was designed to document the feasibility of a moderately intensive, young-adult-oriented smoking cessation program (the X-Pack Program). Participants in the X-Pack group were found to be more engaged in the program activities, to rate their treatment more favorably overall, and to have quit for more consecutive days at 3- and 6-month follow-ups. Differences in quit rates between the groups favored the X-Pack Program but were not significant.

Members of the X-Pack group were more likely to have made a quit attempt and to have adopted cognitive and behavioral techniques for coping with urges to smoke. Most of these techniques were mentioned in both sets of guidebooks and in both sets of in-person counseling sessions. The greater adoption of techniques by the X-Pack group may be related to the more favorable ratings of the X-Pack

Program, which may have predisposed participants to follow the program's prescribed quitting activities. Alternatively, the higher level of adoption of techniques may be the result of the additional mention of these techniques in the E-mails, which only the X-Pack group received.

Also, participants reported reading their E-mails at much higher rates than their guidebook. Whereas 92% of the X-Pack participants read "most" or "all" of their E-mails, only 58.3% of all participants read "most" or "all" of their guidebook, and the difference between groups was not significant. This finding provides some evidence that E-mail is an appropriate platform for reaching college students with health information, and it may be a more promising platform than standard print materials.

The quit rates between the two groups were not significantly different at 3 or 6 months. Nevertheless, the trends were encouraging. At 6 months, both based on self-report and with biochemical validation, quit rates were about twice as high in the X-Pack group. The quit rate of 10.2% is comparable with other minimally invasive interventions in adults such as those with phone counseling followed by multiple mailed tailored materials (Strecher et al., 2005) and is more than twice as high as the estimated natural quit rate in youth of 4% (CDC, 2006b).

Also encouraging for the X-Pack Program was that the average number of consecutive days quit was almost twice as high in the X-Pack group at 3 months ($p<.05$) and almost three times as high in the X-Pack group at 6 months ($p<.05$). It is somewhat surprising that the magnitude of difference increased between 3 and 6 months, especially given that the X-Pack intervention—at just one E-mail per month between 3 and 6 months—was quite minimal. These E-mails may have worked by sustaining participants' motivation to quit. This finding implies that a monthly counseling E-mail might be helpful in prolonging the effects of other brief and intensive smoking cessation interventions (e.g., physician advice, phone counseling at a quitline) over time. Given that so little work has been conducted on the applications of E-mail for promoting smoking cessation (exceptions include Etter, le Houezec, & Landfeldt, 2003, and Lenert, Muñoz, Perez, & Bansod, 2004), further research in this area is recommended.

The present study had several limitations. First, because of the study design, it is unclear what aspect of the X-Pack Program—whether its targeting of young adults or its inclusion of an E-mail component (and the associated increase in contact time)—led to the favorable outcomes associated with the intervention. Future studies should evaluate the effect of the E-mail component alone, as well as consider the effect of variations in the source of E-mails (counselor written and sent versus computer generated and sent) and in the frequency by which E-mails are sent.

This study also is limited by a small sample size and an inclusion of only college students, which limits its generalizability. As most studies of young-adult smoking cessation have used college student samples (Escoffery et al., 2004; Obermayer et al., 2004; O'Neill et al., 2000; Rutter, 1990), future studies are very much needed that focus on young adults outside the college setting.

Strengths of the study include the testing of a novel, theory-based program aimed at a population with high smoking prevalence. The findings from this study indicate that a program targeted to young adults that includes sequential E-mails and a self-help kit is feasible and may be more acceptable and more effective for smoking cessation than a generic less-intensive program. Furthermore, a monthly E-mail sent post–quit date may be effective at sustaining quit attempts and preventing relapse following a more intensive intervention.

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