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Development of targeted messages to promote smoking cessation among construction trade workers

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Abstract

Blue-collar workers, particularly those in the construction trades, are more likely to smoke and have less success in quitting when compared with white-collar workers. Little is known about health communication strategies that might influence this priority population. This article describes our formative work to develop targeted messages to increase participation in an existing smoking cessation program among construction workers. Using an iterative and sequential mixed-methods approach, we explored the culture, health attitudes and smoking behaviors of unionized construction workers. We used focus group and survey data to inform message development, and applied audience segmentation methods to identify potential subgroups. Among 144 current smokers, 65% reported wanting to quit smoking in the next 6 months and only 15% had heard of a union-sponsored smoking cessation program, despite widespread advertising. We tested 12 message concepts and 26 images with the target audience to evaluate perceived relevance and effectiveness. Participants responded most favorably to messages and images that emphasized family and work, although responses varied by audience segments based on age and parental status. This study is an important step towards integrating the culture of a high-risk group into targeted messages to

increase participation in smoking cessation activities.

Introduction

National data show that construction trade workers have higher rates of smoking than workers in other occupations. In the National Health Interview Survey from 1997 to 2004, construction workers had the highest rate of current smoking, more than 1.5 times the rate reported in all workers [1]. Analysis of data from the Current Population Survey-Tobacco Use Supplement (CPS-TUS) showed that construction workers were more likely to smoke than other blue-collar workers [2]. Construction workers were more likely to become smokers and less likely to quit smoking once started, resulting in the highest rates of current daily smoking and lifetime smoking among all job groups [2].

These high rates of smoking in the construction industry may be perpetuated in part by workplace culture and work organization. Most construction jobs are outdoors with few or no smoking restrictions. Data from the CPS-TUS showed that construction trade workers had one of the lowest rates of smoke-free policies at work [2, 3]. Because employers are small, worksites are scattered and workers frequently change employers, traditional employer-based smoking cessation programs are

not feasible for most workers. Union-based cessation programs may be a useful alternative, but there is limited evidence about the feasibility and effectiveness of this approach. The few available studies of the effectiveness of union-based smoking cessation programs indicate that such programs may promote smoking cessation; however, the low participation rates reported in these studies highlight the need for better strategies to increase the reach of smoking cessation interventions [4–7].

Social marketing and audience segmentation

The Guide to Community Preventive Services recommends use of ‘mass-reach health communication interventions’ (e.g. television and radio broadcasts, newspaper, billboards) based on strong evidence for their effectiveness in reducing tobacco use, increasing cessation, and increasing use of cessation services like quit lines [8]. More broadly, the Guide recommends ‘small media interventions’ (e.g. videos, letters, brochures) for promoting a wide range of cancer prevention behaviors [9]. Central to both approaches is the idea of audience segmentation, a core strategy used in marketing and social marketing to identify and describe population subgroups that are homogeneous in ways that are relevant to a desired behavior or outcome [10, 11]. When such groups are identified and well understood, different communication strategies can be developed to reach different subgroups [12]. These group-specific targeted strategies enhance the impact of health information by increasing its relevance to a given audience [13].

A good audience segmentation strategy has four key characteristics [14]. First, it will identify ‘distinct subgroups’ that are truly different with respect to the outcomes of interest. Second, these subgroups will be ‘large enough in size’ or population proportion to justify allocation of resources to reach its members. Third, in order to assure that these groups can be reached with targeted communications, methods of identifying members of different audience segments should exist and be ‘fast, easy-to-use and reliable’. Finally, the unique

characteristics of each audience segment should provide ‘clear opportunities and directions for targeting health information’ content and/or delivery channels.

Several studies suggest that the effectiveness of different types of smoking cessation messages may vary by socioeconomic status, particularly education and income [15–17]. Blue-collar workers may have lower education and income, but this is not always the case. Little is known about the effectiveness of messaging for this group of workers. One study focusing on hearing loss prevention in carpenters demonstrated success in increasing intention to use hearing protectors through the use of a tailored educational intervention [18, 19]. The researchers concluded that programs should be tailored to focus on the attitudes of the intended audience rather than simply providing information.

Purpose of study

The purpose of this formative study was to develop a simple, scalable, inexpensive intervention to increase participation in an existing union-based smoking cessation program being offered to members of a regional union of carpenters. The aims of this study were to: (i) explore behaviors and beliefs about health and smoking among local carpenters, (ii) examine survey and message-testing results to identify possible sub-groups of carpenters using audience segmentation and (iii) develop and pilot test targeted smoking cessation messages.

Methods

Population

The study included members of the Carpenters’ District Council of Greater St Louis (CDC). This union has ~14 000 active members and represents 90% of area carpenters. In our previous studies with this group, we found self-reported prevalence of current smoking ranging from 43 to 50% and lifetime smoking prevalence of 59–64% [20]. In an effort to promote smoking cessation among its members, the CDC began offering a smoking cessation program to all health plan members in 2009.

The program includes online and telephone counseling with coverage for nicotine replacement therapy and other cessation medications, and is free to all union members and covered dependents. Despite frequent advertising in member newsletters and at local union halls and training schools, participation in the program was very low with only 59 individuals enrolling in the first year (representing <1% of estimated eligible smokers).

Union carpenters attending classes at the jointly sponsored labor-contractor training school were invited to participate in the current study. All union apprentices are required to attend 4 weeks of skills and safety training per year for 4 years and journeymen are required to complete at least 8 hours of safety training per year. We recruited individuals for focus groups and message/image testing by having instructors announce the study and placing sign-up sheets in the break room. Survey recruitment was conducted by distributing surveys in all carpenter classes being conducted at the school during a 6-month period. All study participants provided informed consent and the Institutional Review Board at Washington University approved all recruitment and data collection methods.

Overall design

We used an exploratory sequential mixed-methods approach, separated into two phases. During the Exploration phase, we used focus groups, surveys, and group brainstorming sessions to collect, analyse and interpret the data. The Development and Testing phase consisted of an iterative process of creating and refining messages and gathering audience feedback about message concepts. Figure 1 depicts the overall study design.

The research team consisted of members of the Occupational Safety and Health Research lab at Washington University School of Medicine, and members of the Health Communication Research Laboratory (HCRL) at Washington University. The entire research team collaborated to create data collection materials, review focus group and survey data, and develop messages.

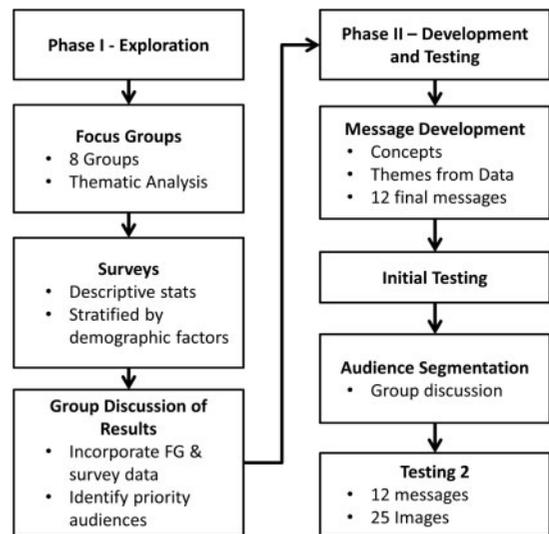


Fig. 1. Overall study design.

Focus groups

The focus groups served two purposes: to inform the survey development process and to provide details about the carpenter culture. The focus group script addressed eight domains: personal interests, life priorities, social support, attitudes about smoking, attitudes about quitting and motivation to quit, smoking on the job, attitudes about union-based health programs and suggestions on motivating carpenters to quit smoking. Two team members attended each group; one led the discussion, whereas the other took notes. Focus groups were audio recorded, transcribed and color coded according to the eight domains specified in the focus group script. The entire team reviewed the color-coded transcripts to identify common themes within each domain. Recurring themes such as family and pride in work were incorporated into the survey questions and later used to help shape messages.

Surveys

The survey was designed to obtain information that could be used in developing messages that would be relevant to the lives of carpenters. The survey was administered on paper, and included demographic

items (e.g. age, marital status, number of children and education) and questions on personal preferences (e.g. hobbies, favorite TV shows, magazines and brands of trucks). We also queried carpenters' use of information technology including email, Internet and social networking. We asked about their health and smoking attitudes, worksite smoking policies, and awareness of the union-sponsored cessation program. Finally, we included questions about current smoking behaviors, readiness to quit and likelihood of participating in the union-sponsored cessation program.

Message development and initial testing

Messages were developed and refined in a series of group meetings. We began by drafting message concepts based on ideas derived from the focus groups and surveys as well as publicly available cessation messages from the Centers for Disease Control and Prevention and the National Cancer Institute. We designed messages with only four to five sentences so that: (i) they could be used in advertisements in union publications and (ii) they would be short enough to allow participants to quickly read and evaluate all messages during the testing phase. During group discussions, we narrowed the pool of concepts, revised the wording, and chose 12 message concepts that would be tested.

We conducted individual testing with 40 self-identified current smokers; the 12 messages were presented one at a time in random order. Participants were asked to use a 10-point scale to answer two questions: 'How convincing was this message?' (Convincing) and 'How much did the message make you think about yourself and your life?' (Think of self) The first question is similar to those used in other studies evaluating perceived effectiveness [21, 22]. The second question was based on the central route processing concept from the Elaboration Likelihood Model that suggests people are more likely to attend to information that they find personally relevant, thus increasing the likelihood of attitude and behavior change [23–25]. After participants rated all messages, they were asked to identify their single favorite message.

Audience segmentation

Age differences in personal preferences, smoking attitudes and life priorities became apparent during focus groups, and were explored more in the survey and message-testing data by stratifying results by age. We also examined data by other demographic factors such as marital status and parental status to look for possible subgroups. The results indicated that workers may differ in personal preferences and life priorities based on their age (under/over 30 years old) and parental status (children/no children). By combining these variables in a 2×2 matrix, we stratified message-testing results into four mutually exclusive segments and looked at which messages were rated highest in each segment.

Using the 8 highest rated messages (out of 12) for each segment, we conducted another round of message testing with a different group of 41 current smokers. Participants were interviewed one-on-one and asked several demographic questions including age and parental status. Interviewers selected messages for the corresponding segments and asked participants to perform two card-sorting tasks. For each task, participants were instructed to read each of the eight messages (printed on eight separate cards) and place the card in front of the appropriate category. For the first task (Take action), participants were asked, 'Which messages, if any, would make you take action to quit smoking?' The three category options were (i) Would not make me take action to quit smoking, (ii) Might make me take action to quit smoking, (iii) Would definitely make me take action to quit smoking. In the second task (Think of self), participants were asked, 'Which messages, if any, would make you think about your own life?' The options were (i) Would not make me think of my life, (ii) Would make me think of my life a little, (iii) Would make me think of my life a lot. For both tasks participants were also asked to explain their categorizations. If multiple messages were placed in category 3, they were asked to choose the most compelling message (i.e. the one message that would make them take action to quit smoking, or the one that makes them think of their life the most). Results of each task were dichotomized as 'yes/no'

by combining categories 2 and 3 into the ‘yes’ category. For example, in the Take Action task, ‘might’ and ‘definitely’ were combined into a single ‘yes’ category).

Image testing

In addition to the two card-sort tasks performed with messages, participants also performed a card sorting task with images; images were tested alone and not associated with any message. Combining pictures with text has been shown to improve attention and recall in various types of communications, including health communication [26]. Picture preferences vary by personal and cultural factors, thus it is important to conduct field testing with the targeted audience before incorporating pictures into messages [26]. The HCRL team chose 25 images representing six main themes: smoking, family, carpentry work, health care, male profile and partying. Participants were given all 25 cards (randomly ordered) and asked to place them in one of two categories: (i) Would catch my attention or (ii) Would not catch my attention. After sorting, they were asked to explain what about the images in the first pile would catch their attention and if any particular image stood out the most.

Data analysis

We used SPSS Version 20 [27] to generate descriptive statistics for surveys and message-testing data, and to conduct simple comparisons using chi-square tests, *t*-tests and ANOVA for different data types.

Results

Focus groups

We conducted six focus groups with a total of 47 apprentice and journeyman carpenters attending classes at the training school. Participants liked the idea of a smoking cessation program designed specifically for carpenters, but said they would join only if they were ready to quit; the decision to quit has

to be theirs and not forced on them by the union (‘Because I can’t stand people telling me what I have to do’). Younger participants were more hesitant to quit (‘It does cross my mind, but then again, well, I’m young, you know, I got plenty of time to quit’), whereas older members often talked about needing to quit smoking because they recognized the impact on their health and work (‘And if you’re one of the people that are in it for the long haul...um you’re going to soon realize that when you’re in your 40s and you smoke, you are not able to do the same amount of work or the same jobs that you used to be able to do when you were younger. You just see it’).

Most participants said that family was their highest priority and the most important motivator to quit smoking (‘Yeah, I mean obviously family is a priority. Some of you guys have kids, I don’t, I have one on the way, but obviously that’s a big concern, you know, being around for them kind of deal’). Those with children were particularly concerned about second-hand smoke around their children and worried that their children would smoke, but most justified their smoking because they didn’t smoke in the house or around their children (‘I smoke in the truck, with the window down, but we don’t smoke in the house or nothing’ either, but still that’s not good’). Many participants discussed the pride they take in their work (‘Yeah, we build a building so when you drive by you can say, well look, I did all that, or I help build up a bridge’) and indicated that they feel a sense of brotherhood and accountability towards coworkers (‘And we, and we all sat here and earlier we said that being in this body, this group of people, this collective, this union, we have somewhat of a trust in each other’). Some participants believed that smoking increased their risk of having complications from work-related respiratory hazards, but the majority did not think smoking made a difference (‘There’s crap all over the place in the air where you work, you’ve just got to try to avoid it...I don’t know that that would be something that would make me want to quit smoking. I don’t think quitting smoking would help that’).

Survey

We surveyed 357 apprentice and journeyman carpenters attending the union training school (93% of those invited to participate); analyses include only those with complete data ($n = 328$). As shown in Table I, 44% of participants self-identified as current smokers, and most of those were moderate to heavy smokers. Smokers and non-smokers did not significantly differ in any demographic characteristic. Approximately 80% reported reading the monthly union magazine, *The Cutting Edge*, where the smoking cessation program was previously advertised; however, only 15% of smokers and 12% of non-smokers knew that the program existed. Approximately 61% of respondents (57% of smokers) said they would be very concerned if their children smoked.

Smokers and non-smokers differed in their opinions about smoking in the workplace, but thought similarly about health. Non-smokers were significantly more likely than smokers to prefer a non-smoking worksite (64.8 versus 13.8%, $P < 0.001$), and were more likely to say that smoking affects job performance (44.8 versus 16.0%, $P < 0.001$) and job safety (19.9 versus 10.3%, $P = 0.018$). Health did not seem to be a major concern for the group overall; only half reported annual doctor visits and the mean rating for any health concern was 2.9 on a scale of 1 (not concerned at all) to 6 (very concerned). In general, workers were more concerned about work injuries such as falls and respiratory hazards ($M = 3.4$, $SD = 1.3$) than about non-work-related health issues such as cancer, heart disease, obesity, diabetes, auto accidents and other diseases related to smoking and alcohol use ($M = 2.4$, $SD = 1.0$). Smokers had significantly higher ratings for non-work-related health concerns than non-smokers ($P = 0.027$); however, after excluding their ratings for smoking concerns, the two groups were similar.

Message development and initial testing

Three dominant findings were used to shape messages to increase participation in the union-sponsored smoking cessation program. The message

Table I. Characteristics of study group by smoking status

	Smokers ($n = 145$)	Non-smokers ($n = 183$)
Age (mean)	30.8	28.8
Male (%)	95.9	99.5
Race (%)		
Caucasian	94.4	89.6
African American	2.8	4.4
Other/missing	2.8	6
Marital status (%)		
Never married	52.4	56.3
Married	36.6	36.6
Separated/divorced	11	7.1
Have one or more children (%)	57.2	42.1
Highest education level (%)		
High school/GED or less	53.1	47.3
Technical school	4.8	10.4
Some college	35.2	35.2
Bachelor's degree or higher	6.9	7.1
Visit doctor annually (%)	49.7	50.2
Health Concerns (mean) ^a		
Work related	3.4	3.5
Non-work related*	2.5	2.2
Any health concern	2.9	2.8
Motivation to improve health (%)		
Concern for own health	47.5	54.1
Ability to provide for family	33.3	40.9
Family member concern	33.3	22.2
Money/financial incentives	21.3	18.8
Ability to participate in sports/hobbies	11.3	16.6
Job security	12.8	9.9
Likelihood of participating in any union health program (mean) ^b	3	2.8
Heard of union-sponsored cessation program (%)	15.3	11.7
Spouse/partner smoke**		
Yes	43.8	11.7
No	29.9	65.6
Not married	26.4	22.2
Smoking Frequency		
Everyday	84.6	n/a
Almost every day (4+ days/week)	7	n/a
1-3 days/week	6.3	n/a
<1day a week	2.1	n/a
No. Cigs/day		
1-10 (half pack or less)	28	n/a
11-20	53.8	n/a
21 or more (more than a pack)	18.2	n/a

^aScale: 1 (not concerned)-6 (very concerned). ^bScale: 1 (not likely)-6 (very likely). *significant difference between smokers and non-smokers ($P < 0.05$). ** significant difference between smokers and non-smokers ($P < 0.001$).

concepts were designed to address those who wanted to quit smoking (63% of survey respondents), those who were unaware of the union-sponsored smoking cessation program (86% of survey respondents) and those who worry about their children smoking (61% of survey respondents with children). We also addressed skewed health risk perceptions among smokers (mean rating for work-related concerns was 3.4 compared with 2.5 for non-work-related health concerns). Finally, we incorporated additional themes from the focus groups and surveys into the messages to enhance their relevance to this population. Examples include independence, brotherhood, pride in work, appreciation for teamwork, focus on fun and concerns about retaining the physical ability to work into middle age. The final 12 messages and rationale for each are presented in Table II.

We tested the 12 messages with 40 current smokers. Table III shows the ratings for each message. Overall, participants preferred messages based on family and work themes. For example, Message 1, 'Your kids do what you do', was rated highest on both items ('Convincing' and 'Think of self') and was selected as the favorite message by the majority of participants. Messages based on the themes of union membership and brotherhood were rated less favorably.

Audience segmentation

Our segmentation approach was based on the criteria of a good segmentation strategy which includes having distinct subgroups that are large in size or population proportion, can be easily identified, and have characteristics that provide clear directions for targeting health information. We looked for segmentation variables that were both supported by our data and available in the union's administrative data, which is necessary for identifying individuals to include in each segment. Age (under/over 30 years old) and parental status (children/no children) were chosen as segmentation variables because they met both criteria. By combining these variables, we stratified message-testing results into four mutually exclusive

segments. Table IV shows characteristics of current smokers in each of the four segments. The data suggest that some groups have distinct smoking behaviors. For example, workers under 30 with no children have lower rates of everyday smoking compared with the other groups, and those with children, especially age 30 or older, were more interested in quitting in the next 6 months. Their personal preferences for hobbies, television and music varied as did their message preferences. Some messages were universally appealing, while others interested only one or two segments. The top three rated messages for each segment are presented in Table IV.

The eight highest rated messages for each segment in the initial testing were tested again, this time identifying the audience segments prior to testing. We tested a total of 41 self-identified current smokers between the four segments: with kids, under 30 ($n=9$); with kids, 30 and older ($n=13$); no kids, under 30 ($n=18$); no kids, 30 and older ($n=1$). Results for the 'No kids, 30 and older' group are not presented since there was only one participant. Across all groups, 55% of participants selected 'Kids do what you do' and 30% selected 'Double Trouble' as the message 'most' likely to make them 'take action to quit smoking'. When asked which message 'most' 'applied to their own life situation', 45% selected 'Kids do what you do', 30% selected 'Double Trouble' and 12.5% selected 'Preserve what you built'. These results parallel those in the initial message testing. Table V presents the results of each card sorting task by message and segment. The three messages presented to all segments, 'Kids do what you do', 'Double Trouble' and 'Preserve what you built' performed well in all segments; even those without kids could relate to the 'kids' message. Other messages were presented only to one or two of the segments and results show some differences between segments. For example, the 'No kids, <30' group more often endorsed 'It won't get any easier' than the 'Kids, <30' group, whereas the 'Grown up yet' performed well in both tested segments.

Table II. *Final messages and rationale*

Message	Rationale from exploratory phase
<p>1. Your kids do what you do. Children who grow up with parents who smoke are more likely to become smokers themselves. You already show your kids how to work hard, how to build things in life. Now it's time to show them the most important thing: how to take care of themselves. Quit smoking for your children. They will follow your lead.</p>	<p>Participants indicated that they valued protecting children from smoking, whether their own children or those of their families and friends.</p>
<p>2. Preserve what you've built. You know what it takes to build the most important things you have today: your career, your family, your life. Your hard work has made strong buildings and a strong family. Take care of what you've built by quitting smoking. It can save your life—and what you cherish the most.</p>	<p>Participants demonstrated pride in their work. Message 2 extends the concept of 'building' to represent family and life.</p>
<p>3. Party on! The band is loud, the girls are hot—and you smell like an ashtray. Just because you stop smoking doesn't mean you have to stop partying. In fact, kicking the habit can save your money and add 10 more years to your life. That's a lot more time and money for fun.</p>	<p>The subgroup of participants under 30 with no kids indicated personal habits different from their older counterparts with regard to partying, having fun, etc. and Message 3 appeals to this.</p>
<p>4. Are you really in control? The tobacco industry works 24×7 to control your mind and take your money. Smoking is expensive, addictive and eventually deadly. You are strong and independent—You don't like to follow the pack, so why are you holding one in your hand? Decide to quit and show the cigarette companies you are in charge.</p>	<p>Participants indicated a sense of personal autonomy and independence they associated with their profession. Message 4 links nicotine addiction to losing this independence.</p>
<p>5. Double trouble. If you smoke and work with toxic dust, the math is easy: If you smoke, your risk of lung cancer is 11 times higher than for others who don't smoke. If your work exposes you to toxic dust, your risk of lung disease is 4 times higher. If you smoke AND work with toxic dust, your risk of lung disease is at least 50 times higher!</p>	<p>Links risk from tobacco to well-understood occupational hazards, highlighting increased risk for smokers. Supported by risk perceptions of work related and non-work related health concerns.</p>
<p>6. How strong are you? Hard jobs can make you tough, but how much will-power do you have? Quitting smoking is not easy. It takes time and effort to stay away from cigarettes. Are you ready for a tough fight? Quit smoking and find out how strong you can be.</p>	<p>Focus group participants discussed pride in physical and mental strength. This message portrays quitting as a challenge.</p>
<p>7. Are you pulling your weight? Most carpenters don't smoke. They may not tell you to your face, but most of them think smokers are less productive and a safety risk. Quitting smoking isn't easy, but it will benefit your health and your work. Quit now and show other carpenters you are not the weak link on the crew.</p>	<p>Nonsmoking carpenters indicated an unspoken sense of unfairness that their smoking colleagues took smoking breaks, and/or smoked while working, undermining the team.</p>
<p>8. You can't build a house alone. It takes more than yourself to put up a strong building. Quitting smoking is the same; it's easier when you have help.</p>	<p>Messages 8 and 9 appeal to a sense of collectivism and pride in union membership, portraying seeking help to quit as a strength instead of a weakness, and the savings in health costs to the union as a shared benefit.</p>
<p>9. Money for you and your brothers. These are tough times and keeping up with family expenses is getting harder for carpenters in St. Louis. A healthier group is a stronger group. Quitting smoking is not easy, but it will</p>	

(continued)

Table II. *Continued*

Message	Rationale from exploratory phase
save money for you and every carpenter who pays more for health care because of problems caused by smoking.	
10. Grown up yet? You're not the same guy you were when you were 20. Your priorities have changed (and maybe your body, too). Family is more important now, and you're building a career. Quitting smoking is another important step. Quitting shows you know what's really important in life.	Older carpenters with kids indicated shifting life priorities compared with their younger counterparts, and Message 10 portrays smoking as among the youthful follies they have left behind as they age.
11. Get into the game. You say you want to quit smoking, so what are you waiting for? Quitting will only get harder if you put it off. It's never easy, but you can't succeed if you don't try. Don't just talk about it, kick the habit now.	Messages 11 and 12 also portray quitting as a challenge, emphasizing that most smokers take several attempts to quit successfully.
12. Step up to the plate. Nobody gets a hit every time. The average smoker tries to quit five to seven times before he stops for good. Get started now by calling QuitNet, a free stop-smoking help service. The sooner you try, the sooner you'll succeed.	

Table III. *Mean message testing ratings among current smokers (n = 40)^a*

	Convincing scale (mean) ^b	Think of self scale (mean) ^c	Selected as favorite (n) ^d
Your kids do what you do	7.7	7.2	21
Double Trouble	7.4	6.9	5
Preserve what you've built	6.6	6	3
Party on!	6.2	6.1	1
Grown up yet?	6.1	6.1	1
Money for you and your brothers	6.2	5.8	2
Get into the game	5.9	5.7	0
Are you really in control?	5.9	5.4	0
You can't build a house alone	5.9	5.3	2
How strong are you?	5.6	5.2	1
Are you pulling your weight?	4.8	4.9	3
Step up to the plate	5.1	4.2	0

^aMessages sorted in descending order of combined ratings (Convincing + Think of self). ^bMean rating for 'How convincing was this message?' Scale: 1(not)–10(extremely). ^cMean rating for 'How much did the message make you think about yourself and your life?' Scale: 1(not)–10 (a lot). ^dNumber of participants who chose message as favorite (one participant did not select a favorite).

Image testing

Overall, nearly 95% of participants sorted work-related images into the 'would catch my attention' category. Family images were categorized as

attention catching by 80% of participants followed by smoking images (78%), party images (63%), health care images (27%) and male profile images (27%). Participants were asked to review the images

Table IV. Characteristics of current smokers and message-testing results by segment

Characteristics (%)	Kids, <30 (n = 32)	Kids, ≥30 (n = 51)	No kids, <30 (n = 49)	No kids, ≥ 30 (n = 13)
Smoking				
Smoke everyday	87.1	96.1	68.8	92.3
Intend to quit next 6 months	61.3	75	57.4	46.2
Smoking doesn't affect work performance	62.5	48	44.9	69.2
Spouse/partner Smoke	53.1	52	30.6	38.5
Heard of smoking cessation program	12.5	22	10.2	15.4
Likelihood of participating in union cessation program (mean) ^a	2.9	3.7	2.5	3.2
Personal lifestyle				
Married	40.6	64.7	4.1	38.5
Top truck choice	Chevy	Chevy	Chevy	Ford
Favorite type of music	Country	Classic Rock	Alternative Rock	Alternative Rock
Top 2 TV shows	Family Guy	Dirty Jobs	Family Guy	Family Guy
Top 2 hobbies/interests	Ultimate Fighter	Two and a Half Men	Dirty Jobs	The Office
	Boating	Grilling	Going to parties	Going to parties
	Grilling	Music	Boating	Grilling
Use of technology				
Send/Receive Email—yes	78.1	76.5	73.5	53.8
Social networking—yes	71	42.9	61.2	30.8
Top 2 web browsing topics	Trade/Union	Music	Hunt/Fish/ Boat	Music
	Music	Sports & Trade/Union	Sports	Health Info & News
Top 3 rated messages	Kids, <30 (n=9)	Kids, ≥30 (n = 14)	No kids, <30 (n = 16)	
	1. Your kids do what you do	1. Your kids do what you do	1. Double Trouble	
	2. Double Trouble	2. Double Trouble	2. Party on!	
	3. Preserve what you've built	3. Grown up yet?	3. Preserve what you've built	

^aRange 1 (not likely)—6 (very likely).

Table V. Card sorting results for audience segmented messages

Messages, <i>n</i> (%)	Task 1: Take action—yes ^a			Task 2: Think of self—yes ^b		
	Kids, <30 (<i>n</i> = 9)	Kids, ≥30 (<i>n</i> = 13)	No Kids, <30 (<i>n</i> = 18)	Kids, <30 (<i>n</i> = 9)	Kids, ≥30 (<i>n</i> = 13)	No Kids, <30 (<i>n</i> = 18)
Kids do what you do	9 (100)	13 (100)	14 (77.8)	7 (77.8)	11 (91.6)	13 (72.2)
Preserve what you built	8 (88.8)	10 (77.0)	15 (83.8)	9 (100)	10 (83.3)	13 (72.2)
Double Trouble	8 (88.9)	10 (76.9)	15 (83.3)	8 (88.9)	12 (100)	16 (88.9)
Party on!	6 (66.7)	—	10 (55.6)	3 (33.3)	—	15 (83.3)
It won't get any easier	3 (33.3)	—	11 (61.1)	5 (55.5)	—	13 (72.2)
How strong are you?	—	7 (53.9)	11 (61.1)	—	9 (75)	13 (72.2)
You can't build a house alone	—	9 (69.2)	—	—	9 (75)	—
Money for you and your brothers	—	9 (69.2)	—	—	8 (66.6)	—
Grown up yet?	8 (88.8)	11 (84.7)	—	6 (66.6)	10 (83.4)	—
Get into the game	—	7 (53.8)	11 (61.1)	—	7 (58.4)	13 (72.2)
Take control	7 (77.7)	—	6 (33.3)	6 (66.6)	—	8 (44.5)
Time to man up	8 (88.9)	—	—	6 (66.6)	—	—

^aSorted into 'might' or 'definitely' categories in response to 'Which messages would make you take action to quit smoking?' ^bSorted into 'a little' or 'a lot' categories in response to 'Which messages would make you think about your own life?'

they placed in the 'would catch my attention' pile and select up to four that were 'most' likely to catch their attention. Family images were selected 48% of the time, followed by work images (41%), smoking images (34%) and party images (10%). Images from the health care and profile categories were never selected.

Discussion

This study provides information about the culture of construction workers and their attitudes toward smoking, two factors likely to influence smoking cessation in this high-risk group. Family was the highest priority for nearly all workers. Most discussions about work and health circled back to family; participants worked in order to provide for their family, and were concerned that their health may eventually impact their ability to support their family. Workers often discussed wanting to quit for their children, stating that they need to be good role models and need to be healthy in order to 'be there' for their kids. Family was also mentioned as an important factor in smoking as many smokers had a spouse or parent who smoked. Message-testing data support the family theme as

'Kids do what you do' and 'Preserve what you built' were preferred by all groups. These results are consistent with another study of unionized construction workers [28].

Another popular message was 'Double Trouble', which is interesting given that the majority of focus group participants were not convinced that smoking and working with toxic dust increased the risk of lung disease. Survey results, however, indicate that workers are more concerned with work-related hazards than personal health risks, so it may be that presenting the risk of smoking in the context of 'work' hazards makes this message appealing to this group. Several other studies have cited evidence for this integrated approach for smoking cessation in blue-collar workers [5–7, 29].

Consistent with previous reports [6, 28, 30], workers in the focus groups discussed the importance of the union brotherhood, but maintained that they wanted autonomy over their decisions. Interestingly, messages that incorporated the concepts of brotherhood and independence were not as appealing as other messages. It could be that the messages did not adequately address these ideas; more research is needed to understand these mixed results.

Our data also suggest that communication interventions may benefit from additional targeting through audience segmentation. Our study sample of workers was not homogeneous. Although we observed several common characteristics and themes across workers, we also found variation in personal preferences, smoking behaviors, health attitudes and opinions about the smoking cessation messages we developed. Although several messages were universally appealing, the systematic variation in reactions to other messages suggests that audience segmentation may be beneficial to better target messages promoting cessation and use of cessation resources within distinct subgroups of workers.

Demographic segmentation is recognized as a simple and cost-effective technique for identifying target audiences [10, 31, 32]. Although other psychological and behavioral factors may improve segmentation efforts, the availability of this information or resources to collect it may be lacking in some organizations [33]. For example, many unions, have access to members' personal information (e.g. age, parental status, income, etc.), but may not have information related to their health beliefs or behaviors. Thus, it is feasible to send targeted messages to specific individuals based on information already used for providing insurance and other benefits.

One limitation of this study is that our sample for message testing was small and over-represented young workers. It is not known if the messages and subgroups tested in this study are applicable to workers in other construction trades, in other geographic locations, in non-union settings, or among Hispanic workers, who make up a large part of the construction industry in some areas of the United States. However, findings were largely consistent with the few other studies in this area, which have engaged different construction trades [5–7]. Similar message testing and audience segmentation could readily be applied to other blue-collar populations, and other union-sponsored health plans.

The major strength of this study is that we used multiple types of data gathered from the target population to drive message development. Findings from

across a range of methods supported the same conclusions: (i) family and work are the highest priorities for these workers and (ii) age and parental status may be useful variables to differentiate groups of workers. This study has the potential to create simple and inexpensive communication strategies that unions can adopt to promote smoking cessation and other health behaviors among their members. In this formative work, we have identified large and distinct subgroups that can be readily identified by member information routinely collected by many unions including the one participating in this study. Targeted communication interventions would be simple and sustainable for unions to implement using existing channels of communication such as newsletters and mailings to distribute smoking cessation messages.

Our next step will be to further refine the smoking cessation messages and test them in a randomized controlled trial comparing targeted messaging using audience segmentation with standard smoking cessation messaging. We predict that the targeted messaging will be more effective in promoting enrollment in the union-sponsored smoking cessation program. Although our current messages were primarily intended to drive action (i.e. enrolling in a smoking cessation program), future efforts may additionally target changing readiness to quit or sustaining cessation.

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Conflict of interest

None declared.

References

- Lee D, Fleming L, Arheart K *et al*. Smoking rate trends in U.S. occupational groups: the 1987 to 2004 National Health Interview Survey. *J Occup Environ Med* 2007; **49**: 75–81.
- Ham DC, Przybeck T, Strickland JR *et al*. Occupation and workplace policies predict smoking behaviors analysis of national data from the current population survey. *J Occup Environ Med* 2011; **53**: 1337–45.
- Gerlach KK, Shopland DR, Hartman AM *et al*. Workplace smoking policies in the United States: results from a national survey of more than 100,000 workers. *Tob Control* 1997; **6**: 199–206.
- Ringen K, Anderson N, McAfee T *et al*. Smoking cessation in a blue-collar population: results from an evidence-based pilot program. *Am J Ind Med* 2002; **42**: 367–77.
- Barbeau E, Li Y, Calderon P *et al*. Results of a union-based smoking cessation intervention for apprentice iron workers (United States). *Cancer Causes Control* 2006; **17**: 53–61.
- Sorensen G, Barbeau E, Stoddard A *et al*. Tools for health: the efficacy of a tailored intervention targeted for construction laborers. *Cancer Causes Control* 2007; **18**: 51–9.
- Okechukwu CA, Krieger N, Sorensen G *et al*. MassBuilt: effectiveness of an apprenticeship site-based smoking cessation intervention for unionized building trades workers. *Cancer Causes Control* 2009; **20**: 887–94.
- Guide to Community Preventive Services. *Reducing Tobacco Use and Secondhand Smoke Exposure: Mass-reach Health Communication Interventions*. 2012. Available at: www.thecommunityguide.org/tobacco/massreach.html. Accessed: 25 August 2014.
- Guide to Community Preventive Services. *Increasing Cancer Screening: Small Media Targeting Clients*. 2005. Available at: www.thecommunityguide.org/cancer/screening/client-oriented/SmallMedia.html. Accessed: 25 August 2014.
- Slater MD. Theory and method in health audience segmentation. *J Health Commun* 1996; **1**: 267–83.
- Forthofer MS, Bryant CA. Using audience-segmentation techniques to tailor health behavior change strategies. *Am J Health Behav* 2000; **24**: 36–43.
- Slater M. Choosing audience segmentation strategies and methods for health communication. Designing health messages: approaches from communication theory and public health practice. In: Maibach EW, Parrott RL (eds). *Designing Health Messages: Approaches from Communication Theory and Public Health Practice*. Thousand Oaks, CA: Sage Publications, 1995. 186–98.
- Kreuter MW, Wray RJ. Tailored and targeted health communication: strategies for enhancing information relevance. *Am J Health Behav* 2003; **27**(Suppl. 3): S227–32.
- Vladutiu CJ, Nansel TR, Weaver NL *et al*. Differential strength of association of child injury prevention attitudes and beliefs on practices: a case for audience segmentation. *Inj Prev* 2006; **12**: 35–40.
- Niederdeppe J, Farrelly MC, Nonnemaker J *et al*. Socioeconomic variation in recall and perceived effectiveness of campaign advertisements to promote smoking cessation. *Soc Sci Med* 2011; **72**: 773–80.
- Durkin SJ, Biener L, Wakefield MA. Effects of different types of antismoking ads on reducing disparities in smoking cessation among socioeconomic subgroups. *Am J Public Health* 2009; **99**: 2217–23.
- Niederdeppe J, Fiore MC, Baker TB *et al*. Smoking-cessation media campaigns and their effectiveness among socioeconomically advantaged and disadvantaged populations. *Am J Public Health* 2008; **98**: 916–24.
- Stephenson C, Stephenson M. Hearing loss prevention for carpenters: part 1—using health communication and health promotion models to develop training that works. *Noise Health* 2011; **13**: 113–21.
- Stephenson C, Stephenson M, Graydon P *et al*. Hearing loss prevention for carpenters: Part 2 - Demonstration projects using individualized and group training. *Noise Health* 2011; **13**: 122–31.
- Armstrong T, Dale A, Franzblau A *et al*. Risk factors for carpal tunnel syndrome and median neuropathy in a working population. *J Occup Environ Med* 2008; **50**: 1355–64.
- Dillard JP, Shen L, Vail RG. Does perceived message effectiveness cause persuasion or vice versa? 17 consistent answers. *Hum Commun Res* 2007; **33**: 467–88.
- Davis KC, Nonnemaker JM, Farrelly MC *et al*. Exploring differences in smokers' perceptions of the effectiveness of cessation media messages. *Tob Control* 2011; **20**: 26–33.
- Petty RE, Cacioppo JT. *Attitudes and Persuasion: Classic and Contemporary Approaches*. Dubuque, IA: WC Brown, 1981.
- Petty RE, Cacioppo JT. The elaboration likelihood model of persuasion. *Adv Exp Soc Psychol* 1986; **19**: 123–205.
- Rucinski D. Community boundedness, personal relevance, and the knowledge gap. *Commun Res* 2004; **31**: 472–95.
- Houts PS, Doak CC, Doak LG *et al*. The role of pictures in improving health communication: a review of research on attention, comprehension, recall, and adherence. *Patient Educ Couns* 2006; **61**: 173–90.
- SPSS. *SPSS Base 20.0*. Chicago, IL: SPSS Inc, 2011.
- Barbeau E, Goldman R, Roelofs C *et al*. A new channel for health promotion: building trade unions. *Am J Health Promot* 2005; **19**: 297–303.
- Sorensen G, Stoddard A, Ockene JK *et al*. Worker participation in an integrated health promotion health protection program: results from the WellWorks project. *Health Educ Q* 1996; **23**: 191–203.

30. Groeneveld I, Proper K, Van der Beek A *et al.* Design of a RCT evaluating the (cost-) effectiveness of a lifestyle intervention for male construction workers at risk for cardiovascular disease: the health under construction study. *BMC Public Health* 2008; **8**: 1.
31. Resnicow K, Baranowski T, Ahluwalia JS *et al.* Cultural sensitivity in public health: defined and demystified. *Ethn Dis* 1999; **9**: 10–21.
32. Holt CL, Shipp M, Eloubeidi M *et al.* Use of focus group data to develop recommendations for demographically segmented colorectal cancer educational strategies. *Health Ed Res* 2009; **24**: 876–89.
33. Boslaugh SE, Kreuter MW, Nicholson RA *et al.* Comparing demographic, health status and psychosocial strategies of audience segmentation to promote physical activity. *Health Educ Res* 2005; **20**: 430–8.