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Original investigation

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Motivating Low Socioeconomic Status Smokers to Accept Evidence-Based Smoking Cessation Treatment: A Brief Intervention for the Community Agency Setting

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Abstract

Introduction: Individuals of low socioeconomic status (SES), smoke at very high rates but make fewer and less successful quit attempts than do other smokers. Low-SES smokers have specific beliefs about smoking and quitting that may serve as barriers to making quit attempts. The purpose of this study was to test the impact of a brief intervention addressing these beliefs on making calls to a telephone quit line.

Methods: Of 522 smokers entering the study at 5 Wisconsin Salvation Army (SA) sites, 102 expressed motivation to quit and served as a comparison group. The remaining 420 smokers were not motivated to quit and were randomly assigned to 1 of 3 conditions: an intervention group who received brief counseling focused on cessation goals and beliefs, an attention-control group, and a low contact control group. The primary outcome was the rate at which smokers made a call to the Wisconsin tobacco quit line (WTQL) during their SA visit. Secondary outcome measures included motivational variables, stage of change, changes in beliefs about smoking and quitting, and self-reported abstinence.

Results: Unmotivated participants in the intervention condition called the WTQL at a significantly higher rate (12.2%) than did those in the 2 control conditions (2.2% and 1.4%) ($p < .01$) and approached the rate of calling by participants who were initially motivated to quit (15.7%). Intervention condition participants also showed improved motivation to quit and stage of change.

Conclusions: A brief, targeted motivational intervention focusing on cessation goals and beliefs increased the initiation of an evidence-based tobacco cessation treatment by low-SES smokers.

Introduction

Overall smoking prevalence has declined substantially over the last 50 years, falling to about 18% of adults today.[1] However, smoking prevalence remains high amongst disadvantaged members of our society, including those with low incomes and educational attainment and who are under/unemployed and underserved (low socioeconomic status [low-SES]). For example, higher smoking prevalence rates have been documented amongst: those on Medicaid (37%),[1,2] the homeless (75%–80%),[3,4] and those with less than a high school education (35%).[1] In fact, smoking prevalence has increased slightly amongst those living in poverty (from 36.5% to 37.9%, from 2006–2010).[5]

The proportion of low-SES smokers who want to quit is at least as high as the proportion who want to quit in the general

population.[6] Despite this, relatively few low-SES smokers make quit attempts,[7–10] a pattern echoed in our own research.[11] Further, when low-SES smokers do try to quit, they are less likely to be successful than other smokers.[9,12–14] This lack of cessation success may reflect, in part, a disuse of either of the two primary evidence-based smoking cessation treatments—cessation medication or counseling.[15] For instance, smokers living in poverty or on Medicaid are much less likely than other smokers to use nicotine replacement treatment.[16–18] These findings highlight the need for an intervention that increases both quit attempts among low-SES smokers and their use of evidence-based treatment for those attempts.

Low-SES smokers' relative lack of quit attempts compared to other smokers, and their disuse of evidence-based treatment, are no doubt due to many factors: for example, limited insurance coverage, financial constraints and reduced access to quality healthcare.[19–21] In addition, perhaps related to low literacy[22] and health literacy,[23] low-SES smokers are especially likely to maintain potentially maladaptive beliefs about smoking and quitting compared to smokers in the general population. For example, low-SES smokers tend to believe that: smoking is normative and acceptable[21,24,25]; willpower is sufficient for successful quitting[24,26]; evidence-based treatments (e.g., counseling) are no more effective than other quitting methods[27]; quitting medicines are ineffective, dangerous, addicting and/or too expensive[26,28]; and cessation treatments are unavailable and hard to access.[27,29] Not only are these beliefs more prominent in low-SES smokers than amongst smokers in the general public, but their endorsement correlates negatively with the use of medications[30] and with intentions and attempts to quit.[24,25,27,31]

The present study recruited low-SES smokers to test a brief intervention designed to change beliefs about smoking and quitting on its ability to increase the initiation of evidence-based cessation treatment, operationalized as calling tobacco quit line. The elements of the brief intervention drew upon several models relevant to behavior change: that is, motivational interviewing,[32–34] cognitive behavior therapy[35,36] and self-determination theory.[37,38] This study expands previous work that found that addressing a single maladaptive belief (that evidence-based cessation treatments are not more effective than other methods) led to stronger intentions to make a quit attempt.[38] We hypothesized that providing a brief intervention to address smoking and quitting beliefs would lead to more adaptive beliefs about quitting and more calls to a tobacco telephone quit line. We further hypothesized that the brief intervention would have a favorable impact on secondary measures; relative to control group participants, low-SES smokers who receive the intervention will report increased motivation to quit, will more likely be in the action stage of change, and will report higher rates of abstinence at follow-up.

Methods

Participants

Participants (N = 522) were recruited from among clients seeking assistance such as temporary housing, meals, food, and/or temporary payment for utilities/rent from five Wisconsin Salvation Army (SA) sites. Recruiting at SA sites means that the great majority of participants were disadvantaged because the SA is structured to serve only low income people. Sites were chosen by SA regional management in consultation with local site management. Eligibility criteria were: age 18 or older and currently smoking (≥1 cigarette daily or ≥10 cigarettes per week for the past year). Exclusion criteria were inability to read and write English and plans to relocate within 3 months.

Participants were divided into those who were ready to quit (in the next 30 days) and those not ready to quit in the same time period (see participant recruitment, below). A power analysis determined that a sample size of 140 in each of the three not motivated groups was needed to detect an effect size of 15% versus 5% on the primary outcome measure with power = .8 and alpha set at .05. The motivated group was included to provide a comparison standard; its presence did not contribute to tests of the study's primary aims. Therefore, its size reflected our estimate of what would constitute a meaningful sample and did not reflect the results of a formal power analysis.

Procedures

Participant Recruitment

Participants were recruited via flyers posted in the SA sites describing a study about smoking and that participants would receive a Walmart gift card. Interested smokers contacted the SA staff. As part of the recruitment procedures, participants were asked whether they were ready to quit (in the next 30 days) versus not ready to quit within this time period. Responses to this question dichotomized the sample into those motivated (n = 102), and not motivated (n = 420), to quit at this time. Recruitment of motivated-to-quit smokers ceased after 102 were recruited. Recruitment of unmotivated smokers continued until 420 were recruited.

SA Staff

The study was conducted by IRB-approved case managers selected by SA site management in consultation with SA regional management based on interest and availability of time. SA staff (typically two per site) received approximately 6 hr of training on the study protocol. This training addressed study mechanics such as recruitment, establishing eligibility, obtaining informed consent, and administering the surveys followed by a description and demonstration of all study conditions. Then SA staff practiced skills required by each condition: for example, how to give corrective, noncritical feedback. This included practicing both elements of the experimental interventions (goal-focused and belief-focused, see experimental intervention, below). Training included detailed scripts to guide discussion of participants' answers to the baseline survey as required in the belief-focused element. Practice continued until staffs were proficient.

General Procedures

After written informed consent was obtained, each of the 420 unmotivated participants was randomly assigned within site to one of three "unmotivated conditions" and provided the appropriate intervention. The intervention was provided in a private room either at the time of recruitment or a later time that was more convenient for the participant. SA staff told motivated smokers and (following the intervention procedures) smokers in the unmotivated conditions about the value and features of the Wisconsin tobacco quit line (WTQL), using talking points provided during their training, and asked if the participant wanted to call the quit line. The participant's willingness to initiate evidence-based treatment by calling the WTQL was the primary outcome. SA staff recorded the duration of the intervention by noting the time of its start and end on a watch. Secondary outcomes, collected via surveys, were also assessed. SA staff assisted any participants who had trouble reading the surveys. Survey data were collected at baseline (in person), immediately following the intervention (in unmotivated conditions

only), and 3 months post-intervention (by phone). Participants were compensated with a $15 gift card following the in-person visit and a $20 gift card following the 3-month post-intervention assessment. To increase fidelity, a senior research assistant (ET) directly observed each SA staff person providing 2–3 deliveries of each intervention shortly after study initiation at each site and provided corrective feedback. In addition, throughout data collection (about 12 months per site), each SA site was visited monthly during which the senior research assistant discussed ongoing study implementation with SA staff. About half of these visits included a review of audio-taped sessions and corrective feedback to study staff (about five per SA staff). All study procedures were approved by the University of Wisconsin Institutional Review Board.

Experimental Intervention

One-third of the unmotivated participants (n = 140) received the experimental intervention. This script-based intervention, designed to last about 20 min, comprised two elements. The first, a goal-focused intervention, was designed to build discrepancy in smokers by helping them complete a decisional balance worksheet as developed for motivational interviewing.[32,33] The participant was asked to describe the good and bad things about continued smoking and quitting. After summarizing the participants' responses, the SA staff asked the participant to focus on the most important reasons to smoke or not, which typically favored quitting. In those rare instances when the most important reasons did not favor quitting, SA staff were instructed to simply explore, briefly, those reasons that did favor quitting to increase their salience. Based on this, participants were asked to reconsider whether or not to quit. The second element was a belief-focused intervention that was tailored to responses participants gave to baseline survey questions regarding six beliefs: the perception that most people smoke; that it is OK to smoke a little or some of the time or in some places; the cost of smoking; how hard it is to quit; the relative effectiveness of various methods of quitting; and the safety, the addictiveness and effectiveness of cessation medicines. Knowledge about the WTQL was also addressed. This belief-focused intervention is consistent with the basic behavioral therapy strategy of correcting dysfunctional beliefs and attitudes as a way of effecting change.[34,35] It is also consistent with the self-determination theory[36,37] assumption that accurate information can foster effective coping and a sense of competence. SA staff reinforced correct survey responses and corrected inaccurate responses in a noncritical, supportive manner. For example, if a participant indicated on the baseline survey that 15% of Wisconsin adults smoke, the scripted SA staff response was, "Good job. Just about 20% of adults in Wisconsin smoke." On the other hand, if the participant estimated a smoking rate between 50% and 75%, the scripted response was, "So you believe a lot of people smoke. But, in fact, the vast majority of adults in Wisconsin do not smoke—only about 20%. That's only 1 in 5. So you see, it's more normal not to smoke than to smoke."

Attention-Control Group

One-third (n = 140) of the unmotivated participants were in an attention-control group. The SA staff guided them through a nontailored booklet (modified slightly for this study) that described the effects of smoking on the various organ systems and health in general by pointing out important information on each page.[39] This is a commonly used strategy to convince smokers to quit.[15,40] This intervention was designed to be about the same duration as the experimental intervention.

Low Contact Control Group

One-third (140) of the unmotivated smokers were assigned to read a short, two-page, pamphlet addressing the importance of making good nutritional choices, getting regular exercise, quitting smoking, being compliant with general medication use, and stress management.[41] Reading this brochure provided a credible activity between the two surveys.

Motivated Participants

The 102 participants reporting at baseline that they were motivated to quit were administered the baseline survey and then, after learning about the WTQL, were invited to call. These participants formed a comparison group that established the rate of calling the WTQL by those initially motivated to quit.

Measurements

The primary outcome was whether participants initiated an evidence-based attempt to quit smoking operationalized as calling the WTQL immediately after the intervention. The standard protocol of the WTQL is to initiate treatment during the first call so we assume that the vast majority of participants who called the WTQL received an intervention. At the time of this study, the WTQL offered 2 weeks of free nicotine replacement medicines (lozenge, patch or gum), unlimited opportunity to call back for additional support (but no scheduled calls back from the WTQL), access to WTQL internet resources and support, information about additional local treatment/support opportunities, and a workbook to facilitate an individualized quit plan. For those who said "yes", the SA staff helped the participant make the call (using SA or client telephones, based on client preference). Those who said "no" were asked if they would accept a fax referral to the WTQL, resulting in the WTQL directly calling the participant. Those who said "no" to this were provided take home materials describing the WTQL (as were all other participants). WTQL records contained in a database maintained by the Center for Tobacco Research and Intervention, the Wisconsin fiscal agent for the WTQL, were searched to document quit line contacts by participants who contacted the WTQL within 3 months after their SA visit or who had agreed to the fax-to-quit option and later accepted services. This was done by matching the names of study participants with entries in this database. Permission to search for participant information was granted by participants within the informed consent document.

Secondary outcomes were measured via surveys that included items assessing demographics, smoking history such as age of smoking onset, quitting history, current smoking, aforementioned beliefs about smoking and quitting, intention and motivation to quit, current stage of change,[42] the decisional balance inventory (DBI)—short form, quitting preferences, and (for those in unmotivated conditions only) satisfaction with the SA. Scores on the DBI relate to progression toward quitting; the short form has good internal consistency, factorial invariance, and good psychometric properties for those with lower formal education.[43,44] The baseline survey included 35 items, the post-intervention survey included 29 items, and the 3-month follow-up survey included 32 items. The follow-up survey asked different questions of those participants who reported abstinence (e.g., date of quitting) versus those who did not (e.g., intention to quit). All measures used in this study reflect single survey items with the exception of stage of change and the Pro and Con scales of the DBI. Surveys were approximately 15 min in length. Non-SA staff were used for follow-up survey administration to reduce demand effects.

Data Analysis

The primary outcome, calling the WTQL, as well as accepting a fax referral for those who did not call, was tested using logistic regression. Treatment condition was dummy coded with the experimental condition as the reference condition, and models contained site as a covariate and site by treatment condition interaction terms to test for differential treatment effects across sites. Changes in beliefs and other secondary outcomes were assessed using mixed design analysis of variances[45–48] with time (first baseline vs. post-intervention and then baseline vs. follow-up) and condition and site as factors. When there was a statistically significant interaction between time and condition, follow-up simple effect testing explored whether the treatment group changed significantly across time, whether the control group changed significantly across time and whether the intervention and control group differed significantly at the various time points. Screening analyses showed that the item response distributions approximated normalcy and that inter-condition variances were highly similar. Because site did not change the pattern of findings meaningfully, site statistics are not reported. All analyses were conducted using IBM SPSS Statistics, version 22.

Results

Recruitment and Follow-up

Recruitment took place between May, 2012 and January, 2014 (with the target $N = 100$ for motivated participants recruited by January, 2013). When enrollment was open to both motivated and unmotivated smokers, 43% of smokers (137) reported they were motivated to quit and 57% reported they were not. The 3-month follow-up rate was 59.7% (see Supplementary Material for Consort Chart).

Sample Characteristics and Group Equivalence

There were no significant differences between the unmotivated groups on any of the demographic, smoking history, current smoking or motivation to quit variables (Table 1). There were differences between the participants in the motivated comparison group and the combined unmotivated groups on gender, annual income, health insurance status, educational status, and smoking heaviness (Table 1). As expected, participants in the motivated comparison group reported greater motivation to quit than their unmotivated counterparts on all motivational measures ($p < .01$). There were no differences between any groups regarding follow-up contact rate.

Intervention Duration

The average duration of the experimental intervention was 23.6 min, slightly longer than the targeted 20 min (range: 5–50 min). The mean duration for the attention-control group was 14.9 min, which was significantly shorter than the duration of the experimental intervention ($t = 8.9$, $df = 266$, $p < .01$).

Table 1. Sample Characteristics

	Intervention	Attention control	Low contact control	Motivated
Demographics				
Age (average)	41.8	42.8	42.9	41.7
Gender (% male)	51.9%	50.8%	58.8%	43.6%[a]
Race (% Black, % White)	12.5%, 68.4%	9.5%, 75.9%	11.6%, 73.2%	16.7%, 65.7%
Hispanic (%)	12.3%	9.8%	5.5%	7.3%
Annual household income (% <$15,000)	48.1%	50.8%	57.1%	74.5%[b]
Health insurance (% none)	33.6%	31.2%	29.9%	44.3%[a]
Highest education level achieved (% high school)	34.4%	35.6%	30.8%	19.0%[c]
Smoking history				
Age of onset (average)	16.6	16.4	16.0	16.8
Years of smoking (average)	24.2	25.7	26.3	24.4
Lifetime quit attempts (average)	4.0	5.0	4.3	5.0
Current smoking				
First cigarette of the day (% within 5 min of waking)	48.8%	58.5%	63.4%	47.0%
Daily smoking (cigarettes/day) (%≤10, %11–20)	20.8%, 49.2%	15.0%, 51.1%	18.3%, 37.4%	36.0%, 50.0%[b]
Motivation to quit				
Try in next 6 months (1 = definitely not to 5 = definitely) mean	1.52	1.47	1.67	3.48[b]
Cut down in past year (1= no to 4 = a lot) mean	1.66	1.67	1.62	2.18[b]
Ready to quit (1–10 scale) (average)	3.9	3.8	4.0	8.0[b]
Likely success if tried (1–10 scale) (average)	4.2	4.0	4.2	7.1[b]
Ask for help if tried (1 = definitely not to 5 = definitely) mean	2.20	2.12	2.17	3.15[b]
Will set a quit date (% yes)	12.0%	12.6%	15.9%	66.3%[b]
Stage of change (% pre-contemplative, % contemplative, % preparation)	57.3% 41.1% 1.6%	62.1% 31.5% 6.5%	58.9% 35.4% 5.6%	1.1% 47.4% 51.6%[b]
Pro decisional balance scale (average)	11.8	11.5	11.0	10.1[b]
Con decisional balance scale (average)	9.1	8.8	8.2	11.2[b]
Follow-up (percent)	57.8	60.0	58.6	63.7

[a]Motivated vs. three unmotivated groups, $p < .05$.
[b]Motivated vs. three unmotivated groups, $p < .01$.
[c]Motivated vs. three unmotivated groups, $p = .01$.

Intervention Effect on Smoking/Quitting Beliefs

Very few participants needed assistance reading the surveys. Because the two control groups did not differ from one another at any assessment time point, their data were combined in subsequent analyses. There were no intervention-control differences at baseline on these belief variables except that control participants believed medicine and coaching/counseling is more effective for quitting relative to will power and considered smoking as more addicting than did intervention participants ($ps < .05$). There was a statistically significant condition × time interaction at both baseline versus post-intervention and baseline versus follow-up on 15 of the 18 belief measurements and a significant effect on one of the two time frames for two of the three remaining beliefs (see Table 2 and Supplementary Table S1 for *F* values and significance levels). All follow-up simple effects tests found that beliefs improved for intervention participants from baseline to post-intervention and from baseline to follow-up. For example, intervention participants more strongly endorsed the belief that cessation medicines were safe and effective at post-intervention and follow-up than at baseline. In addition, intervention participants held more adaptive beliefs than control participants on 16 of 18 beliefs measured at post-intervention and on 16 of 18 at follow-up. Twenty-three of these 32 significant differences remained so after Bonferonni correction ($\alpha = .0013$) (Supplementary Table S1). For example, intervention participants agreed less strongly that smoking was acceptable under some circumstances than control participants both post-intervention and at follow-up. Beliefs of control participants also became more adaptive at post-intervention and follow-up,

Table 2. Beliefs About Smoking and Quitting

	Intervention group			Control groups		
Belief	**Baseline**	**Post-intervention**	**Follow-up**	**Baseline**	**Post-intervention**	**Follow-up**
Percent of adults who smoke—mean percent[a,b]	55.8%	**33.6%**[c]	**35.9%**[c]	51.7%	**51.2%**	**50.8%**
OK to smoke some of the time (1 = strongly agree to 5 = strongly disagree)—mean[a,b]	3.34	**3.78**[c]	**3.78**[c]	3.21	**3.33**[c]	**3.21**
How hard to quit (1 = very easy to 10 = very hard)—mean	7.67	7.20	7.10	7.66	7.30	7.38
Relative treatment effectiveness						
Will power vs. medicine 1 = will power more effective to 5 = medicine more effective—mean[a,b]	2.51	**3.95**[c]	**3.95**[c]	2.78	**2.81**	**3.09**[c]
Will power vs. coaching/counseling 1 = will power more effective to 5 = coaching/counseling more effective—mean[a,b]	2.36	**3.93**[c]	**4.01**[c]	2.72	**2.86**	**3.05**
Will power vs. medicine + counselling, 1 = willpower more effective to 5 = medicine + counseling[a,b]	2.69	**4.15**[c]	**4.15**[c]	2.90	**2.94**	**3.23**
Beliefs about medications						
Medications are dangerous (1 = strongly agree to 5 = strongly disagree)—mean[a,b]	3.18	**3.90**[c]	3.70[c]	3.28	**3.31**	3.54[c]
More dangerous than smoking (1 = strongly agree to 5 = strongly disagree)—mean[a,b]	3.22	**3.87**[c]	**3.91**[c]	3.45	**3.46**	**3.60**
As addicting as smoking (1 = strongly agree to 5 = strongly disagree)—mean[a,b]	3.06	**3.85**[c]	**3.84**[c]	3.35	**3.38**	**3.49**
Medicines don't work (1 = strongly agree to 5 = strongly disagree)—mean[a,b]	2.68	**3.41**[c]	**3.67**[c]	2.73	**2.83**[c]	**3.19**[c]
Medicines lower cravings (1 = strongly agree to 5 = strongly disagree)—mean[a]	2.83	**2.38**[c]	2.50	2.70	**2.68**	2.51
Wisconsin tobacco quit line (WTQL)[d]						
Cost to call? Percent free[a,b]	25.0%	**93.8%**[c]	**90.0%**[c]	26.8%	**81.5%**[c]	**76.1%**[c]
Will WTQL send medicines? Percent yes[a,b]	13.3%	**95.3%**[c]	**86.1%**[c]	12.4%	**79.4%**[c]	**63.0%**[c]
Will medicines cost? Percent free[a,b]	6.7%	**85.0%**[c]	**81.5%**[c]	7.2%	**65.9%**[c]	**55.2%**[c]
Other beliefs						
Quitting is just a matter of will power (1 = strongly agree to 5 = strongly disagree)—mean[a,b]	2.05	**2.76**[c]	3.01[c]	2.20	**2.36**[c]	2.80[c]
Counseling doesn't help (1 = strongly agree to 5 = strongly disagree)—mean[a,b]	2.64	**3.32**[c]	**3.60**[c]	2.60	**2.77**[c]	**3.08**[c]
Shouldn't quit when under stress (1 = strongly agree to 5 = strongly disagree)—mean[b]	2.24	2.50	**3.04**[c]	2.05	2.14	**2.47**[c]
Can't quit if live with smokers (1 = strongly agree to 5 = strongly disagree)—mean[a,b]	2.07	**2.55**[c]	**3.23**[c]	2.04	**2.16**[c]	**2.61**[c]

Bolded data indicate a significant difference ($p < .01$) between the intervention and control group at that measurement time. The percentage of missing data for comparisons at baseline and post-intervention ranged from 3.1% to 7.8%; the range for comparisons at follow-up was 0.8% to 3.2%.

[a]Baseline—post-intervention, group × time interaction, $p < .05$ or $p < .01$.

[b]Baseline—follow-up, group × time interaction, $p < .05$ or $p < .01$.

[c]Indicates that this value differs significantly ($p < .05$ or $p < .01$) from the baseline value for this condition.

[d]Information about the WTQL was given to control participants as part of inviting them to call the WTQL, the primary outcome.

although less so and for fewer beliefs than was true for intervention participants.

The results reveal intervention effects on beliefs that were not specifically targeted (Table 2). For example, in comparison with their baseline scores, at both post-intervention and follow-up, intervention participants agreed less strongly that smokers can't quit if they live with others who smoke; their scores were also lower than those of control participants at those two later time points.

Primary Outcome

Compared to individuals in the two control groups, individuals receiving the experimental intervention were significantly more likely to call the WTQL to initiate a quit attempt immediately following the intervention (12.2% [n = 17] vs. 2.2% [n = 3] for attentional-control and 1.4% [n = 2] for low contact group). Moreover, this rate approached the rate of calling amongst initially motivated participants (15.7%) (Figure 1). A logistic regression yielded a significant effect for treatment condition (Wald = 15.05; $p < .001$) for this outcome, with site entered as a covariate; the experimental group differed from each of the unmotivated control groups (ps < .004). When rates of agreement for fax referral were examined (amongst those who did not make an immediate WTQL call) the intervention group had higher rates of acceptance than did the two unmotivated control groups (19.7% vs. 10.3% and 6.6% for the attention control and low-contact groups, respectively). A logistic regression of the fax referral outcome yielded a significant effect for treatment condition (Wald = 10.26; $p < .006$), and again comparisons of each control group with the experimental condition were significant (ps < .039). There were no significant site main effects or site × treatment interactions for any of the logistic regression models (ps > .10)

In addition to those participants who called the WTQL, the WTQL database was searched to identify additional participants who received services from the WTQL during the 3-month follow-up period from among those that agreed to fax referral or only took WTQL materials. For participants motivated at baseline, an additional 19.7% received WTQL service. This was significantly greater than for participants who were unmotivated at baseline (X^2 = 26.0, df = 1, $p < .01$) but there was no difference among the three unmotivated groups (intervention group—4.8%, attention-control group—3.6% and low contact control group—5.8%).

Self-Reported Abstinence

At the 3-month follow-up, 29.2% of the motivated participants reported not smoking in the previous 7 days, as did 12.3% of the intervention participants and 7.3% of the participants in the control groups (the two control groups did not differ from each other). A chi-square test across the conditions was significant (X^2 = 19.7, df = 2, $p < .01$), but the intervention participants did not differ from the control participants.

Secondary Outcomes

Because the two control groups did not differ from one another at any assessment time point, their data were combined in subsequent analyses. There were no differences between the intervention and control groups at baseline. There were significant group × time interactions for baseline versus post-intervention and/or baseline versus follow-up on all nine of the secondary outcomes (Table 3 and Supplementary Table S2 for F values and significance levels). Follow-up simple effects testing found that for most of these outcomes the intervention participants became more motivated at post-intervention and follow-up compared to their motivation at baseline and compared to control participants at these two time points. Overall, significant differences were found on 13 of 18 of the secondary measure (eight of nine baseline to post-intervention differences and five of eight baseline to follow-up differences). Seven of these 13 tests remained significant after Bonferonni correction (α = .0027) (Supplementary Table S2). At follow-up, these secondary measures were collected on only participants still smoking. Thus, those available for assessment in the intervention and control groups reflect factors other than randomization: for example, quitting success and attrition may have differentially influenced the nature of participants remaining in the two groups. For example, intervention participants became more confident that they could quit successfully both at post-intervention and at follow-up compared to their baseline and compared to control participants at these two time points. Moreover, after the intervention, 58.4% of the intervention participants indicated that they would use both a medicine and coaching/counseling to quit compared to their baseline rate of 8.8% and compared with a rate of 44.9% amongst unmotivated control participants after the intervention.

Regarding stage of change, intervention participants were more likely to be in the Preparation stage both at post-intervention and at follow-up compared to their stage at baseline and compared to control participants at post-intervention and follow-up. Consistent with this, as measured by the decisional balance scale, the reasons not to smoke (Con scale) for intervention participants became more important at post-intervention relative both to their baseline measurement and the control group. However, the reasons to smoke (Pro scale) were

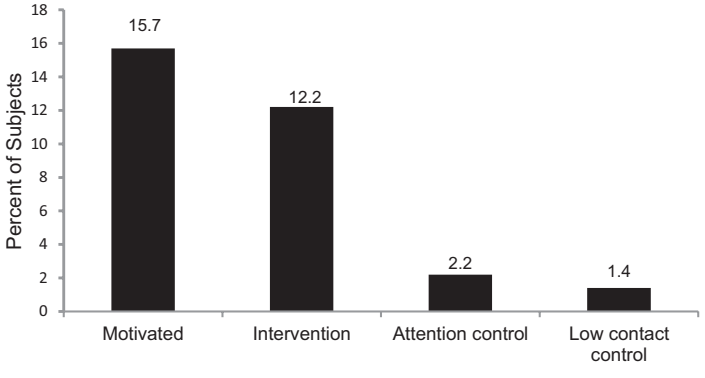

Figure 1. Primary Outcome—Percent of participants who made a call to the Wisconsin tobacco quit line while at the Salvation Army.

Table 3. Secondary Outcomes

Outcome	Intervention group			Control groups		
	Baseline	Post-intervention	Follow-up	Baseline	Post-intervention	Follow-up
Try to quit in next 6 months (1 = definitely not to 5 = definitely)—mean[a]	1.52	**1.99**[c]	2.27	1.61	**1.70**[c]	2.14
Ready to quit (1 = not at all to 10 = most ready)—mean[a,b]	3.92	**4.78**[c]	**4.63**	3.98	**4.14**	**4.09**
Likely to succeed if try (1 = not at all to 10 = most ready)—mean[a,b]	4.10	**5.18**[c]	**5.38**[c]	4.20	**4.62**[c]	**4.60**
If try to quit, ask for help? (1 = definitely not to 5 = definitely yes)—mean[a]	2.19	**2.78**[c]	2.63	2.15	**2.30**[c]	2.29
Will you set a quit date if asked? Percent yes[a,b]	12.3%	**22.0%**[c]	**20.3%**[c]	14.2%	**15.2%**	**19.6%**
Quit using a medicine + counseling? Percent yes[a]	8.8%	**58.4%**[c]	47.5%	13.0%	**44.9%**[c]	40.5%
Stage of change (% pre-contemplative, % contemplative, % preparation)[a,b]	55.5%	**40.3%**	**21.4%**	60.5%	**58.5%**	**49.3%**
	42.9%	**45.7%**	**62.9%**	33.5%	**31.2%**	**39.3%**
	1.7%	**14.0%**[c]	**15.7%**[c]	6.0%	**10.3%**	**11.3%**[c]
Pro decisional balance scale (1 = positive unimportant to 15 = positive very important)—mean[b]	11.81	11.88	**11.36**	11.22	10.89	**10.03**[c]
Con decisional balance scale (1 = negative unimportant to 15 = negative very important)—mean[a]	9.12	**9.83**[c]	10.00	8.51	**8.70**	9.04

Note. Bolded data indicate a significant difference ($p < .05$ or .01) between the intervention and control group at that measurement time. The percentage of missing data for comparisons at baseline and post-intervention ranged from 4.0% to 14.2% except for the multiitem Pro and Con decisional balance scale which ranged from 16.9% to 20.7%; the range for comparisons at the follow-up was 2.4% to 11.3% with the two decisional balance scales at 12.1% and 13.8%.

[a]Baseline—post-intervention, group × time interaction, $p < .05$ or $p < .01$.

[b]Baseline—follow-up, group × time interaction, $p < .05$ or $p < .01$.

[c]Indicates that this value differs significantly ($p < .05$ or $p < .01$) from the baseline value for this condition.

more important for intervention participants relative to control participants at follow-up. Coefficient alphas for the Pro scale at baseline, post-intervention, and follow-up were .77, .87 and .73, respectively. These values for the Con scale were .86, .92, and .84, respectively.

Regarding outcomes asked only at follow-up, intervention participants reported thinking about quitting more in the past 3 months than did control participants (55.7% thinking quite a bit or a lot for intervention participants vs. 36.4% for control participants, $X2 = 13.7$, $df = 3$, $p < .01$) and reported cutting down at least a little (83.1% vs. 59.8%, respectively, $X2 = 16.3$, $df = 3$, $p < .01$).

Evaluation of the SA

When asked to rate the quality of the overall service provided by the SA, participants receiving the intervention gave a higher rating than did the two control groups (which did not differ with one another—8.8 vs. 8.3 on a 1–10 scale, $t = 3.4$, $df = 395$, $p < .01$).

Site Differences

Despite standard training and monitoring during the course of the study at each site, outcomes differed among sites. The percentage of participants who received the intervention and contacted the WTQL to make a quit attempt varied across the five sites (from 5.4% to 20.5%). While these differences were not statistically significant, the magnitude of differences was meaningful. At the best performing site, the rate of calling the WTQL by the intervention group (20.5%) exceeded the overall rate of calls by motivated participants (15.7%). The average duration of the intervention also varied among the sites from a low of 17.4 min to a high of 34.6 min ($F = 21.9$, $p < .001$). Interestingly, the best performing site in terms of calls to the WTQL (20.5%) had the shortest intervention duration (17.1 min.). There were also site differences on secondary outcomes. For example, the following ranges of values were found across the sites for the post-intervention scores of the intervention participants: readiness to quit (range 3.6–5.6) ($F = 12.6$, $df = 4/386$, $p < .01$), confidence in quitting (range 3.6–5.9) ($F = 14.8$, $df = 4/381$, $p < .01$), and intention to quit in the next 6 months (range 1.4–2.4) ($F = 11.7$, $df = 4/386$, $p < .01$). Despite such site differences, the pattern of significant effects due to the intervention was little affected by including site in the analysis.

Discussion

Consistent with previous literature,[24,28,49] this study found that low income smokers held beliefs about smoking and quitting that might reduce quit attempts and success. This research evaluated a brief intervention that was intended to change such beliefs in low-SES smokers visiting SA sites. The results showed that when SA staff gave the intervention to smokers who were initially unmotivated to quit smoking, it increased: (a) smokers' adoption of beliefs and attitudes that were hypothesized to promote making quit attempts and quitting successfully (were more adaptive), and (b) the likelihood that smokers would call the WTQL to initiate an evidence-based quit attempt. Improvement in smokers receiving the intervention was seen relative to both their baseline scores, and relative to smokers who received attentional and information control interventions. Importantly, these improvements persisted over a 3-month follow-up relative to baseline. The intervention also appeared to affect positively a broad range of motivational outcomes (e.g., intention to quit in the next 6 months, stage of change, and willingness to seek help in quitting), and affect beliefs that were not specifically targeted by the intervention (e.g., that it is possible to quit even when someone else in the home smokes).

The intervention effect sizes appeared to be clinically meaningful. Of participants who were motivated to quit at baseline, 15.7% called the WTQL at their visit, versus 12.2% of the initially unmotivated participants who received the intervention (the two control groups called at a rate of 2.2% and 1.4%). Thus, the intervention

closed 75% of the motivational gap between the unmotivated and the motivated smokers.

Consistent with previous research,[38] intervention participants evaluated the SA more highly than did the control participants. Thus, this research suggests that not only can community agencies provide tobacco dependence interventions,[11,50,51] but such interventions may enhance the perceived value or status of the agency. Tobacco intervention in the community agency setting may have great public health impact because people living in poverty smoke at high rates, but are less likely than other smokers to access preventive health services and receive treatment for tobacco dependence in primary care.[52,53]

Simply asking potential participants if they were ready to quit now or in the next 30 days was an effective way to separate the motivated from the unmotivated. Of those that said "yes," 99% were in the contemplative or preparation stage of change whereas 59% of those that said "no" were in the pre-contemplative stage of change. Having a simple and easy method to assess motivation is important because of the increasing emphasis on identifying effective motivational interventions[15] and the growing appreciation that interventions need to be specific to the phases of smoking cessation.[54]

Differences in calling the WTQL to initiate a quit attempt varied four-fold across the five SA sites (from 5.4% to 20.5%) and significant differences were also found on secondary outcome measures. These differences could reflect multiple factors: for example, populations served by the sites or differences in staff implementation. More consistent implementation and results may be achieved via greater automation of intervention delivery and increased training/monitoring.

To the degree that the study hypotheses were supported, the theories upon which the intervention elements were based also derive support. As noted, the goal-focused intervention element used the decisional balance worksheet developed as part of motivational interviewing,[33] while the belief-focused intervention element drew upon self-determination theory[37,38] and cognitive behavior therapy.[35,36] Of course, the results of this study do not provide sensitive tests of any particular supporting theory since the theories are somewhat overlapping and, in some cases, offer similar guidance. For example, the goal-focused intervention could be viewed as compatible with both self-determination theory as well as motivational interviewing (see [55–57] for discussion of such overlap).

Limitations of this study include a lack of significant differences in 7-day point prevalence abstinence measured at three months post-intervention. However, the difference found (12.7% vs. 7.5% for the intervention and control participants, respectively) could be of public health importance if it were consistently obtained. Second, differences in intervention duration could have affected outcomes via nonspecific effects. Third, there was study attrition; 3-month follow-up was obtained for only 60% of the participants. This probably reflects, in part, the transient nature of people served by community agencies. Fortunately, the primary outcome was measured immediately after the intervention and was not affected by participant attrition. Fourth, the large site differences suggest that efforts to ensure fidelity may have been insufficient. Perhaps increased automation of the intervention might promote greater consistency in intervention delivery and effect. Fifth, even participants in the control groups had more adaptive changes over baseline on some variables such as knowledge of the WTQL and intent to use medicines or counseling in future quit attempts. This might reflect the fact that control participants received information about the WTQL, both verbally and in writing. It is also possible that these changes reflect social desirability or demand characteristics. Sixth, results other than those obtained from the WTQL database, were self-reported. Seventh, the generalizability of the results across different community agencies and smoker populations is unknown. In fact, because the SA sites used in this study may reflect a selection bias, study results may not generalize to other SA sites. Site differences suggest the need for additional research to establish generalizability. Finally, this study enrolled smokers of low-SES because the beliefs being targeted are more prominent in this population relative to the general population.[30,58] However, some smokers of higher SES do have these beliefs, raising the possibility that smokers in general might benefit from similar interventions.

This study identifies a promising, brief intervention that was tailored to low-SES smokers not motivated to quit and delivered by community agency staff. The intervention changed smokers' attitudes about smoking and quitting in directions that were hypothesized to promote quit attempts and successful cessation. Additionally, it increased initiation of evidence-based treatment by previously unmotivated smokers. Future research should be powered to detect a difference in abstinence that would be clinically significant and should also explore the mediational paths between intervention, changes in beliefs or attitudes, and making a quit attempt and successful quitting. Also, methods to improve the consistency of intervention delivery should be explored.

Supplementary Material

Supplementary Material, Table S1 and S2 can be found online at http://www.ntr.oxfordjournals.org

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Declaration of Interests

None declared.

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