Addictive Behaviors Reports 9 (2019) 100171

Contents lists available at ScienceDirect

Addictive Behaviors Reports

journal homepage: www.elsevier.com/locate/abrep

Support person interventions to increase use of quitline services among racially diverse low-income smokers: A pilot study☆

Christi A. Patten[a,*], Steven Fu[b,c], Katrina Vickerman[d], Martha J. Bock[a], David Nelson[b,c], Shu-Hong Zhu[e], Joyce E. Balls-Berry[f], Alula Jimenez Torres[d], Tabetha A. Brockman[a,f], Christine A. Hughes[a], Abigail E. Klein[b,c], Miguel Valdez-Soto[f], Paula A. Keller[g]

[a] Department of Psychiatry and Psychology, Mayo Clinic, 200 First St SW, Rochester, MN 55905, United States
[b] Veterans Affairs HSR&D Center for Chronic Disease Outcomes Research, Minneapolis VA Health Care System, Mail code: 152, Bldg 9, One Veterans Drive, Minneapolis, MN 55417, United States
[c] Department of Medicine, University of Minnesota, One Veterans Drive, Minneapolis, MN 55417, United States
[d] Optum Center for Wellbeing Research, Optum Health, 999 Third Ave, Seattle, WA 98104, United States
[e] University of California San Diego, 9500 Gilman Drive #0905, La Jolla, CA 92093, United States
[f] Center for Clinical and Translational Science Community Engagement Program, Mayo Clinic, 200 First St SW, Rochester, MN 55905, United States
[g] ClearWay Minnesota℠, 8011 34th Ave S, Suite 400, Minneapolis, MN 55425, United States

ARTICLE INFO

Keywords:
Smoking
Social support
Low-income
Intervention
Treatment

ABSTRACT

Introduction: Social support from nonsmokers may have a role in prompting smokers to use evidence-based cessation treatment. Prior studies found that an intervention for nonsmoking support persons (SPs) was effective for promoting smokers' use of free, state quitline services. This pilot study adapted and assessed feasibility of this intervention for a racially diverse, low-income population.

Methods: Single group, non-randomized design enrolling SP-smoker dyads with low income status enrolled in one of three study "waves" of 10 pairs each. Participants were recruited using flyers and in-person outreach methods. The SP intervention included a 1-session coaching call and written materials; study waves 2 and 3 also included text messaging and a monetary incentive for smokers who used quitline services. Using content analysis, the intervention was iteratively adapted based on SP feedback. Baseline measures assessed socio-demographics, dyad and tobacco use characteristics. Follow-up assessments were conducted among SPs at 1-month follow-up and among smokers at 3-months follow-up. Feasibility indicators were recruitment, retention, and SP intervention acceptability and adherence. Secondary outcomes were smokers' use of any quitline service verified by quitline staff and 7-day, point prevalence, biochemically verified smoking abstinence at 3 months.

Results: Recruitment of 30 dyads was feasible; in-person recruitment methods were the most successful. SPs who completed follow-up assessments found the intervention acceptable, suggesting only minor content modifications, and they perceived the quitline information as novel. But the study had some feasibility challenges (e.g., SP coaching call completion: 60% and SP study retention: 53%). At 3 months, 2 smokers (7%) had used any quitline service and 13% were biochemically confirmed smoking abstinent.

Conclusions: This pilot study demonstrated feasibility of recruiting SP-smoker dyads from diverse, low-income communities. While the intervention was well received, its delivery was not feasible in this population. Results suggest that further consumer adaptation of the intervention is needed among both SPs and smokers.

1. Introduction

Recent attention has focused on the potential beneficial role of social support networks for increasing smokers' use of evidence-based cessation treatment and quitting behaviors (Aschbrenner et al., 2018; Baha & Le Faou, 2010; Graham et al., 2017; Kim et al., 2017; vanDellen et al., 2017). Cigarette smoking is increasingly concentrated among racial/ethnic minorities and those with low-income status (Hu et al.,

☆ The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs or the United States Government.

* Corresponding author at: Mayo Clinic, 200 First St SW, Rochester, MN 55905, United States.
E-mail address: patten.christi@mayo.edu (C.A. Patten).

https://doi.org/10.1016/j.abrep.2019.100171
Received 24 October 2018; Received in revised form 8 February 2019; Accepted 10 February 2019
Available online 12 February 2019

2016; Levinson, 2017). These populations are more likely to have social networks that reinforce smoking as a normative behavior (Mead et al., 2014). Racial minorities and low-income smokers are less likely to use evidence-based cessation treatment compared to general population smokers and smokers with higher incomes (Stahre et al., 2010). Telephone quitlines are an effective public health service available in all 50 states and provide free cessation services (Hollis et al., 2007; North American Quitline Consortium, 2017). Among low-income smokers, quitline utilization is associated with higher smoking abstinence compared to not using these services (Bernstein et al., 2016). While effective, uptake of quitlines among smokers is low (North American Quitline Consortium, 2016).

Nonsmoking members of the social network of smokers are an understudied but promising population to increase the reach of effective cessation treatments to underserved smokers (McAfee et al., 2013). Recent observational studies of racially diverse, low-income smokers indicate the potential role of social support, as well as interpersonal communications within social networks, for increasing quitting motivation and cessation behaviors (Meijer et al., 2016; Parks & Kim, 2018; Patten et al., 2016). A prior randomized, controlled, effectiveness trial found that a phone coaching intervention delivered to nonsmoking support persons (SPs) was effective for increasing smoker use of a state quitline, with both one or three coaching calls more effective than a control condition (14.6%, 14.8%, and 6.4% respectively) (Patten et al., 2017). However, that study engaged SPs with high socioeconomic status and 95% were white. In the current pilot study, our goal was to adapt this effective intervention and assess feasibility in a racially diverse, low-income population.

The conceptual basis for the SP intervention is Cohen's theory of social support which postulates that both verbal and non-verbal supportive actions (instrumental, informational, emotional) promote positive health practices of others by encouraging more effective coping (Cohen, 2004). Another important theoretical dimension is the positive-negative nature of supportive behaviors (Cohen & Lichtenstein, 1990). Increasing positive behaviors (e.g., praise) while avoiding negative behaviors (e.g., policing) is consistently associated with smoking cessation.

In this pilot study, we also developed a text messaging component as a complement to the one-call coaching session to reinforce intervention content. Text messaging and mobile technology delivery platforms are acceptable (Boland et al., 2017) and feasible (Montague & Perchonok, 2012) in diverse, low-income populations, enhancing their potential reach. There is also some evidence that monetary incentives for quitline utilization are effective among Medicaid-insured smokers (Anderson et al., 2018; Fraser et al., 2017). The current work builds on this idea by encouraging the SP to convey to their smoker the availability of an incentive for use of quitline services. We hypothesized that the SP intervention that included text messaging and incentives would be feasible when iteratively adapted for a racially diverse, low-income population as indicated by treatment acceptability and adherence.

In our prior research, we enrolled only SPs and therefore we did not measure the potential impact of the intervention on the smokers' quit outcomes. Thus, in the current study, we evaluated the feasibility of enrolling both SPs and smokers as dyads to enable the assessments of cessation outcomes from the smokers.

2. Methods

2.1. Study design

The study used a single group, non-randomized design assigning SP-smoker dyads in the order in which they enrolled to one of three consecutive “waves” of 10 pairs each. SPs received the intervention and completed assessments at baseline and at one-month follow-up. No incentives were offered for completing the intervention. A $25 gift card was provided to each SP after completing each assessment. Smokers were eligible to receive free, state quitline services. Smokers completed assessments at baseline and three-month follow-up. A $25 gift card was provided to each smoker after completing each assessment. Smoker participants could receive an additional $25 gift card for returning a saliva specimen sample at the three-month follow-up. In study waves two and three, they could receive a $25 gift card for any quitline service use.

2.2. Participants

The targeted sample size was 30 dyad participants, which is consistent with recommendations for Stage I behavioral addictions treatment development (Rounsaville et al., 2001). The study recruited a purposeful sample from both rural and urban regions of Minnesota using two methods: (1) flyers displayed in select locations and (2) in-person outreach at community settings (e.g., public libraries, free lunch programs). Separate flyers and study information targeted smokers and SPs, respectively. Screening was done in person and by phone, email, or text messaging to provide study information and determine the individual's eligibility based on the study inclusion/exclusion criteria. Smokers and SPs could approach research staff in-person together or separately. If a smoker or SP contacted or approached study staff first and was eligible, he/she was asked to have the other member of the dyad contact research staff for screening.

Eligibility criteria for both SPs and smokers were: (1) resides in MN, (2) age $\geq$18 years, (3) low-income status defined as receiving state funded health insurance including medical assistance (e.g., Medicaid) or MinnesotaCare, and (4) has a mailing address/P.O. box.

Additional eligibility criteria for SPs were: (1) never or former smoker (has not smoked in the past six months), (2) owns or has access to a working cellular telephone with text messaging capabilities, and (3) wants to support a smoker with whom there is some form of contact at least one day/week. Additional criteria for the smokers were: (1) has phone access, (2) has smoked at least one cigarette in the past 30 days (includes both light/intermittent as well as daily/frequent smokers to enhance generalizability), and (3) has not received smoking cessation treatment in the past three months.

Oral consent for SPs was obtained in person or via telephone. Written consent for smokers was obtained in person or through mail. Once informed consent was obtained and the baseline assessments completed, the dyad was enrolled. Along with a $25 gift card, an enrollment letter was mailed to each member of the dyad explaining next steps in the study. Dyads were enrolled on a rolling basis until each of three consecutive study “waves” of 10 pairs each was full.

2.3. Procedures

2.3.1. SP intervention

We adapted the intervention with the SP participants in an iterative manner consistent with recommendations for behavioral addictions treatment development Stage Ia work (Rounsaville et al., 2001). We made intervention protocol refinements after each wave of 10 SPs based on participant feedback. The final treatment manual (used in wave three) is presented as Supplementary Material S1.

2.3.1.1. Coaching call. All three waves included an individually delivered, one-session coaching call based on a manualized intervention (Brockman et al., 2018) with estimated duration 15–20 min. The coaching calls were delivered to SP participants by five research staff trained in motivational interviewing, with education ranging from a bachelor's to a doctoral degree and backgrounds in medicine, psychology, and health education. All coaches completed study-specific training in which they were introduced to the theories behind the material in the coaching call manual and practiced responses to common statements and questions that may arise during the call.

The coach used behavior change strategies delivered with a motivational interviewing style. Topics covered in the session were: (1) rationale for treatment, (2) role of the SP, (3) information about quitline services, (4) education on readiness to quit, (5) supportive actions based on the smoker's readiness to quit, and (6) reinforcing (recognizing) the smoker's progress, even small steps toward the intervention goal of their smoker using quitline services.

2.3.1.2. Written materials. For all three study waves, existing written materials (Patten et al., 2017) were provided to SPs: (1) National Cancer Institute Clearing the Air brochure that SPs could share with their smoker, (2) tri-fold brochure containing tips on supportive behaviors and statements, (3) information sheet on nicotine dependence including nicotine withdrawal, and (4) a description of quitline services.

2.3.1.3. Text messaging

Across all three waves, we developed and piloted text messages for SPs to complement the coaching call. Wave one obtained feedback from nonsmokers on potential text messages that would complement and reinforce the content of their coaching call. Using content analysis (Krippendorff, 2004), this feedback was used to develop 12 text messages classified as: (1) factual or supportive/encouraging, and (2) interactive or non-interactive. Each message was a maximum of 140 characters and messages were at a Flesch-Kincaid reading grade level of 4.2. Text messages were then piloted and refined in waves two and three. After the coaching call, text messages were delivered by the intervention coach to SP participants three times a week for the duration of four weeks. If the SP did not complete the coaching call, she/he was not sent any text messages. The text messages are described and listed in chronological order of their delivery in Supplemental Material S2.

2.3.1.4. Monetary incentive information. A previous study used a flyer mailed to smokers that described the availability of a gift card incentive for use of quitline services (Anderson et al., 2018). We adapted this flyer for use in study waves two and three for SPs to share the incentive information with their smoker.

2.3.2. Quitline services

All smoker participants were eligible to receive free, state quitline services for up to three months after study enrollment. QUITPLAN® Services offers Minnesotans the option of the QUITPLAN Helpline or Individual QUITPLAN Services. Minnesotans who are uninsured or underinsured are eligible for the Helpline, which provides telephone counseling, nicotine replacement therapy (NRT), integrated text and email messaging, and a welcome kit. Minnesotans who are interested in telephone counseling and who have health insurance are connected to their health plan quitline. All adult Minnesotans are eligible for Individual QUITPLAN Services, which consist of up to four services that tobacco users can select from: a two-week NRT starter kit, text messaging, email program, and a printed quit guide.

The smoker participants could enroll in QUITPLAN Services online or by telephone using the general QUITPLAN Services toll-free number advertised statewide: 1-888-354-PLAN (7526). Optum is the vendor for QUITPLAN Services in Minnesota. ClearWay Minnesota℠, an independent nonprofit organization funded with 3% of Minnesota's tobacco settlement, funds QUITPLAN Services and paid for services used by our pilot smoker participants and for the cost of connecting our participants to their own health plan quitline.

2.4. Measures

SPs and smokers each completed a separate baseline assessment by phone or in person. A one-month follow-up assessment was conducted among all enrolled SPs by telephone with research staff. Among all enrolled smokers, a follow-up assessment was done at three months by research staff by telephone, mail, or in person. Research staff conducting the follow-up assessments did not deliver the SP intervention.

2.4.1. Baseline characteristics

Both SP and smoker participants completed a baseline measure taking about 5–15 min to complete. The measure assessed socio-demographic characteristics: age, income, employment, race, ethnicity, gender, education, marital status (Patten et al., 2017). SPs were additionally asked about their prior tobacco use and dyad characteristics: type of relationship (e.g., spouse) and if they currently resided with their smoker (Patten et al., 2017). Smokers were additionally asked about their tobacco use characteristics: number of days smoked in the past 30 days, time to first cigarette after waking (Fagerström, 2012), and readiness to quit (Contemplation Ladder) (Biener & Abrams, 1991).

2.4.2. Feasibility (primary outcome)

2.4.2.1. Recruitment. For enrolled SP-smoker dyads, we assessed duration of recruitment and recruitment method (flyer or in-person outreach).

2.4.2.2. Retention. Study retention was defined as completion of the one-month assessment among SP participants and the three-month assessment among smoker participants. Research staff also documented the proportion of smokers who provided a saliva specimen for cotinine analysis.

2.4.2.3. SP intervention adherence and acceptability. The intervention coach documented completion of the coaching call and its duration. In waves one and two, the intervention coach classified non-interactive text messages as completed if the participant received the message (i.e., noted as delivered), and interactive text messages as completed if the participant received the message and responded. Text messaging adherence was defined as completing 75% (9/12) text messages.

To assess acceptability, during the SP intervention call, the coach took detailed notes on how the content was received and understood by participants to determine if the content needed modifying. One month after enrollment, research staff assessed the perceived helpfulness of each intervention component (coaching call, written materials, text messaging, and health incentive flyer), with response options: not helpful, somewhat helpful, and very helpful; and what changes they recommended (open-ended response format). Participants were asked if they would recommend the program to another person who was concerned about a smoker with response options: definitely would not, probably would not, undecided, probably would, or definitely would. In wave one, participants were asked their receptivity to receiving text messages as a complement to or instead of the coaching call, preferences for types of text messages, and frequency and duration of messages.

2.4.3. Secondary outcomes assessed among smoker participants

2.4.3.1. Smoking cessation. The three-month follow-up assessment inquired about current (past seven days) self-reported cigarette smoking, use of other tobacco products and e-cigarette use, use of NRT or other stop smoking medications (Hughes et al., 2003), and self-reported use of any quitline service. Upon completion of the assessment, participants were mailed a saliva specimen collection kit with instructions for returning the sample using a postage-paid envelope. Samples were shipped to and assayed for cotinine by Mayo laboratories. Prior studies documented the validity of mailed saliva specimen samples for verifying smoking abstinence (Greeley et al., 1992). The outcome was self-reported 7-day point prevalence abstinence verified with cotinine concentrations of ≤ 10 ng/mL (Rigotti et al., 2014; SRNT Subcommittee on Biochemical Verification, 2002). If participants self-reported smoking abstinence and the cotinine concentration was elevated, but NRT use was reported, participants were classified as abstinent. Self-reported use of other

nicotine/tobacco products is reported separately.

2.4.3.2. Verified quitline services utilization. At the time of enrollment, smokers provided consent for research staff to share the smokers' names and telephone numbers with Optum, who used that information to match participants to smokers in Minnesota who used QUITPLAN Services or were transferred to their health plan's quitline during the study period. We used a three-month period from the time of the smoker's enrollment in the study to document their use of quitline services. For each wave of 10 participants, Optum transmitted data to Mayo Clinic on the number of smoker participants who: (1) had used any QUITPLAN Service, (2) among those using services, types of service (s) used that were provided by Optum, or (3) those who were transferred to his/her own health plan quitline. No other data about the smokers were shared between Optum and research staff. All data sharing and transmission was done through a secure, electronic REDCap database. The outcome was use of any QUITPLAN service from the time of enrollment through three-months follow-up.

If a smoker enrolled in study waves two or three utilized the QUITPLAN Helpline or Individual QUITPLAN Services, or was transferred to their health plan quitline during the three month follow-up period, research staff mailed him/her a $25 gift card.

2.5. Statistical methods

Using SPSS statistical software, descriptive statistics were used to summarize for each wave of 10 dyads the participant baseline characteristics and study retention as well as SP intervention call completion and duration, text messaging adherence, and treatment acceptability ratings. We also summarized rates of saliva sample assessment, self-reported abstinence and verified abstinence, and quitline use at three-month follow-up based on an intent-to-treat approach using descriptive statistics. Content analysis (Krippendorff, 2004) of the major themes was used for open-ended questions.

3. Results

3.1. Recruitment feasibility

Enrollment occurred from May 2017 to February 2018 and follow-up was done from June 2017 through May 2018. Duration of recruitment of 10 dyads was four weeks (wave one), one day (wave two), and three weeks (wave three). Passive recruitment (flyers) yielded only one dyad. In contrast, in-person outreach methods yielded enrollment of the remaining 29 dyads.

A total of 116 individuals approached the research staff and were given study information, of which 45 were not interested in participating. Of the 71 people screened, 11 were not eligible to participate, resulting in 30 dyads eligible for the study. Reasons for ineligibility included: SP did not fit the low-income criteria or did not reside in MN, or smoker did not have a SP. For 13 (43%) of the dyads, the smoker was recruited first, for seven pairs (23%), the SP was recruited first, and the remaining 10 dyads (33%) approached research staff together.

3.2. Participants

Baseline characteristics of the 30 dyad participants and for each study wave are presented in Table 1. Overall, SPs were 33% female, 53% racial minority, mostly single (80%), 53% were unemployed, and 43% were former smokers. Sixty-seven percent enrolled to help a friend and 30% lived with their smoker. Smokers were 33% female, 50% racial minority, 73% were unemployed, 87% were single, and 60% reported low-medium levels of readiness to quit.

3.3. SP intervention adherence and acceptability, and study retention

3.3.1. Wave 1

Coaching call completion among SPs was 80% (8/10) in the first wave with mean (SD) call duration of 24.0 (10.0) minutes (range 7–39). Feedback from the coaches suggested that the content was well received by SPs during the call and did not need any modifications. All eight participants expressed during the coaching call that they were not aware of the quitline, and they found the information to be very interesting and were excited to share it with their smoker.

Retention at one-month follow-up was 80% (8/10). Participants who completed the follow-up assessment felt that the coaching call and written materials were somewhat or very helpful and no changes were suggested. Five (63%) stated they definitely would and three (37%) stated they probably would recommend the program to another person. Six of eight participants (75%) thought that text messages received from their coach after the call would be somewhat or very helpful. However, no participants thought that text messages should replace the coaching call. All participants indicated they would like to receive messages that were encouraging of their efforts as a SP and also to reinforce the content from the call, for example, "*Encouraging messages, like how's it going with your smoker*," and "*Encouraging messages to support me*." All participants thought that receiving 3–5 text messages for four weeks after the call would be an optimal schedule.

3.3.2. Wave 2

The coaching call completion for this wave was only 40% (4/10), with mean call duration of 25.0 (11.1) minutes, range (17–41). Three of the four participants (75%) were adherent to the text messaging component. Feedback from the coaches suggested that the session content was acceptable to participants. As in wave one, coaches noted the perceived novelty of the quitline information among participants during the coaching call.

Retention at one-month follow-up was only 20% (2/10). Feedback obtained from these two participants who completed the follow-up assessment indicated that all intervention components were somewhat/very helpful and did not require changes. Both participants were highly satisfied with the frequency, timing, number, and duration of text messages. Both said they definitely would recommend the program to others.

3.3.3. Wave 3

In this wave, the coaching call completion was 60% (6/10), with mean call duration of 19.0 (7.9) minutes (range 7–26). All six of these participants were adherent to the text messaging component. Coaches indicated the content was well received by participants and the perceived novelty of the quitline information was again noted during the call.

Retention at one-month follow-up was 60% (6/10). These six participants completing the follow-up assessment suggested minor modifications to the intervention content: (1) adding information on death statistics, how smoking affects life expectancy, and other disadvantages of smoking to the coaching call, (2) spending more time during the coaching call explaining how to help a smoker who is reluctant to quit, (3) sending text messages to the smoker, and (4) adding more photos to the written materials. Participants responded favorably to the heath incentive flyer, but suggested making it more obvious as it was easy to overlook in the packet of written materials. Five participants (83%) indicated the coaching call and text messages were somewhat or very helpful, and all six indicated the written materials and health incentive flyer were somewhat or very helpful. All participants were highly satisfied with the frequency, timing, number, and duration of text messages. In addition, all said they definitely would recommend the program to others.

Table 1
Baseline characteristics of 30 support person and smoker participants.

Characteristic	Wave 1		Wave 2		Wave 3		Total	
	SP	Smoker	SP	Smoker	SP	Smoker	SP	Smoker
Age (years)	36.7 ± 15.7	50.4 ± 13.9	38.4 ± 14.1	37.6 ± 15.8	52.0 ± 11.1	44.7 ± 9.6	42.4 ± 15.0	44.2 ± 14.0
Range	18–66	22–70	23–60	19–59	26–68	29–54	18–68	19–70
Female gender	5 (50)	2 (20)	4 (40)	5 (50)	1 (10)	3 (30)	10 (33)	10 (33)
Race								
White	7 (70)	8 (80)	0 (0)	0 (0)	7 (70)	7 (70)	14 (47)	15 (50)
African American	2 (20)	2 (20)	8 (80)	7 (70)	3 (30)	2 (20)	13 (43)	11 (33)
Native American	1 (10)	0 (0)	1 (10)	2 (20)	0 (0)	0 (0)	2 (7)	2 (7)
Asian	0 (0)	0 (0)	1 (10)	0 (0)	0 (0)	0 (0)	1 (3)	0 (0)
Other	0 (0)	0 (0)	0 (0)	1 (10)	0 (0)	1 (10)	0 (0)	2 (7)
Marital status: Single	9 (90)	9 (90)	8 (80)	8 (80)	7 (70)	9 (90)	24 (80)	26 (87)
Highest level of education								
Less than high school	2 (20)	2 (20)	0 (0)	0 (0)	1 (10)	(0)	3 (10)	2 (7)
High school/GED	7 (70)	7 (70)	10 (100)	8 (80)	5 (50)	9 (90)	22 (73)	24 (80)
College or graduate degree	1 (10)	1 (10)	0 (0)	2 (20)	4 (40)	1 (10)	5 (17)	4 (13)
Unemployed	8 (80)	8 (80)	4 (40)	7 (70)	4 (40)	7 (70)	16 (53)	22 (73)
Smoking history								
Never smoked	4 (40)	–	3 (30)	–	3 (30)	–	10 (33)	–
Experimented	0 (0)	–	7 (70)	–	0 (0)	–	7 (23)	–
Former smoker	6 (60)	–	0 (0)	–	7 (70)	–	13 (43)	–
Relationship to smoker								
Friend	5 (50)	–	7 (60)	–	9 (90)	–	21 (70)	–
Spouse/partner	2 (20)	–	2 (20)	–	1 (10)	–	5 (17)	–
Other family member	3 (30)	–	1 (10)	–	0 (0)	–	4 (13)	–
SP lives with smoker	5 (50)	–	2 (20)	–	2 (20)	–	9 (30)	–
No. days smoked of past 30 days	–	26.5 ± 6.7	–	28.3 ± 4.1	–	25.4 ± 9.8	–	26.5 ± 7.4
Range	–	10–30	–	20–30	–	4–30	–	4–30
Time to first cigarette within 5 min.	–	3 (30)	–	7 (70)	–	4 (40)	–	14 (47)
Contemplation Ladder score	–	5.8 ± 2.8	–	6.3 ± 3.5	–	5.8 ± 2.7	–	5.9 ± 2.9
Range	–	2–10	–	0–10	–	0–10	–	0–10
0–3 (low)	–	1 (11)	–	1 (12)	–	1 (10)	–	3 (11)
4–6 (medium)	–	5 (56)	–	3 (38)	–	4 (40)	–	12 (44)
7–10 (high)	–	3 (33)	–	4 (50)	–	5 (50)	–	12 (44)
Missing	–	1 (−-)	–	2 (−-)	–	0 (−-)	–	3 (−-)

Note. SP = support person.

3.4. Study retention among smokers

Among the smokers, three-month follow-up retention was 90% (9/10) in wave one, 30% (3/10) in wave two, and 70% (7/10) in wave three; overall 63% (19/30). Saliva specimen collection was 80% (8/10) for wave one, 10% (1/10) for wave two, and 50% (5/10) for wave three; overall 47% (14/30).

3.5. Quitline service utilization

Due to a procedural error, in wave one, smokers were not asked to self-report their use of quitline services. None of the ten smokers were verified as having used quitline services. For study wave two, one smoker reported use, but none of the ten was verified as using quitline services. In wave three, 20% of smokers (2/10) reported using Individual QUITPLAN Services, specifically using the two-week starter kit of free NRT. Two of ten smokers (20%) were also verified as using quitline services, and both used Individual QUITPLAN Services.

3.6. Smoking cessation

In wave one, two of ten smokers (20%) self-reported seven-day point prevalence smoking abstinence and both were biochemically confirmed as abstinent. Two participants reported other tobacco product use and one of these also reported use of e-cigarettes. None of the participants reported use of NRT/stop smoking medications.

In study wave two, two of ten smokers (20%) self-reported seven-day point prevalence smoking abstinence but neither was biochemically confirmed as abstinent. None of the participants reported use of NRT/stop smoking medications, use of other tobacco products or e-cigarette use.

In wave three, three of ten smokers (30%) self-reported seven-day point prevalence smoking abstinence. One of these did not provide a saliva specimen sample. Two had elevated cotinine concentrations, but reported NRT use. No other participants reported use of NRT/stop smoking medications. None of the participants reported use of other tobacco products or e-cigarette use.

For all three study waves, no adverse events or unintended effects were reported by the nonsmoker or smoker participants.

4. Discussion

In this pilot feasibility study, we sought to adapt an effective SP intervention to a racially diverse, low-income population. The study was successful in reaching the targeted population, with face-to-face outreach approaches being the most successful. This finding is consistent with another study which recruited diverse smokers and found that low-income and African American smokers responded more to interpersonal contact methods than did high-income and non-African American smokers (Brodar et al., 2016). Our study successfully reached smokers with low to medium levels of readiness to quit whereas most clinical trials enroll only highly motivated smokers. We extended our prior work by assessing baseline readiness to quit and other characteristics directly from the smoker, whereas we previously relied on proxy (SP) reports (Patten et al., 2017). Overall, SPs completing the follow-up assessments found the coaching call acceptable and suggested only minor content modifications. The novelty of the quitline information expressed by SPs completing the coaching call was also

interesting compared with our prior study that found nearly all SPs were at least aware of the quitline. While this presents a potential opportunity, there were some feasibility with both delivering the SP intervention and study retention.

Among SP participants, the overall coaching call completion rate was lower than in our prior effectiveness study (60% vs. 84%) (Patten et al., 2017). Moreover, only about half of SPs completed the one-month assessment compared with 79% in our prior trial. For both SPs and smokers, the retention rates were poorer for those enrolled in wave two, and for SPs, the coaching call completion and text messaging adherence was also much lower for those in study wave two. Smokers were either recruited first or jointly with the SP whereas in our prior trial only SPs were targeted and enrolled. This procedural difference could account for the large proportion of SPs who did not follow through with their coaching session. Also, lower coaching call completion and retention in wave two could be due to demographic characteristics (e.g., all SPs and smokers were racial minorities in wave two vs. 20–30% in waves one and three). Moreover, study waves one and three were done in settings where the staff had an ongoing face-to-face presence during the study period. In contrast, in study wave two, recruitment was completed very quickly (one day) and was done in a setting located a substantial distance from research staff where it was not feasible to have a presence beyond recruitment.

Given the SP intervention feasibility challenges, it is somewhat encouraging that two of 30 smokers (6.7%) were verified as using quitline services. This rate is similar to the rate found for the control condition (6.4%) but less than the intervention condition (15%) in our prior effectiveness study (Patten et al., 2017). In addition to the racial and economic differences, the current SP sample notably differed with respect to gender composition (33% females vs. 85% or more in our prior study). Research has found gender differences with respect to how social support is provided and received (Westmaas et al., 2010). SP participants also differed on characteristics that may have influenced the relationship dynamics within the dyad. Only about one-third of SPs lived with their smoker compared to about half in our prior trial. In addition, the relationship of the SP with the smoker was mostly that of a friend (70%) whereas in our prior study the most common relationship type was a family member (spouse/partner or child). Moreover, the social-environmental context (e.g., normative role of smoking) may have presented challenges to the dyad for both promoting and utilizing the quitline. As smokers were most often recruited first, it is possible that limiting the SP intervention to nonsmokers does not adequately reflect the social network of smokers with low income status. Future studies could consider enrolling dual-smoker dyads.

This study advances the methods of our prior work by assessing smoking abstinence outcomes among the smokers. Retention of smokers was acceptable (63%) and overall we observed a smoking abstinence rate of 13%. Only 2–4% of daily smokers in the U.S. adult population stop smoking each year (National Cancer Institute, 2000), thus the SP interventions may have potential for impact on low-income smoker quitting if applied on a population level.

The current study has some limitations. One, we did not include a randomized design or control group, but adapted the intervention in an iterative manner. Second, we are not able to assess the differential impact of the SP intervention components on smoker quitline utilization or quitting due to our study design and small sample size, but no obvious trend was observed across waves. Third, we did not adapt the SP intervention for health literacy or other characteristics potentially applicable to low-income smokers. Moreover, we did not obtain feedback on the SP intervention from the perspective of the smoker participants, which may have provided important insights into refining the intervention. Fourth, we did not assess theory-based process variables such as social support provided or received, or dyad communication. Fifth, the study enrolled SPs who only had contact with their smoker at least once a week. Future studies could consider including people who live with or have more frequent contact with their smoker which may enhance the feasibility and impact.

Despite these limitations, this study contributes to the field by identifying both the challenges and opportunities of a nonsmoking SP intervention for low-income smokers. While the planned recruitment was achieved, feasibility of the SP intervention was not. Our results suggest that further consumer adaptation of the intervention is needed among both SPs and smokers, especially among racial minority groups. Alternative approaches such as targeting SPs directly and using different SP intervention delivery formats may enhance the feasibility. SPs liked the text messaging in particular, so expanding on that component may be helpful. Adding short video clips for SPs to show their smoker (e.g., what happens when calling a quitline) could serve as a brief, direct opportunity for education and facilitating communication. Interestingly, we did observe a higher than expected smoking abstinence rate suggesting that the SPs may have promoted smoking cessation behavior changes among their respective smokers. Future research should examine ways for clinicians to integrate SP interventions as an adjunct to tobacco cessation models of care.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.abrep.2019.100171.

Role of funding sources

This study was supported by the National Institutes of Health, National Center for Advancing Translational Sciences (NCATS) (Grant number UL1 TR02377). Its contents are solely the responsibility of the authors and the funders had no role in the work of this manuscript.

Contributors

Authors CAP, SF, KV, DN, SHZ, JEBB, AJT, TAB, CAH, and PAK designed the study. Authors CAP, SF, KV, MB, DN, SHZ, AJT, TAB, CAH, and PAK wrote the protocol. Authors MJB, JEBB, AJT, TAB, CAH, AEK, and MVS contributed to data collection. Authors CAP, MJB, DN, and TAB contributed to data analyses. Authors CAP, SF, KV, MJB, DN, TAB, and PAK wrote the first draft of the manuscript. All authors contributed to and approved the final manuscript.

Conflicts of interest

All authors declare that they have no conflicts of interest.

Acknowledgements

We wish to acknowledge the contributions to this study of Mayo Clinic medical students Daniel Witt and Arya Shah, and Randi Lachter from ClearWay Minnesota. We also appreciate the collaborations for this study with our community partners: Rochester Public Library, Rochester Salvation Army, and the St. Paul Rondo Public Library.

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