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Original investigation

# A Social Network Family-Focused Intervention to Promote Smoking Cessation in Chinese and Vietnamese American Male Smokers: A Feasibility Study

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## Abstract

**Introduction:** Smoking prevalence is high among limited English-proficient Chinese and Vietnamese American men, who are frequently unmotivated to quit and who underutilize smoking cessation resources. This study applied lay health worker outreach to leverage peer and family networks to promote smoking cessation among these men.

**Methods:** We integrated qualitative formative research findings and Social Network Theory to develop a social-network family-focused intervention. In a pilot single-group trial, 15 lay health workers recruited 96 dyads ( $N = 192$ , 75% Vietnamese) of Chinese or Vietnamese male daily smokers and their family members and delivered the intervention consisting of two small group education sessions and two individual telephone calls over 2 months.

**Results:** At baseline, 42% of smokers were at precontemplation. At 3 months following the initiation of the intervention, 7-day and 30-day point prevalence smoking abstinence rates as reported by smokers and independently corroborated by family members were 30% and 24%, respectively. Utilization of smoking cessation resources (medication, quitline, physician's advice) increased from 2% to 60% ( $P < .001$ ). Findings showed high acceptability of the intervention as it facilitated learning about tobacco-related health risks and cessation resources, and communications between smokers and their families.

**Conclusions:** This novel social network family-focused intervention to promote smoking cessation among Chinese and Vietnamese smokers appears to be acceptable, feasible, and potentially efficacious. Findings warrant evaluation of long-term efficacy of the intervention in a larger scale randomized controlled trial.

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## Introduction

Cigarette smoking among Asian Americans is an important public health problem. Asian Americans are the fastest growing racial group in the United States; Chinese and Vietnamese constitute the largest (23%) and fourth largest (11%) Asian American subgroups, respectively.<sup>1</sup> Nearly two-thirds<sup>2</sup> emigrated from countries with high male smoking prevalence (53% in China and 47% in Vietnam).<sup>3</sup> Lower acculturation and limited English proficiency (LEP), the latter defined by self-rated spoken English proficiency as less than well,<sup>4</sup> are associated with higher smoking and lower quit rates.<sup>5,6</sup> While the current smoking prevalence rate among non-Hispanic white males is 21%,<sup>7</sup> recent immigrant or LEP Chinese and Vietnamese men have disproportionately high rates, ranging from 22% to 34% for Chinese men<sup>8-11</sup> and 25% to 37% for Vietnamese men.<sup>12-14</sup> Among LEP immigrants, Vietnamese men (43%) and Chinese men (32%) had the highest and the second highest smoking prevalence rates, respectively, among all Asian subgroups in California.<sup>15</sup>

High social acceptability, low quit intention, and low utilization of smoking cessation resources are important challenges facing tobacco control among Asian American men. There is high social acceptability of smoking among Asian American men in the immigrants' home countries<sup>16</sup> and in the United States.<sup>17,18</sup> More than one-third of Chinese<sup>19</sup> and over half Vietnamese American smokers<sup>20,21</sup> were in "precontemplation" with no intention to quit in the next 6 months. A majority of Asian American smokers do not seek assistance to quit smoking.<sup>5,8</sup> Most former and current Chinese and Vietnamese smokers and their families thought that nicotine replacement therapy (NRT) and quitlines were unhelpful<sup>20,22</sup>; when used, NRT was used incorrectly.<sup>22</sup>

Few studies have rigorously assessed strategies to promote smoking cessation among Asian American smokers.<sup>23,24</sup> A PubMed search up to January 2015 found eight randomized trials targeting Asian Americans. Strategies tested include media interventions targeting Vietnamese,<sup>25,26</sup> lay health worker (LHW) outreach to individual Southeast Asian male smokers,<sup>27</sup> individual smoking cessation counseling plus NRT for Chinese and Koreans,<sup>28-30</sup> Internet-based smoking cessation program versus booklet for Koreans,<sup>31</sup> and telephone quitline counseling versus booklet for Chinese, Vietnamese, and Koreans.<sup>32</sup> Four of these eight trials showed effectiveness in promoting abstinence at 6 months or beyond (media campaign,<sup>25</sup> counseling plus NRT,<sup>29,30</sup> and quitline<sup>32</sup>). None of these trials targeted both smokers' family and their peer networks despite the need to address the high social acceptability among Asian men,<sup>33,34</sup> and the emerging evidence supporting roles of family and peers in promoting quitting intention and smoking cessation in this population.<sup>21,35,36</sup>

To our knowledge, there is no published smoking cessation intervention randomized trial that has simultaneously targeted both family and peer networks of smokers in any population within or outside of the United States.<sup>37</sup> LHW outreach, a social network-based intervention, has been effectively applied across different behaviors such as immunization uptake and cancer screening<sup>38-40</sup> and diabetes management.<sup>41</sup> A LHW shares the same ethnicity, cultural and language background of the targeted populations and who, though not a health professional, has received training to deliver specific health messages via individual or small group settings. The present pilot study evaluated the feasibility, acceptability and efficacy of a new social network family-focused intervention program applying LHW outreach to involve smokers and their family and their peer networks to promote intention to quit smoking, use of cessation resources, and smoking abstinence.

## Methods

### Research Design

This was a single-group feasibility trial with assessments at baseline and 3 months after the initiation of a 2-month intervention. LHWs recruited dyads of smoker-family participants. The data were derived from two independently-funded projects conducted within 6 months of one another using identical study procedures and intervention protocols. One project targeted 24 Chinese and 24 Vietnamese smoker-family dyads and the other, 48 Vietnamese smoker-family dyads. There was no overlap in LHWs or participants in these two projects. Thus, the combined data set included 96 smoker-family dyads, 75% Vietnamese, and 25% Chinese.

### Eligibility

For LHWs, smokers, and family participants, the general inclusion criteria were: (1) age 18 years and older; (2) self-identified as Chinese, Chinese-American, Vietnamese, or Vietnamese-American; (3) able to read and speak Cantonese or Mandarin (if Chinese) or Vietnamese (if Vietnamese). LHWs also had to be a current nonsmoker, defined as a never smoker or a former smoker who had not smoked for at least the prior. Additional eligibility criteria for smoker participants were being male and having smoked at least one cigarette daily in the prior 7 days. Those who were concurrently utilizing assistance to quit smoking were excluded. Family participants had to live in the same household as the participating smoker. A family member could participate regardless of smoking status.

### Recruitment

A total of 15 LHWs (four ethnic Chinese and Chinese-speaking, 11 ethnic Vietnamese and Vietnamese-speaking) were trained. There were eight female never smokers and seven male former smokers who had stopped smoking from 6 months to 40 years (median = 7 years) earlier. The average age of all LHWs was 55.5 years (range: 40-70), with 20% not having completed high school, 33% high school graduates, and 47% had at least some college education; 67% were employed. All were foreign-born with an average length of US residency of 13.8 years (range: 1 to 30).

Each LHW received a stipend of \$1000 to attend three training sessions (12 hours in total), recruit six smoker-family dyads and deliver the intervention. The training sessions provided an orientation to the study procedures, guided instructions including a sample script to recruit smoker-family dyads, and role-play practices for intervention delivery. Training materials are available from the authors. LHWs had 4 weeks to recruit and then provide a list of potential participants for research staff to confirm eligibility. Each participant received \$25 each for completing the baseline and the 3-month assessment telephone surveys. No incentive was provided for other study activities.

### Study Intervention

The development of the intervention was guided by formative work and integration of selected constructs from the Social Cognitive Theory,<sup>42,43</sup> the Transtheoretical Model of Change,<sup>44</sup> and Social Network Theory.<sup>45,46</sup> The formative research was based on 39 in-depth dyadic and individual interviews with 13 smoker-family dyads (four Chinese and nine Vietnamese). They provided insights that drove the intervention design specifically to address family communication dynamics<sup>47</sup> and misconceptions related to underutilization of resources such as NRT.<sup>22</sup> The newly developed social

network family-focused (SNFF) intervention utilized LHW outreach to provide a supportive social network for smokers by involving the smoker's family member and peers from other participating smoker-family dyads. We anticipated the SNFF intervention would lead to increases in family members and smokers' knowledge of tobacco-related health risks, family members' self-efficacy and intention to assist their smokers to quit smoking, and smokers' self-efficacy and intention for quitting smoking. As a result of the intervention, smokers would increase the use of smoking cessation resources, quit attempts, and smoking abstinence.

The 2-month SNFF intervention involved LHW outreach to both smokers and families through two small group education sessions with smoker-family dyads (90 minutes each) and two LHW-delivered individual telephone calls (10–15 minutes each) to reinforce progress and provide support. The size of each small group ranged from 2 to 4 dyads. Education sessions involved engaging participants sharing their personal stories, teaching with a flip chart, and setting individual goals using a "Health Family Action Plan." The flip chart was made of hard laminated cardboard and able to stand on its own base. Bulleted speaking points for the LHW in English, Chinese, and Vietnamese were on one side of each page while the other side had a headline, brief explanatory text, and culturally appropriate graphics. The content aimed to increase: (1) supportive communications on tobacco-related issues between smoker and family members; (2) awareness of illnesses and disabilities caused by tobacco use, harms from second- and third-hand smoke, and impact on familial relationships; (3) understanding nicotine addiction and using strategies matched to smokers' readiness; and (4) learning about proven cessation resources such as NRT, quitline, and physician's advice. The Health Family Action Plan provided a menu of suggested action items. Participants were encouraged to set their goals with consideration of the smokers' readiness for quitting in one or more of the five areas: talk with their family, make some changes, call the quitline, consider using stop smoking medications, and go talk to their doctors. For example, for a smoker who indicated not thinking about quitting, both he and his family member might choose to set the same goal of implementing a smoke-free home rule ("make some changes"); for a smoker who was thinking about quitting, he might set a goal of going to talk with his doctor, and his family member might set a goal of calling the quitline to learn about the services available. LHWs engaged smokers and family members to set their goals and shared them with the group during the sessions. The intervention materials were field-tested in six focus groups (three groups with 25 Vietnamese-speakers and three groups with 22 Chinese-speakers) of current or former male smokers or family members of a current or former smoker.

### Data Collection

Data were collected from smoker and family member participants independently via telephone surveys at baseline and 3-month post-initiation of the intervention in the participants' preferred language, hereafter, referred as "baseline" and "3-month" assessments. Trained research staff who were bilingual in English and Chinese or Vietnamese conducted telephone surveys. LHWs were not involved in research data collection.

### Background Measures

Background characteristics assessed of smokers and/or family participants at baseline included sociodemographics (years in the United States, education, gender, income, insurance/health care

access, children in the household, self-ratings of English proficiency); relationship with dyad member (eg, spouse, parent); and smoking status (never, former, or current). Smokers were assessed on previous quit attempts in the past 12 months, stages of change,<sup>48</sup> average number of cigarettes smoked, the Fagerstrom Test for Nicotine Dependence,<sup>49</sup> and smoking cessation resources use during any previous quit attempt and during the past 3 months.

### Outcome Measures

The primary efficacy outcomes were assessed by 7-day and 30-day point prevalence smoking abstinence at 3 months reported by the smoker, later independently corroborated by his family participant. A smoker was classified to have achieved 7-day smoking abstinence only when both smoker and family participant reported at least 7 days since the smoker last smoked. A similar process was used to assess 30-day smoking abstinence. Secondary efficacy outcome measures were smokers' self-reports of one or more 24-hour quit attempts during the study, and self-reported utilization of one or more cessation resources (NRT, quitline, or physician's advice).

Feasibility outcomes included recruitment feasibility, measured by the proportion of LHWs who successfully recruited six smoker-family dyads as targeted, and retention feasibility, indicated by the proportions of smoker and family member participants who received at least three of the four scheduled intervention contacts.

Acceptability was measured by the proportions of smoker and family member participants who indicated at the 3-month assessment that they would recommend the program to others. In addition, comments were solicited at the end of the 3-month survey from each participant by an open-ended question: "Any other comments or suggestions to help us make this program better, such as the program activity that you liked the most, or liked the least, or disliked?"

### Process Measures

At baseline and 3-month assessments, from both smokers and family participants, these measures were obtained: knowledge about smoking-related risks using 4 true-false items adapted from previous research.<sup>14</sup> Smokers' self-efficacy to quit was assessed by: "From 0 to 10, how confident are you that you can quit smoking completely (or remain not smoking) in the next 6 months?"<sup>50</sup> Smokers' intention to quit was assessed by an adapted Contemplation Ladder item: "Where are you in thinking about smoking?" (0 = have not thought about quitting to 4 = taking action to quit).<sup>51</sup> Family member's self-efficacy was assessed by: "From 0 to 10, how confident are you that you can help to quit smoking, or to stay smoke-free completely in the next 6 months?"<sup>52</sup> Family member's intention was assessed by: "How committed are you in assisting your to quit smoking or stay smoke-free?"<sup>53</sup> (0 = no desire to 4 = totally committed). Both smokers and family participants were asked about the frequency of experiencing smoking-related conflicts within the family using a five-point scale (0 = not at all to 4 = all the time), and satisfaction with the support received or provided (1 = very dissatisfied to 5 = very satisfied).

### Data Analysis

Quantitative analyses included frequencies and descriptive statistics computed to describe baseline characteristics of smoker and family participants separately. To evaluate whether or not there was a significant change from baseline to 3-month assessments, a linear model adjusting for repeated measures and LHW clusters (eg, PROC GENMOD. SAS Institute, Inc, 2013) was used with a binary or a

continuous outcome for the other acceptability measures (conflicts and satisfaction), efficacy outcomes (quit attempt and resource utilization), and process measures.

Qualitative analyses of participants' comments at 3-month surveys were analyzed. The research team conducted multiple readings to identify prominent themes following standard Grounded Theory techniques.<sup>54</sup> For this study, we report selected themes regarding acceptability of the intervention and the study procedures.

## Results

### Participant Characteristics

Of the 96 smoker and 96 family participants, nearly all (95.8%) had LEP; 79% of the smokers had health insurance (Table 1). Smoker

participants smoked an average of 8.8 cigarettes per day, and half (41.7%) were precontemplators. Of note, one-fifth (21.9%) had never tried quitting smoking. Among those who had, one-quarter (25.0%) reported using at least one cessation resource, but only one person had ever called the quitline (not shown in Table 1). Virtually all of the family participants were females (93.8%), most often (78%) spouses of the smokers. Demographics of family participants were very similar to smoker participants, except that they were younger (mean age difference =  $3.1 \pm 9.6$ ,  $P = .002$ ). Only two family participants were current smokers and two were former smokers.

### Efficacy Evaluation

Efficacy data were obtained from 94 smoker-family dyads (Table 2). Using intent-to-treat analysis, assuming the two missing smokers did

**Table 1.** Baseline Measures of Participant Characteristics ( $N = 96$  Smoker-Family Dyads)

	Smokers, $n$ (%) or mean ( $SD$ , range)	Family member participants, $n$ (%) or mean ( $SD$ , range)
Sex		
Females	0 (0.0)	90(93.8)
Males	96 (100.0)	6(6.2)
Age, $y$ mean ( $SD$ , range)	53.5 (10.8; range 24–76)	50.4 (11.8; range 20–75)
Ethnicity		
Chinese	24 (25.0%)	24 (25.0%)
Vietnamese	72 (75.0%)	72 (75.0%)
Education attained in or outside the United States		
Less than high school	40(41.7)	47(49.0)
High school or equivalent	26(27.1)	24(25.0)
Some college or more	30(31.2)	25(26.1)
Currently employed	45(46.9)	48(50.0)
Married/living with partner	86(89.6)	84(87.5)
Annual household income		
<\$20 000	49(51.1)	(same as smokers)
\$20 000 to < \$40 000	17(17.7)	
\$40 000 or more	16(16.6)	
Refused to answer	14(14.6)	
Age, came to the United States (years)	38.3 (14.0; range 8–64)	38.4 (13.2; range 1–69)
Self-rated English proficiency		
So so/poorly/not at all	92 (95.8)	93 (96.9)
Fluent/very well	4 (4.2)	3 (2.1)
Perceived general health		
Excellent/very good/good	41(42.7)	55(57.3)
Fair/poor	55(57.3)	41(42.7)
Had health insurance	76(79.2)	79(82.3)
Number of household current smokers		
1 (only the participating smoker)	85 (88.5)	(same as smokers)
2	8 (8.3)	
3 or more	3 (2.1)	
Smoking status		
Never smoker	0(0.0%)	91(94.8)
Former smoker	0(0.0%)	3(3.1)
Current smoker: smoked some days	0 (0.0%)	1(1.0)
Current smoker: smoked daily	96(100.0)	1(1.0)
Smoking characteristics		
Years smoked regularly	29.0 (12.8; range 1–57)	(not assessed)
Number of cigarettes smoked per day	8.6 (6.6; 1–40)	
Time to first cigarette: <31 minutes	49 (51.0%)	
Had at least one 24-hour quit attempt in the past year	40 (45.8)	
Stage of change		
Precontemplation	40 (41.7)	
Contemplation	44 (45.8)	
Preparation	12 (12.5)	

**Table 2.** Intervention Efficacy and Process Evaluations

	Efficacy outcomes		
	Baseline (N = 96) n (%)	3 months (N = 96) n (%)	P <sup>a</sup>
7-day point prevalence smoking abstinence	0 (0%)	29 (30.2%)	—
30-day point prevalence smoking abstinence	0 (0%)	23 (24.0%)	—
Made at least one 24-hour quit attempt <sup>b</sup>	22 (22.9%)	57 (59.4%)	<.001
Use of evidence-based smoking cessation resource <sup>b</sup>			
Medications (NRT or prescription medicine)	2 (2.1%)	15 (15.6%)	.002
Quitline	0 (0%)	37 (38.5%)	—
Advice from physician or other health professional	0 (0%)	27 (28.1%)	—
Any of the above	2 (2.1%)	58 (60.4%)	<.001
	Process outcomes (smokers)		
	Baseline (N = 94) Mean ± SD	3-month (N = 94) Mean ± SD	P
Knowledge <sup>c</sup>	2.1 ± 1.0	2.9 ± 1.0	.006
Self-efficacy to quit smoking in the next 6 months <sup>d</sup>	4.8 ± 3.0	6.9 ± 3.0	<.001
Intention to quit smoking <sup>e</sup>	2.2 ± 1.4	3.9 ± 0.5	<.001
Smoking-related family conflicts <sup>f</sup>	1.0 ± 1.3	1.0 ± 1.3	NS
Satisfaction with support received from the family participant <sup>g</sup>	3.8 ± 0.8	4.4 ± 0.7	<.001
	Process outcomes (family members)		
	Baseline (N = 94) Mean ± SD	3-month (N = 94) Mean ± SD	P
Knowledge <sup>c</sup>	2.5 ± 0.9	3.0 ± 0.9	.006
Self-efficacy to help the smoker participant to quit smoking in next 6 months <sup>d</sup>	6.4 ± 2.5	7.8 ± 2.3	<.001
Intention to help smoker participants to quit smoking or to stay smoke-free <sup>e</sup>	2.43 ± 0.8	2.85 ± 0.4	<.001
Smoking-related family conflicts <sup>f</sup>	1.3 ± 1.3	0.9 ± 1.2	.02
Satisfaction with support provided for the smoker <sup>h</sup>	4.3 ± 0.8	4.4 ± 0.7	NS

NRT = nicotine replacement therapy.

<sup>a</sup>P values accounted for correlations within lay health worker clusters; P values could not be computed for cell sizes with 0 count. NS denotes P > .05, not statistically significant.

<sup>b</sup>In baseline survey, “during the past 3 months” prior to the intervention was used as the timeframe; in 3-month survey, “during the past 3 months since starting the intervention” was used as the timeframe.

<sup>c</sup>Knowledge: number of items out of 4 answered correctly (possible range: 0–4).

<sup>d</sup>Self-efficacy had possible score ranges from 0 (not at all confident) to 10 (extremely confident).

<sup>e</sup>Intention to quit smoking had possible scores ranged from 0 (have not thought about quitting smoking) to 4 (taking action to quit smoking), which was assessed among smokers who continued to smoke at 3 months (n = 64).

<sup>f</sup>Intention to help smoker participants to quit smoking or to stay smoke-free had possible scores ranged from 0 (no desire) to 3 (totally committed).

<sup>g</sup>Frequency of smoking-related conflicts within the family had possible scores ranged from 0 (not at all) to 4 (all the time).

<sup>h</sup>Satisfaction had possible scores ranged from 1 (very dissatisfied) to 5 (very satisfied).

not quit, the 7-day point prevalence abstinence rate was 30.2% and the 30-day abstinence rate was 24.0%. There was independent corroboration of these rates by family members. Smokers' reports of making at least one 24-hour quit attempt increased from 22.9% at 3 months prior to the intervention to 59.4% at 3 months post-initiation of the intervention (P < .001). Significant increase in smokers' self-reported use of medication, quitline or physician's advice before and after the intervention was observed (Table 2). Smokers' utilization of any cessation resources (medication, quitline, or physician's advice) increased from 2.1% (n = 2) during the 3 months prior to the initiation of the intervention (as obtained by the baseline survey) to 60.4% (n = 58) at 3 months post-initiation of the intervention (P < .001).

Further analyses of intervention efficacy by smokers' stages of change (not shown in table) revealed that precontemplators were less likely to achieve 30-day abstinence (7.5%) than those in contemplation (38.6%) or preparation (41.7%), P = .03. The 7-day abstinence

rates across stages were statistically similar at 17.5%, 34.1%, and 41.7% for smokers in preparation, contemplation and preparation, respectively (P = .16). Smokers at different stages of change reported similar rates of 24-hour quit attempts or use of cessation resources at 3-month assessment (P > .05).

## Feasibility Evaluation

### Recruitment

All 15 LHWs recruited six potentially eligible smoker-family dyads within 4 weeks; one LHW recruited 12 dyads. Research staff reviewed each LHW's list of potential participants, confirmed those who were eligible, and asked LHWs to recruit participants to replace the ineligible. Three LHWs had to replace one dyad and four LHWs, two dyads. To reach the minimum targeted goal of 12 participants in the six dyads, LHWs asked on average 24 individuals (range: 15–39) to participate. The mean refusal rate was 39% (range: 14%–65%).

Among the recruited participants, 77% were from the LHW's immediate social network while 23% were referred by other participants.

### Retention

All smokers received all four intervention contacts. All family participants but one received all four intervention contacts; one received three. At 3 months, 94 of the 96 smoker-family dyads completed the 3-month assessment (attrition = 2%).

### Acceptability Evaluation

At 3-month assessment, 94% of smokers and 98% of family members would recommend the program to others. In addition, 70 (73%) smokers and 75 (78%) family members provided comments about their experience in the study. Out of the 145 comments, 96% were positive comments supporting high acceptability of the intervention and 4% (three from smokers and three from family participants) were negative or provided suggestions to improve the program.

Table 3 provides sample quotations from participants with of both positive and negative comments. Both smokers and family members appreciated the intervention because it helped them learn more about tobacco-related health risks including secondhand and thirdhand smoke, increase self-efficacy for quitting or providing support to their smokers, and increase motivation for quitting. Particularly, participants valued the importance of being together with family members and with other participants because that provided opportunities for enhancing family talks on tobacco-related issues. Furthermore, the intervention had motivated family members to assist the smokers in accessing resources for quitting. The small number of negative comments focused on research procedures, such as project duration being too long, cash incentives (for completing research surveys) possibly undermining the effort of discouraging the smokers from buying cigarettes, and timing of the telephone calls at night. One smoker suggested the project should offer discounted pricing for nicotine replacement products. Lastly, one smoker indicated that the project could only help those without determination to quit.

### Process Evaluation

As shown in Table 2, knowledge, self-efficacy, and intention increased significantly from baseline to 3-month assessments in both smoker and family member participants. In addition, smokers reported no change in the frequency of smoking-related family conflicts but an increase in overall satisfaction with the support received from their family participants. In contrast, family members reported having fewer smoking-related conflicts after the intervention; their satisfaction with the support they provided was high at baseline and remained unchanged 3 months afterwards.

### Discussion

Both the quantitative and qualitative findings support the high feasibility and acceptability of a SNFF intervention to promote smoking cessation in Chinese and Vietnamese male smokers. The SNFF intervention was effective in recruiting and engaging smokers who had not been reached by more traditional approaches, including LEP smokers who were unmotivated to quit (42% of the sample) and who had low educational attainment (>40%). The intervention yielded promising efficacy with 7-day and 30-day abstinence rates of 30% and 24%, respectively, at 3 months following the initiation of the 2-month intervention. In addition, there were large increases in making at least one 24-hour quit attempt and in use of

evidence-based smoking cessation resources. These findings help to expand the existing array of tobacco control strategies, particularly among ethnic minority, immigrant, and LEP populations.

To date, the treatment literature has not demonstrated efficacy of any partner- or peer-support enhanced intervention in smoking cessation outcomes beyond 6 months.<sup>37,55</sup> All of those interventions were delivered by professional counselors; none involved family and peer networks simultaneously as we did. Although there are two published LHW outreach smoking cessation intervention studies, one targeted Southeast Asian men including Vietnamese Americans<sup>27</sup> and the other targeted Latino smokers,<sup>56</sup> they were focused on individual smokers. Thus, this is the first report on the efficacy, feasibility, and acceptability of using LHW outreach to involve a smoker's family and peer network simultaneously to promote cessation. The findings showed high acceptability of the SNFF approach among both smokers and their family members. The pilot study provided evidence for the SNFF approach in recruiting priority populations that have traditionally been thought of as being hard to reach, such as unmotivated smokers, immigrants, and LEP individuals.

A second potential benefit of the SNFF intervention is its high retention rate, with 100% of smokers and 99% of family members completing all four contact activities and an overall attrition rate of only 2% for the 3-month assessment. These retention rates are unusual for smoking intervention trials and need to be replicated in other studies. It is possible that the social network connections that either existed prior to study participation or newly formed during the study intervention along with the involvement of family members may have helped to maintain a high retention rate. The acceptability findings from this study suggest that social network interventions may have this advantage over other types of interventions in populations similar to this one. Other studies promoting cancer screening through similar LHW outreach approaches for ethnic minority groups had yielded similarly high retention rates of > 95%.<sup>38,40</sup>

The abstinence rates obtained from this pilot study were promising, particularly in the contexts where the intervention was delivered by nonprofessionals with no free medications and the proportion of unmotivated smokers was high in the study sample. Among the limited number published randomized trials targeting Asian American smokers, which included mostly smokers who were motivated to stop smoking such as callers to the quitline<sup>32</sup> or smokers who were willing to use NRT,<sup>28-30</sup> the 7-day abstinence rates of these trials ranged from 9.5% using LHW outreach<sup>27</sup> to 66% using intensive individual counseling sessions plus NRT at 3 months.<sup>29</sup> Only two of these trials provided 30-day or prolonged abstinence rates, which ranged from 15% with quitline<sup>32</sup> to 50% with intensive counseling plus NRT.<sup>30</sup> The findings showed that the SNFF intervention yielded comparable and promising quit rates for not only motivated but also for unmotivated smokers. Specifically, the 7-day abstinence rate obtained among unmotivated smokers who were in precontemplation (18%) with the SNFF approach was remarkable when compared to treatment studies of English-speakers targeting unmotivated smokers that yielded 5% without NRT to 13% when provided with NRT.<sup>57,58</sup>

### Limitations and Future Directions

One limitation of this study is that smoking abstinence was based on self-report without biochemical validation. However, we employed independent corroborations from the family member as a form of validation. Second, positive comments from participants may have been somewhat influenced by response bias. Third, since only smokers with household family members willing to participate were



eligible, generalizability is limited to smokers who have a nonsmoking family member in their household willing to provide support. Fourth, the study sample included only daily smokers with the majority being Vietnamese Americans who had LEP, which may limit the generalizability of the findings. In addition, this pilot study has a single group design and thus its finding of a strong effect on smoking cessation remains preliminary; it will need to be confirmed in a randomized controlled trial. The small sample size did not allow adequate statistical power to examine potential moderators of treatment efficacy such as ethnicity or smoking characteristics. Last, this study only focused on a small set of preselected smoker-family interactions (perceived conflicts and satisfaction with support received or provided), but did not assess changes in relevant social network processes such as interactions with the LHWs, other participants, or other influential members in the smokers' social network. Further research is warranted to explore how the relevant social network processes for smoking cessation would vary by cultures, and support persons' characteristics such as relationship qualities and types (families vs. peers, living in the same versus different household with the smoker).

## Conclusion

Our social network family-focused intervention approach using LHW outreach to involve both smokers and their family members was highly feasible, highly acceptable, and had promising efficacy. It not only led to promising short-term smoking abstinence rates but also to promising increases in knowledge about the harms of smoking in both smokers and their family participants, in smokers' self-efficacy and intention regarding quitting, and in family members' self-efficacy and commitment in assisting their smokers to quit smoking. The current findings provide evidence that involvement of families can be an effective avenue for tobacco control in Asian Americans. Future large-scale randomized controlled trials are warranted to establish efficacy of the intervention and to understand further the family and social dynamics relevant to smoking cessation, relapse, and long-term abstinence.

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## Declaration of Interests

None declared.

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