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# Comparing acceptance of smoking cessation and smoke-free home intervention offers and associated factors among people with low income in the USA: baseline results of a randomised controlled trial

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## ABSTRACT

**Introduction** State tobacco quitlines are the most commonly available smoking cessation programmes; however, they have low reach and typically only enrol people who are ready to quit in the next 30 days. Expanding quitline services may increase the total number of people engaged in tobacco control efforts and the number who eventually quit. In this randomised controlled trial, we offered both arms a tobacco quitline intervention. In arm 2, if they declined the quitline, we then offered a smoke-free home (SFH) intervention. We examined the number of participants who accepted each intervention offer at baseline and whether acceptance varied by participant characteristics.

**Methods** We recruited 1982 people who called 211, a social services helpline for social needs; mean age=50, 68% female; 45% white, 41% black and 14% other race/ethnicity; 68% reported an annual household income <US$20 000.

**Results** In each arm, 59.7% of participants accepted the quitline offer. In arm 2, among those who declined the quitline offer, 53.1% accepted the SFH intervention offer. Thus, an additional 212 (21.4% of all arm 2 participants) people who smoke engaged in tobacco control programmes than would have with standard practice alone (quitline only). Acceptance differed by participant characteristics: males were less likely than females to accept either offer. Whites were less likely, and older adults and those with greater nicotine dependence were more likely, to accept the quitline offer.

**Conclusions** Proactive approaches identified many low-income people who smoke and offering an SFH intervention retained many more of them in tobacco control efforts. Future trial results will assess intervention engagement and effects on cessation.

**Trial registration number** ClinicalTrials.gov identifier NCT04311983.

### WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ State tobacco quitlines offer evidence-based programmes that are often the primary resource for smoking cessation intervention, but they are most relevant for those interested in setting a quit date.

### WHAT THIS STUDY ADDS

⇒ By offering people who decline offers to participate in a state tobacco quitline cessation programme other options such as an evidence-based intervention to create a smoke-free home, more people will remain engaged in tobacco control efforts.

### HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ States should expand services to include additional tobacco control interventions available through quitlines that may ultimately increase the number of people who successfully quit.

## INTRODUCTION

Successful tobacco control policies have resulted in significant declines in smoking prevalence, but in 2019 14.0% of US adults smoked cigarettes and the rate is much higher among disadvantaged populations and across geographical regions, which denote significant disparities in smoking prevalence and health consequences.[1–3] Adult smoking prevalence is greater among the poor, least educated and those with Medicaid or are uninsured.[4 5]

Key factors that prevent low-income people who smoke from quitting are social norms around smoking, stress and less access and use of evidence-based cessation support.[6] In

most US populations and places, smoking is relatively uncommon and/or not permitted. However, in social networks of low-income people who smoke, it is more prevalent, normative and acceptable, especially at home and work.[7 8] Social norms like these are associated with higher rates of indoor smoking[9] and lower rates of cessation[10] among low-income people who smoke, in part because they feel less pressure to quit.[11]

State tobacco quitlines are the most common smoking cessation programmes available and focus on people who are ready to quit in the next 30 days, which may not apply to the majority of people who smoke. Services vary by state, but most consist of behavioural counselling by phone and supplemental online and text messaging support. Most offer eligible adults free nicotine replacement therapy (NRT) to improve their chances for success. However, proactive approaches that offer support to everyone who smokes without waiting for them to seek help are also effective in connecting them with tobacco quitlines[12] and increasing cessation.[13 14] Meta-analyses of clinical trials of pharmacotherapy use among those who are unmotivated to quit show cessation rates comparable to trials with people intending to quit.[13 15 16] Thus, proactive approaches may be beneficial for engaging more people in tobacco control efforts that will ultimately increase cessation rates.[17]

Multiple evidence-based tobacco control programmes exist and could be offered to people who smoke, based on their preferences, in order to expand standard quitline services. For example, preferences vary for resources such as telephone counselling, text-based messages, self-help print materials, apps and websites and pharmacotherapy.[18] Additionally, for people not ready to quit, interventions to help them create a smoke-free home (SFH) can directly lower risk of smoke exposure for anyone inside the home and indirectly increase cessation rates.[19–23] When customer needs and preferences vary,[24 25] offering a variety of products or services may attract more customers and increase sales.[26–28] In the present study, we wanted to test whether the same notion of expanded services to meet customer preferences can be applied to tobacco control efforts.

This study examined whether offering a SFH intervention in addition to a tobacco cessation programme could engage more low-income people who smoke in tobacco control efforts compared with focusing on cessation programmes alone. For this novel trial, we proactively recruited people who smoke from those calling 211 helplines across the USA for help with social needs or other assistance to address the high smoking rates in this population. Previous studies recruiting participants from 211 callers have consistently enrolled samples with high proportions reporting very low income.[29–31] In this report, we examined the number of participants who accepted each intervention offer at baseline and whether acceptance varied by participant characteristics. The objective was to identify the additional number of people who smoke engaged in tobacco control efforts when expanded intervention options were offered. Future analyses will examine dose and effects on cessation of these evidence-based interventions in this sample; however, the analysis in this report is important for evaluating the extent to which expanding offers to assist smokers increases the uptake of such interventions. Connecting people who smoke with evidence-based cessation interventions is especially important because most will attempt to quit multiple times before they succeed.

## MATERIALS AND METHODS

### Study population

Details of the study design and protocols were reported previously.[32] In brief, recruitment was conducted with 211 helpline partners in 9 states (Missouri, Indiana, North Carolina, Louisiana, Tennessee, South Carolina, Washington, New Mexico, Connecticut) between June 2020 and January 2023. 211 offers live operators who respond to calls (like 911), assess callers' needs, access databases of resources available and provide information and referrals or direct transfer to organisations that address caller's needs. Example needs include food, housing, utilities, medical care, transportation, protective services, childcare and more. After a 211 specialist delivered standard service, excluding anyone in crisis or calling on behalf of someone else, they asked callers about their smoking status and rules about smoking in their home. Callers who smoked daily and did not have a home smoking ban were asked if they were interested in participating in a study for people who smoke. If interested, the caller's name and phone number were shared with the study team. Study team members contacted interested individuals to assess additional eligibility criteria, obtain verbal informed consent and administer the baseline survey over the phone. Eligible participants were English-speaking adults, 21 years and older, who smoked daily, had no home smoking ban and were not pregnant. No restrictions were made based on readiness to quit or the number of cigarettes smoked per day.

For the larger trial, the primary outcome is 7-day point-prevalence abstinence at 6-month follow-up and the secondary outcome is acceptance of intervention offers at baseline and 3-month follow-up. Additional outcome measures include 7-day point-prevalence cessation at 3-month follow-up; 30-day point-prevalence cessation, 24-hour quit attempts and rules about smoking in the home at 3-month and 6-month follow-up.[32] For this analysis, we focus on acceptance of intervention offers at baseline.

### Study design and procedures

After completing the baseline survey, participants were randomly assigned by the survey computer program to one of the two study arms with different interviewer scripts: arm 1, in which participants were offered standard tobacco quitline services only, and arm 2, in which participants were first offered standard quitline services, but if

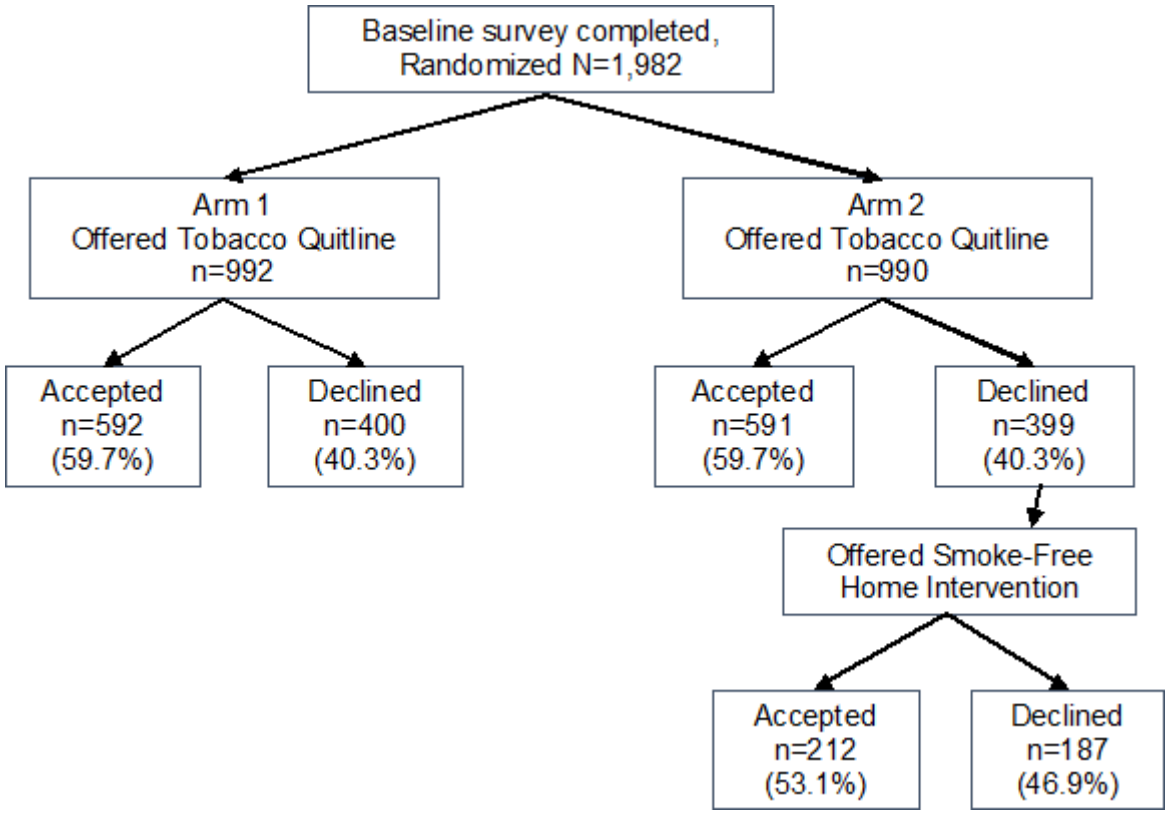


**Figure 1** Randomisation of intervention offers and participants' acceptance at baseline.

the quitline offer was declined, they were then offered an SFH intervention: *Smoke-Free Homes: Some Things are Better Outside* (figure 1).[33–36] Offer scripts are available as supplementary material for a previous publication.[32] Offers highlighted some of the free services available through most state quitlines (telephone coaching, text messages, NRT) and if offered, the free mailed materials and telephone coaching call to help make their home smoke free to protect others from secondhand exposure without feeling pressured to quit smoking right now. Participants were not required to accept either intervention to remain in the study. Random assignment was stratified by state to account for potential state-level differences in quitline benefits, tobacco-related policies and potential seasonal effects on study outcomes (eg, cold weather interfering with SFH rule enforcement). Randomisation was executed by a computer program using balanced sets of 20 random numbers, assuring that for every 20 people enrolled from any state, 10 were assigned to each study group (1:1). Data were collected via telephone interviews administered by trained research staff at baseline, 3-month and 6-month follow-up. Principal investigators were blinded to study outcome data during data collection. Participants received a US$25 gift card for each completed survey. Patients or the public were not involved in the design, conduct, reporting or dissemination plans of our research.

### Baseline survey measures

Sociodemographic items included age, sex, race/ethnicity, household composition (lives alone, with children only, with adults and children), level of education, health insurance status and type, annual pre-tax household income, social needs, residence type (unattached vs attached dwelling), homeownership status (owner vs renter/other) and satisfaction with current housing (1=not at all, 10=very satisfied). Social needs summed 9 items reflecting the likelihood of experiencing various unmet social needs in the next 30 days (eg, reliable transportation, childcare, food and housing insecurity, physical threats or harm, and having enough money for bills, necessities, unexpected expenses).

Smoking-related items included standard measures from the North American Quitline Consortium Minimal Dataset for Intake[37] including the 2-item Heaviness of Smoking Index[38] (number of cigarettes smoked per day, minutes to first cigarette after waking). We also assessed past use of pharmacotherapy (ever used any of seven Food and Drug Administration (FDA) approved quit aids), other smoking (vaping, pot, cigarillos) and created a sum score of four items (yes/no) to reflect the social influence of smoking (live with another person who smokes, smoking is allowed at work, friends who smoke, family who live nearby that smoke). We assessed beliefs about smoking and quitting from existing measures of readiness to quit smoking,[39 40] ambivalence about smoking (3 items),[41] optimism about quitting (5-item subscale from Cessation Fatigue Scale[42]) and confidence in quitting (1–10 scale). For readiness, participants were first asked if they were seriously thinking about quitting smoking cigarettes in the next 6 months (yes/no). If they answered

no, then they were considered to be in the precontemplation stage of change. If they answered yes, then they were asked if they had a specific plan to quit smoking in the next 30 days. If they answered no to the second question, they were considered to be in the contemplation stage. If they answered yes to the second question, then they were considered to be in the preparation stage.

Psychosocial measures included Cohen's 4-item perceived stress scale sum score,[43] Patient Health Questionnaire (PHQ-2) depression symptom screener,[44] a single item rating perceived poor sleep quality (1=very good, 4=very bad),[45] a sum of a three-item measure of general social support from the Patient Reported Outcomes Measurement Information System (PROMIS) Emotional Support item bank (eg, having someone who understands your problems; listens; gives suggestions)[46] and self-rated health (1=poor, 5=excellent).

### Data analysis

This study involved a secondary data analysis of baseline outcomes. Results of the randomised intervention trial are forthcoming. Our sample size for this analysis includes all recruited trial participants. For the trial, we calculated the sample size required to detect study group quit rate differences of 6% versus 11% (minimum expected), 8% versus 14% and 10% versus 17% (maximum expected) at three levels of power. With 1116 participants (558 per group) completing 6-month follow-up, we can detect a 6% versus 11% difference with 85% power.

Descriptive statistics were used to report sample characteristics, as well as acceptance and refusal rates per study arm for intervention offers. Bivariate logistic regression analyses were conducted to examine associations between baseline sample characteristics and acceptance of each intervention offer. Multivariable analyses included any significant variables ($p < 0.05$) in bivariate analyses for each outcome. For the first comparison, we pooled all 1982 participants who were offered the quitline and compared those who accepted it in either study arm versus those who declined it (figure 1). For the second comparison, we limited analyses to participants in arm 2 who declined the quitline offer and were offered the SFH intervention (n=399): we compared those who accepted the SFH intervention offer (n=212) versus those who declined both offers (n=187). Missing data at baseline were minimal and were treated with listwise deletion methods.

## RESULTS

We recruited 1982 people who smoked daily with an average age of 50.5 years old (SD=12.1). Most participants were female (68.4%), non-Hispanic black (40.9%) or non-Hispanic white (45.3%), reported annual household incomes less than US$20 000 (71.9%) and lived with another person who smoked or vaped (79.3%). Table 1 summarises sociodemographic, health and psychosocial sample characteristics. Figure 1 illustrates the intervention offers made to participants per randomised study arm and participant acceptance rates at baseline. In each study arm, 59.7% of participants offered their state tobacco quitline accepted it. In arm 2, among those who declined the quitline offer, 53.1% accepted the SFH intervention and 46.9% declined both offers. Thus, an additional 212 (21.4% of all arm 2 participants) people who smoke engaged in tobacco control programmes than would have with standard practice alone (quitline only).

Table 1 identifies significant variables associated with greater odds of accepting the quitline offer among all study participants (both arms). In bivariate analyses, older age, female sex, African American and other race, greater social needs, less satisfaction with housing, greater nicotine dependence, prior use of pharmacotherapy to quit smoking, greater readiness to quit, optimism and ambivalence about smoking, confidence to quit, perceived stress and depression symptoms were significant positive predictors of accepting the quitline offer in bivariate analyses. Age, social needs, housing satisfaction and perceived stress were no longer significant when controlling for all other variables in the multivariable model.

Table 2 identifies significant factors associated with greater odds of accepting the SFH programme compared with declining both interventions offered among arm 2 participants only. Similar results were observed as table 1 except having children at home was associated with greater odds of accepting the SFH programme, but only in bivariate results. Age had a small positive association with acceptance of the quitline (table 1) and a small negative association with acceptance of the SFH intervention (table 2). Also, fewer covariates were significant in table 2; only female sex, less satisfaction with housing, optimism and confidence in quitting, and depression symptoms were significantly associated with acceptance of the SFH intervention after controlling for all other variables.

## DISCUSSION

This study provides information from a novel approach to engaging more low-income people who smoke in tobacco control efforts. First, we did not restrict recruitment for this trial based on participants' readiness to quit and successfully engaged participants in an intervention from each stage of change: 19.0% precontemplation, 56.1% contemplation and 21.8% preparation. Also, when given an alternative after declining the quitline programme (n=399), 53.1% of participants accepted the SFH intervention offer, who otherwise would have been left out of tobacco control efforts. If these promising effects were scaled up across state tobacco control programmes, we could significantly expand the reach of standard cessation-only services. Further, if similar proactive approaches were used with 211s and other social service and health organisations nationally, we could proactively refer many more low-income people who

**Table 1** Factors associated with acceptance of a tobacco quitline intervention at baseline (arms 1 and 2)

| Sample characteristics | Total n=1982 | Accepted (1) versus declined (0) quitline | | | |
|---|---|---|---|---|---|
| | | Bivariate | | Multivariable | |
| **Sociodemographic factors** | M (SD) or n (%) | OR | 95% CI | AOR | 95% CI |
| Age (range: 20–85 years) | 50.5 (12.07) | **1.01** | **1.00 to 1.02** | 1.00 | 0.99 to 1.02 |
| Sex | | | | | |
| Female | 1351 (68.2%) | 1.00 | | 1.00 | |
| Male | 621 (31.3%) | 0.63 | **0.52 to 0.76** | 0.65 | **0.50 to 0.84** |
| Race/ethnicity | | | | | |
| Non-Hispanic white | 888 (44.8%) | 1.00 | | 1.00 | |
| Non-Hispanic black/African American | 802 (40.5%) | **1.42** | **1.17 to 1.73** | **1.62** | **1.23 to 2.13** |
| Other race or mixed | 270 (13.6%) | **1.49** | **1.12 to 1.98** | **1.51** | **1.04 to 2.20** |
| Living situation | | | | | |
| Live alone | 733 (37.0%) | 1.00 | | | |
| Live only with child(ren) (age <18) | 182 (9.2%) | 1.06 | 0.76 to 1.48 | | |
| Live with other adult(s) and/or child(ren) | 1063 (53.6%) | 1.06 | 0.88 to 1.29 | | |
| Education | | | | | |
| Less than high school | 532 (26.8%) | 1.00 | | | |
| High school graduate | 681 (34.4%) | 1.03 | 0.82 to 1.30 | | |
| Advanced training or degree | 769 (38.8%) | 0.98 | 0.78 to 1.22 | | |
| Health insurance | | | | | |
| Uninsured (R) | 229 (11.6%) | 1.00 | | | |
| Medicaid/dual | 1289 (65.0%) | 1.13 | 0.85 to 1.51 | | |
| Medicare/private | 415 (20.9%) | 1.12 | 0.81 to 1.56 | | |
| Annual pre-tax household income (US$) | | | | | |
| <10 000 | 712 (35.9%) | 1.00 | | | |
| 10 000–-19 999 | 638 (32.2%) | 1.03 | 0.83 to 1.28 | | |
| >20 000 | 527 (26.6%) | 0.88 | 0.70 to 1.12 | | |
| Sum social needs (range: 0–9) | 2.38 (1.88) | **1.10** | **1.04 to 1.15** | 1.04 | 0.96 to 1.11 |
| Live in apartment or attached home | | | | | |
| No | 1126 (56.8%) | 1.00 | | | |
| Yes | 854 (43.1%) | 1.00 | 0.84 to 1.20 | | |
| Home owner | | | | | |
| No (renter, other) | 1580 (79.7%) | 1.00 | | | |
| Yes | 397 (20.0%) | 0.87 | 0.69 to 1.08 | | |
| Satisfaction with housing (range: 1–10) | 6.10 (3.45) | 1.00 | 0.97 to 1.02 | | |
| **Smoking factors** | | | | | |
| *Smoking history* | | | | | |
| Nicotine dependence (range: 0–6) | 2.96 (1.39) | **1.08** | **1.01 to 1.15** | **1.21** | **1.10 to 1.32** |
| Ever used pharmacotherapy to quit | | | | | |
| No | 669 (33.8%) | 1.00 | | | |
| Yes | 1076 (54.3%) | **1.58** | **1.30 to 1.93** | **1.34** | **1.04 to 1.73** |
| Other smoking (vape, pot, cigarillo/little cigar) | | | | | |
| No | 1064 (53.7%) | 1.00 | | | |
| Yes | 918 (46.3%) | 1.17 | 0.97 to 1.40 | | |
| Social influence on smoking | 2.21 (.94) | 0.95 | 0.86 to 1.05 | | |

Continued

**Table 1** Continued

| Sample characteristics | Total n=1982 | Accepted (1) versus declined (0) quitline | | | |
|---|---|---|---|---|---|
| *Beliefs about smoking and quitting* | | | | | |
| Readiness to quit smoking | | | | | |
| Precontemplation | 377 (19.0%) | 1.00 | | 1.00 | |
| Contemplation | 1111 (56.1%) | **9.53** | **7.17 to 12.66** | **6.35** | **4.37 to 9.23** |
| Preparation | 432 (21.8%) | **9.15** | **6.61 to 12.67** | **5.29** | **3.37 to 8.31** |
| Optimism about quitting (range: 0–20) | 12.12 (.85) | **1.70** | **1.51 to 1.90** | **1.04** | **1.00 to 1.08** |
| Ambivalence about smoking (range: 0–9) | 6.07 (.68) | **1.20** | **1.15 to 1.26** | **1.08** | **1.01 to 1.14** |
| Confidence in quitting (range: 0–10) | 5.45 (3.19) | **1.13** | **1.10 to 1.17** | **1.07** | **1.03 to 1.12** |
| **Psychosocial and health factors** | | | | | |
| Perceived Stress Scale (range: 0–16) | 7.63 (3.38) | **1.04** | **1.01 to 1.07** | 1.00 | 0.96 to 1.05 |
| Depression symptoms (range: 0–6) | 2.58 (2.58) | **1.13** | **1.07 to 1.90** | **1.10** | **1.02 to 1.19** |
| Poor sleep quality (range 1–4) | 2.59 (1.03) | 1.04 | 0.96 to 1.14 | | |
| General social support (range: 0–9) | 5.89 (2.60) | 1.01 | 0.98 to 1.05 | | |
| Self-rated health (poor–excellent; 1–5) | 2.44 (1.05) | 0.94 | 0.86 to 1.02 | | |

Note: percentages may not equal 100 due to rounding and missing data. Significant associations are bolded.

smoke to existing services to reduce the harms of tobacco on individuals and families.

Multiple factors were related to intervention acceptance. In a prior analysis of our baseline data, we found that individuals preferred different quitline services, and women were generally more open to cessation services.[18] In this analysis, we also found that whites and males were less likely to accept intervention offers, so different approaches or options may be needed for them. In our prior analysis, there were no sex differences by interest in NRT,[18] but having to enrol in phone counselling to obtain free NRT from the quitline may be a deterrent for some men. At baseline, fewer men in our sample reported prior use of NRT compared with women (data not shown). However, in a prior study with completers of the Arizona tobacco quitline programme, more men used NRT and completed at least five coaching calls, which accounted for the sex differences in cessation rates.[47] Older adults and those with greater nicotine dependence and prior use of pharmacotherapy to quit were more likely to accept quitline offers and less likely to accept the SFH intervention offer. Younger adults may prefer text-based messages[48] or cessation apps.[49] Providing different services through different modes of communication requiring different levels of personal interaction is important to engaging diverse audiences.

Having social needs was associated with quitline acceptance but not SFH acceptance, which may be related to greater motivation to quit to relieve financial burden from smoking. Additionally, all participants had called 211 for help, so perhaps they had greater willingness to accept our first offer to refer them for cessation services. In contrast, we found that greater satisfaction with housing lessened acceptance of any intervention. Perhaps people who are not satisfied with their housing are more motivated to make a change, especially if they perceive that if they quit smoking, they will have greater options for better quality rental housing. Future research should explore this association more thoroughly using mixed methods.

Similar to prior research showing that low-income people who smoke are motivated to protect children and others who do not smoke from smoke exposure as the primary reason for adopting a home smoking ban,[50–54] we found that living with children predicted acceptance of an SFH intervention, but not a cessation intervention. Offering harm reduction alternatives to parents may engage more in tobacco control efforts to protect children from exposure.

Barriers to quitting smoking including permissive social norms about smoking, higher rates of smoking within one's social network and greater stress have been found in prior work to influence cessation rates, whereas in this study, stress was related to quitline offer acceptance in bivariate analysis only. Psychosocial readiness, ambivalence and confidence were similarly related to acceptance of both intervention offers, which may suggest that these constructs are less informative in targeting *different* programmes to people who smoke.

## Limitations

The outcome in these analyses was acceptance of intervention offers, not actual engagement with interventions or behaviour change, which may overestimate who actually receives and benefits from these services. Similarly, rates of interest or willingness to accept intervention offers may be higher because participants were also willing to join a longitudinal trial, complete a baseline survey and

**Table 2** Factors associated with acceptance of smoke-free home intervention after rejecting a tobacco quitline intervention (arm 2 only)

| Sample characteristics | Total n=399 | Accepted (1) versus declined (0) Smoke-free home intervention offer | | | |
|---|---|---|---|---|---|
| | | Bivariate | | Multivariable | |
| **Sociodemographic factors** | M (SD) or n (%) | OR | 95% CI | AOR | 95% CI |
| Age (range: 23–85 years) | 50.3 (12.08) | 0.98 | **0.96 to 0.99** | 0.99 | 0.96 to 1.01 |
| Sex | | | | | |
| Female | 251 (62.9%) | 1.00 | | 1.00 | |
| Male | 145 (36.3%) | 0.62 | **0.41 to 0.94** | 0.52 | **0.31 to 0.87** |
| Race/ethnicity | | | | | |
| Non-Hispanic white | 198 (49.6%) | 1.00 | | | |
| Non-Hispanic black/African American | 148 (37.1%) | 1.42 | 0.92 to 2.17 | | |
| Other race or mixed | 42 (10.5%) | 1.36 | 0.70 to 2.66 | | |
| Living situation | | | | | |
| Live alone | 164 (41.4%) | 1.00 | | 1.00 | |
| Live with child(ren) (age <18) | 31 (7.8%) | **2.95** | **1.25 to 6.97** | 2.20 | 0.77 to 6.31 |
| Live with other adult(s) and child(ren) | 201 (50.4%) | 1.17 | 0.77 to 1.76 | 0.93 | 0.55 to 1.59 |
| Education | | | | | |
| Less than high school | 104 (26.1%) | 1.00 | | | |
| High school graduate | 145 (36.3%) | 1.03 | 0.82 to 1.30 | | |
| Advanced training or degree | 150 (37.6%) | 0.98 | 0.78 to 1.22 | | |
| Health Insurance | | | | | |
| Uninsured | 49 (12.3%) | 1.00 | | | |
| Medicaid/dual | 260 (65.2%) | 1.06 | 0.64 to 1.75 | | |
| Medicare/private | 80 (20.1%) | 1.50 | 0.73 to 3.09 | | |
| Annual pre-tax household income (US$) | | | | | |
| <10 000 | 141 (35.3%) | 1.00 | | | |
| 10 000-19 999 | 117 (29.3%) | 0.83 | 0.51 to 1.36 | | |
| >20 000 | 107 (26.8%) | 0.84 | 0.51 to 1.39 | | |
| Sum social needs (range: 0–8) | 2.10 (1.82) | 1.01 | 0.90 to 1.14 | | |
| Live in apartment or attached home | | | | | |
| No | 224 (56.1%) | 1.00 | | | |
| Yes | 174 (43.6%) | 0.95 | 0.64 to 1.41 | | |
| Home owner | | | | | |
| No (renter, other) | 322 (80.7%) | 1.00 | | | |
| Yes | 76 (19.0%) | 1.43 | 0.87 to 2.36 | | |
| Satisfaction with housing (range: 1–10) | 6.27 (3.48) | 0.94 | **0.89 to 0.99** | 0.92 | **0.85 to 0.99** |
| **Smoking factors** | | | | | |
| *Smoking history* | | | | | |
| Nicotine dependence (range: 0–6) | 2.89 (1.40) | 0.91 | 0.79 to 1.04 | | |
| Ever used pharmacotherapy to quit | | | | | |
| No | 135 (33.8%) | 1.00 | | | |
| Yes | 187 (46.9%) | 0.83 | 0.53 to 1.30 | | |
| Other smoking (vape, pot, cigarillo, cigar) | | | | | |
| No | 225 (56.4%) | 1.00 | | | |
| Yes | 174 (43.6%) | 1.11 | 0.75 to 1.65 | | |

Continued

Table 2 Continued

| Sample characteristics | Total n=399 | Accepted (1) versus declined (0) Smoke-free home intervention offer | | | |
|---|---|---|---|---|---|
| Social influence on smoking (range: 0–4) | 2.23 (.94) | 1.10 | 0.89 to 1.35 | | |
| *Beliefs about smoking and quitting* | | | | | |
| Readiness to quit smoking | | | | | |
| Precontemplation | 155 (38.8%) | 1.00 | | 1.00 | |
| Contemplation | 166 (41.6%) | **2.05** | **1.31 to 3.20** | 0.99 | 0.56 to 1.75 |
| Preparation | 61 (15.3%) | **2.92** | **1.56 to 5.43** | 1.55 | 0.67 to 3.59 |
| Optimism about quitting (range: 0–20) | 10.84 (4.50) | **1.10** | **1.05 to 1.15** | **1.07** | **1.00 to 1.14** |
| Ambivalence about smoking (range: 0–9) | 5.71 (2.03) | 1.02 | 0.92 to 1.12 | | |
| Confidence in quitting (range: 0–10) | 4.62 (3.27) | **1.14** | **1.07 to 1.21** | **1.12** | **1.03 to 1.21** |
| **Psychosocial and health factors** | | | | | |
| Perceived Stress Scale (range: 0–16) | 7.32 (3.50) | 1.05 | 0.99 to 1.11 | | |
| Depression symptoms (range: 0–6) | 2.29 (1.82) | **1.15** | **1.03 to 1.28** | **1.19** | **1.03 to 1.37** |
| Poor sleep quality (range: 1–4) | 2.55 (1.01) | 1.16 | 0.95 to 1.41 | | |
| General social support (range: 0–9) | 5.83 (2.54) | 0.98 | 0.91 to 1.06 | | |
| Self-rated health (range: 1–5) | 2.48 (1.08) | 1.04 | 0.87 to 1.25 | | |

Note: percentages may not equal 100 due to rounding and missing data. Significant associations are bolded.

were provided an incentive for completing each survey (not for engaging with an intervention). Our sample, as in most studies, is more representative of those willing to participate in research than the total population of people who smoke. Participants were recruited from only English-speaking people who called 211 for assistance for unmet needs and did not have an SFH policy, so they will not represent all low-income people who smoke and income was not used in inclusion criteria. The acceptability of SFH policies and interventions among non-English speakers warrants further study. Individuals were invited to be in a study about smoking and although there was no requirement for attempting to quit to participate in the study, those who agreed to be contacted may have been more open to smoking interventions and quitting than those who declined to be contacted. Future studies should also test acceptance rates when both interventions are offered simultaneously.

## Conclusions

We believe the implications of our approach suggest that minimal adjustments could be made to quitline and other services to reach and engage more people who smoke in tobacco control efforts. Although cessation outcomes are important, we believe efforts to increase engagement are also valuable intermediate outcomes, especially since people who smoke may try multiple times before they quit for good. In our sample of 1982, the status quo would be to offer assistance to those ready to quit in the next 30 days (preparation stage of change) which was 432 (22%) in this study, and of those only 300 (69.4%) accepted the quitline offer. In our approach, all 1982 participants were offered an intervention, 1189 (60%) accepted the quitline offer and an additional 212 accepted the SFH intervention, when offered (figure 1). Thus, expanding quitline services could increase the proportion of people who smoke that accept tobacco control programme offers from 59.7% to 81.1%. Future evaluations of offering more choices (simultaneously, sequentially, or bundled) to people who smoke can be used to confirm these estimates in real-world practice.

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**Competing interests** KC is employed by RVO Health, a leading provider of state-supported tobacco quitline services in the U.S.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Ethics approval** This study involves human participants and was approved by Washington University Institutional Review Board approval HRPO#201603150. Participants gave informed consent to participate in the study before taking part.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available upon reasonable request. Final analysis-ready datasets will be distributed upon request, and these will be accompanied by the appropriate codebooks, documentation on calculation of scales and subscales, and missing data information for all variables. The HCRL Data Center will make the datasets and other materials available without cost to researchers and analysts after a data sharing agreement is completed. Consistent with NIH guidelines, the data sharing agreement: (1) records a request for data use and detailed description of the intent of use; (2) details the study's publication guidelines, including acknowledging and citing project personnel as appropriate; (3) ensures IRB compliance, including not using these data for non-research purposes; and (4) stipulates that users will not share or distribute the data to others without written permission.



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