Original Investigation

Cognitive barriers to calling a smoking quitline

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Abstract

Introduction: This study examined cognitive barriers that might prevent cigarette smokers who are interested in quitting from calling a smoking quitline.

Methods: Using qualitative and quantitative methods, we developed a 53-item inventory of possible cognitive barriers to quitline access. A total of 641 daily smokers who reported high intentions to stop smoking in the next 30 days completed this inventory and were then prompted to call a toll-free smoking quitline (800-QUIT NOW) on 3 occasions. Two months later, they completed a follow-up phone interview to assess use of the quitline, quit attempts, and smoking status.

Results: Exploratory and confirmatory factor analysis of the barrier items revealed a 5-factor solution: stigma, low appraisal of the service, no need for assistance, poor fit with the service, and privacy concerns. Endorsements of barrier factors were generally low. Although several barrier factor scores predicted concurrent intentions to call a quitline in the near future, none prospectively predicted calling the quitline by 2-month follow-up.

Discussion: Cognitive barriers to use of quitlines remain elusive.

Introduction

Approximately 40% of cigarette smokers in the United States attempt to quit smoking each year (Centers for Disease Control and Prevention, 2006). The vast majority of these quit attempts are made without the benefit of behavioral counseling or pharmacotherapy (Cokkinides, Ward, Jemal, & Thun, 2005; Zhu, Melcer, Sun, Rosbrook, & Pierce, 2000), even though both

interventions, delivered separately or together, increase the likelihood of abstinence (Fiore et al., 2008). Behavioral counseling is particularly underutilized, accessed in fewer than 10% of all quit efforts (Shiffman, Brockwell, Pillitteri, & Gitchell, 2008).

A desire to make behavioral counseling and support for smoking cessation easily accessible, convenient, readily available, and free led to development of toll-free smoking quitlines that minimized external barriers to utilization. Several reviews testify to the efficacy of telephone support (Lichtenstein, Glasgow, Lando, Ossip-Klein, & Boles, 1996; Stead & Lancaster, 2002; Solomon et al., 2005), with results typically increasing short-term abstinence rates by a factor of 1.3 relative to control conditions. Yet, fewer than 2% of U.S. smokers call a quitline for cessation counseling each year (Ossip-Klein & McIntosh, 2003). This low response rate may be due, in part, to inadequate promotion of quitlines for financial reasons, as short-term call volume can surge following aggressive promotional campaigns (Miller, Wakefield, & Roberts, 2003), particularly when accompanied by the provision of free nicotine replacement therapy (An et al., 2006; Cummings et al., 2006). Yet, even in the midst of these short-term surges, the vast majority of smokers do not call for assistance.

Why smokers may be reluctant to call a quitline is unclear. Both consumer demand experts (National Tobacco Cessation Collaborative, 2007) and smokers (Carter, Borland, & Chapman, 2001) suggest it is critical to understand smokers' perspectives on cessation offerings to determine how to design, develop, place, and promote their use. No published studies have systematically explored barriers to calling a smoking quitline, per se; however, results from broader investigations of internal barriers to cessation assistance suggest that use is compromised by lack of familiarity with offerings, underestimation of their efficacy, and overestimation of ability to quit on one's own (Gross et al.,

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2008; Hammond, McDonald, Fong, & Borland, 2004; Paul et al., 2004). Balmford and Borland (2008) observed that 80% of current and recent ex-smokers endorsed “wanting to quit” as sufficient for succeeding, suggesting that assistance is considered unnecessary if motivation is high, and 35% viewed use of cessation aids as an indication of weakness.

Additional barriers to cessation assistance may be gleaned from barriers to treatment for other substances and psychological difficulties. Daily cannabis abusers mentioned stigma, negative perceptions of treatment, confidentiality concerns, reluctance to disclose problems, unawareness of treatment options, and embarrassment as treatment barriers (Ellingstad, Sobell, Sobell, Eickelberry, & Golden, 2006). Among problem drinkers, beliefs that treatment is unnecessary and/or not beneficial and privacy concerns were identified barriers (Tucker, Vuchinich, & Rippens, 2004), and privacy issues topped the list of emotional barriers to treatment among primary care patients asked about willingness to seek psychotherapy (Mohr et al., 2006).

None of the aforementioned studies prospectively tested whether professed barriers actually predict not seeking treatment. In the current study, we used qualitative and quantitative methods to develop a measure to assess barriers to calling a toll-free smoking quitline and then determined the predictive validity of its factors in a prospective test. We focused on calling a quitline in order to bypass external barriers to treatment (e.g., cost, availability, convenience) and thereby isolate cognitive factors that might deter access. Thus, this study is an attempt to identify cognitive barriers that differentiate smokers who do and do not call a quitline.

Methods

Item generation

To generate items for the barriers measure, we drew from the existing literature on reluctance to seek counseling (Ellingstad et al., 2006; Hammond et al., 2004; Tucker et al., 2004) and worded the concepts around hesitancy to call a smoking quitline. Additionally, we elicited items during interviews with 12 smoking cessation experts who had experience with Black, Hispanic, and/or White smokers of lower income and education. Finally, we interviewed 49 smokers who had made a quit attempt in the past year but had not called a quitline. These smokers were recruited from Vermont, Texas, and Florida via newspaper ads requesting a 30-min interview in exchange for \$25. Participants had a mean age of 41 years and smoked a mean of 16 cigarettes per day; 63% were men, 25% were Hispanic, 14% were Black, and 43% had a high school education or less. Barriers to calling a quitline were elicited through several open-ended questions and subsequent probes for clarification.

After listing the generated items, we eliminated redundancies and made wording changes for clarification, leaving 92 items that we preliminarily sorted into six conceptual categories: stigma, low appraisal of the service, no need for assistance, poor fit with the service, fear of failure, and social influences.

Item reduction

To reduce the number of barrier items, we conducted two Internet-based surveys with convenience samples, including approx-

imately half the items on each survey. The first survey was conducted with an existing Internet sample of smokers who had participated in a series of studies by one of us (J-FE) and agreed to be contacted for future research. From 6,610 E-mail invitations, 104 smokers (1.6%) responded and met eligibility criteria (18 years or older, smoked daily for the past year, English is their “mother tongue”). No incentives were offered for participation. Their mean age was 48, mean education was 14.7 years, mean cigarettes per day was 20, 63% were women, and 92% were White. Participants were asked to assume a hypothetical scenario in which they wanted to quit smoking in the next 30 days and had the phone number for a toll-free smoking quitline. They were then asked to rate each of 47 barrier items on a 4-point scale according to how true each item was for them (1 = *not at all true for me*, 4 = *completely true for me*). A “don’t-know/unclear” response option was also included. For this sample, the barrier items consisted of a randomized list from the “low appraisal of the service” and “no need for assistance” conceptual categories. Additional questions assessed demographics, smoking behavior, and intentions to call a quitline in the future.

The second Internet-based survey was conducted in the United States through Zoomerang.com, which had an existing panel of 18,629 Whites and 902 Blacks 18 years or older who had smoked in the past year and had volunteered to complete surveys in return for points redeemable for goods. E-mail invitations were sent to 700 of the White and all of the Black smokers (total $N = 1,602$). From those, 654 people (41%) responded, and 235 of the 654 (36%) met all the eligibility criteria (smoked daily for the past year, tried to quit in the past year). Their mean age was 45, mean education was 14 years, mean cigarettes per day was 17, 63% were women, 51% were White, 46% were Black, and 4% were Hispanic. Participants were given the same hypothetical scenario, rating scales, and additional questions described above; however, the barrier items were a randomized list of 45 items from the “stigma,” “fear of failure,” “poor fit with the service,” and “social influence” conceptual categories.

Using data collected in these two surveys, we eliminated items with (a) “don’t-know/unclear” endorsements by greater than 20% of participants, (b) “not-at-all-true-for-me” responses by greater than 75%, (c) mean endorsements of less than 1.6 on the 4-point scale, and (d) endorsements that were unexpectedly correlated with higher intentions to call. We were left with 56 items, with a range of 5–13 items in each of our initial conceptual categories.

Finally, we administered the 56 items to six homogeneous focus groups of Black, Hispanic, and White male and female daily smokers ($n = 36$) to elicit discussion about items that seemed unclear, offensive, or poorly worded. With this feedback, we reduced the items to 53.

All participants gave informed consent, and all phases of the pilot work and the main study were approved by the University of Vermont Institutional Review Board.

Main study

Participants and procedure. Participants were recruited in 2007 via newspaper ads in 12 cities across eight states. The ads invited daily smokers who planned to quit smoking to

call a toll-free number to participate in a study that involved compensation for completing a survey about quit smoking services and one follow-up phone interview. Harris Interactive (www.harrisinteractive.com), a large marketing research firm, screened callers and administered the surveys and interviews. The ads generated 1,527 calls, of which 789 (52%) were ineligible. Of those ineligible, 88% were excluded because they did not “probably” or “definitely” intend to quit smoking in the next 30 days. Of 738 eligible callers, 6% refused to give verbal consent, leaving 697 who were sent a baseline survey to complete either online or by mail based on participant preference.

The online version of the survey was accessed through a password-protected Web site. The paper version was mailed to participants and included a stamped return envelope. Both surveys ended with the message, “We encourage you to call your toll-free smoking Quit Line to get free assistance with stopping smoking. That toll-free number is: 800-QUIT-NOW [800-784-8669].” Following completion, participants were mailed a check for \$35 along with a business-card-sized magnet that again displayed the quitline phone number.

To determine the test–retest reliability of our barrier items, we readministered the baseline survey to a random sample of 117 participants (18%) within 10 days of completing the baseline. Participants received \$35 for completion of the retest.

Five weeks after the baseline survey, we sent all participants a letter reminding them of the upcoming follow-up telephone interview and again prompting them to call the toll-free quitline. Eight weeks after baseline, Harris Interactive recontacted participants by phone and administered a 5-min interview for which participants were paid \$25.

We included the three prompts to call the quitline (on the baseline survey, on the magnet in the reimbursement mailing, and on the phone call reminder letter) in order to generate a sufficient number of quitline calls to compare barrier item endorsements between those who did and did not call the quitline during our study. This study was not designed to test the prompts as a marketing strategy for quitlines.

Assessments. The baseline survey consisted of demographic and smoking history questions, the 53 barrier items (randomized in a different order for 10 versions of the questionnaire), and questions about past calls and future intentions to call a toll-free quitline (on a 5-point scale where 1 = *definitely not*, 5 = *definitely intend to call*). In an introduction to the barrier items, written instructions directed participants to assume they wanted to quit smoking in the next 30 days and had the phone number for a toll-free smoking quitline. They were then asked to rate each of the reasons they might *not* call the quitline on a 4-point scale (1 = *not at all true for me*, 2 = *somewhat true for me*, 3 = *mostly true for me*, 4 = *completely true for me*); thus, higher scores reflected greater endorsement of the barriers (sample items are listed in Table 1).

The 2-month follow-up interview assessed the primary dependent variable (“In the past 2 months, did you call a smoking quit line?”), along with quit attempts and current smoking status.

Data analyses. We examined whether responses differed across the 10 survey versions by testing equality of the items’ means across versions using analysis of variance and equality of the variability using Levene’s test for homogeneity of variance. Test–retest reli-

ability of the barrier measure was determined by computing the intraclass correlation coefficient (ICC; Streiner & Norman, 2003).

An initial exploratory factor analysis was run with a randomly selected subset of 375 participants using SAS PROC FACTOR (SAS Institute Inc., 2002). The squared multiple correlations were used as priors, and the scree plot was examined to determine the number of factors to keep. Oblique promax rotation was applied to the retained factors. A barrier item was dropped if it had similar loadings on two or more factors or had a loading less than 0.5. The stability of the factor structure was examined using the remaining 266 participants in a confirmatory factor analysis. Model fit indices were obtained using AMOS (Arbuckle, 2003) for the final model including all participants. Once the factor structure was established, mean factor scores were calculated.

To test predictive validity, we ran univariate and multivariate logistic regression analyses to predict calling the quitline, as well as intentions to call the quitline, from barrier factor scores and other baseline variables. Because barrier factor scores were highly skewed, we dichotomized mean factor scores into greater than or equal to 2 (endorsed) and less than 2 (not endorsed). The multivariate logistic regression models included all barrier factors as well as significant univariate demographic and baseline smoking variables as predictors.

To determine if barrier factor scores differed by demographic and baseline smoking variables, Kruskal–Wallis non-parametric tests were used. Additionally, separate logistic regressions were run to test whether these variables moderated the effects of barrier factor scores on calling the quitline.

Results

Participant characteristics and follow-up completion rates

Baseline surveys were completed by 641 participants (87% of eligible). Response rates did not differ for paper versus online surveys ($p = .89$). Participants’ mean age was 49 years ($SD = 12$), 55% were women, 69% had more than a high school education, 67% were White, 25% were Black, and 8% were Hispanic. They smoked a mean of 20 cigarettes per day ($SD = 11$); their median time to first cigarette after waking was 15 min. At baseline, 44% had heard of a smoking quitline; 8% had previously called a quitline, but not within the past 30 days; and 56% reported that they would probably or definitely call a quitline in the next 30 days if they had the phone number.

Eighty-five percent (543/641) completed the 2-month follow-up assessment. Completers, compared with noncompleters, were older ($M = 50$ vs. 44 years, $p < .001$), had more education (95% with a high school degree or greater vs. 91%, $p < .01$), and were more likely to have heard of a quitline (47% had heard of it vs. 32%, $p < .01$). Sensitivity analyses determined that coding noncompleters as not having called the quitline did not alter the pattern of our results; therefore, our main analyses are restricted to the 543 participants who completed the 2-month assessment.

Item order and test–retest reliability of barriers measure

There was no significant difference in the mean ($p = .15$) or variance ($p = .26$) of the barrier items for the 10 differently

Table 1. Factor loadings for barrier items

Barrier items within factors	Factor loading
Stigma	
If I called, it would mean I'm not a strong person.	0.68
If I called, I'd be embarrassed if someone else found out.	0.67
If I called, it would be a poor reflection on me.	0.68
If I called, I'd worry I might disappoint the person who is trying to help.	0.66
If I called the quit line and didn't quit, I'd worry about what the person on the phone would think of me.	0.71
If I called, others might think less of me.	0.67
It would be embarrassing to me to talk about my smoking.	0.64
Low appraisal of service	
I'm too addicted to smoking for the quit line to be able to help me.	0.66
If I called, they probably wouldn't tell me anything new.	0.68
I don't think that talking about quitting will help solve my smoking.	0.71
I don't think the advice I would get from a quit line would help me.	0.69
Other services didn't work for me in the past, so the quit line probably won't work for me either.	0.55
I doubt that the quit line can help me with my real barriers to quitting.	0.73
My problems are too complex to fix with brief help given over phone.	0.63
No need for assistance	
I'd probably stop smoking for longer if I quit on my own.	0.73
If I want to quit, that's all I need to be able to do it.	0.67
I'm sure that I can quit on my own.	0.57
If other smokers can quit on their own, I should be able to as well.	0.69
I want to be able to say that I quit on my own without help.	0.65
Poor fit with service	
I'm concerned that the staff wouldn't know what it's like to be a smoker.	0.70
If I called, the staff probably wouldn't be able to relate to my experiences.	0.75
The quit line staff might not understand my background enough to help me.	0.80
If I called, the staff probably wouldn't really understand my situation.	0.76
I don't know if the quit line staff would have my best interest at heart.	0.64
If I called, the staff might make too many false assumptions about me.	0.70
Privacy concerns	
I wouldn't like telling my personal concerns to a stranger.	0.73
I don't like the idea of asking for help.	0.61
I don't like to talk about my problems with anyone other than family/friends.	0.73

ordered versions of the survey; therefore, responses by survey version were pooled. Only 6% of participants were missing two or more of the 53 barrier items.

The retest survey was completed by 82 (70%) of the 117 participants to whom it was sent. Reliability of the mean barrier score was high ($ICC = 0.81$, 95% CI 0.72–0.88).

Factor structure of barriers measure

Based on the exploratory factor analyses, five factors were retained with a total of 32 items. A factor analysis restricted to five factors with the confirmatory subset of participants closely replicated the exploratory factor structure. Two items were dropped because they loaded on a different factor, and two others were dropped because the loadings were less than 0.5. The overall fit was $\chi^2(340) = 917$, $p < .001$, which is less than optimal; however, the chi-square test is known to be too sensitive when the sample size is large. The other indices indicated a reasonable fit for the model (comparative fit index = .92, Tucker-Lewis index = .91, root mean squared error of approximation = .05). An examination of the modification indices did not indicate a problem with the factor structure.

Table 1 presents the barrier items, factors, and factor loadings using our full sample of participants. The factors closely paralleled our initial conceptual categories and included stigma, low appraisal of the service, no need for assistance, poor fit with the service, and privacy concerns. The test-retest reliabilities of the factor scores showed substantial agreements, with $ICCs$ ranging from 0.67 to 0.80. However, overall endorsement of each barrier factor tended to be low, with mean endorsements on 4-point scales of 1.3 for stigma, 1.5 for poor fit with the service, and 1.8 for low appraisal of the service, no need for assistance, and privacy concerns. These means reflected ratings of reasons why they might *not* call a quitline between “1 = *not at all true for me*” and “2 = *somewhat true for me*.”

Predictive validity of barrier factors

Our primary dependent variable was whether or not participants called the quitline between baseline and the 2-month follow-up. Twenty-two percent (121/543) reported making a quitline call, although 78% (423/543) reported making a quit attempt during that time interval. Of the 423 who made a quit attempt, 108 (26%) called the quitline. Of those who called, 59% reported calling prior to their quit attempt; 40% called

Table 2. Logistic regressions to predict calling a quitline and intentions to call a quitline from demographics, smoking behaviors, and barrier factors and items (*n* = 543)

Predictor variables	Actually calling a quitline, odds ratios (95% <i>CI</i>)		Intent to call a quitline ^a , odds ratios (95% <i>CI</i>)	
	Univariate	Multivariate	Univariate	Multivariate
Demographics				
Gender: males vs. females	0.90 (0.60–1.36)		0.73 (0.52–1.02)	
Age	1.00 (0.98–1.02)		1.01 (1.00–1.02)	
Education (high school or less vs. more than high school)	1.29 (0.84–2.00)		0.95 (0.65–1.38)	
Race/ethnicity				
Black vs. white	1.80 (1.13–2.87)*	1.40 (0.84–2.34)	2.25 (1.47–3.45)**	1.57 (0.96–2.56)
Hispanic vs. white	2.79 (1.39–5.62)**	2.40 (1.15–5.02)*	2.00 (0.99–4.02)	1.65 (0.76–3.62)
Multiple/other vs. white	1.19 (0.38–3.71)	1.01 (0.31–3.27)	0.90 (0.36–2.27)	0.70 (0.26–1.89)
Smoking behaviors				
Cigarettes per day	1.01 (0.99–1.02)		1.01 (0.99–1.02)	
Time to first cigarette (<30 vs. ≥30 min)	1.43 (0.90–2.27)		1.06 (0.74–1.54)	
Intentions to quit in next 30 days				
Highest intent (5) vs. all others	1.14 (0.75–1.72)		1.15 (0.81–1.64)	
Confidence to quit in next 30 days				
Highest confidence (5) vs. all others	0.74 (0.27–1.98)		0.42 (0.19–0.93)*	0.43 (0.17–1.05)
Ever heard of the quitline	0.60 (0.39–0.91)*	0.78 (0.49–1.22)	0.67 (0.48–0.95)*	0.71 (0.47–1.08)
Ever called the quitline	0.98 (0.47–2.04)		3.47 (1.64–7.36)**	3.58 (1.49–8.60)**
Intent to call quitline in next 30 days	1.70 (1.37–2.10)**	1.64 (1.28–2.12)**		
Barrier factors (dichotomized ≥2 vs. <2)				
Stigma	0.99 (0.51–1.90)	1.23 (0.56–2.66)	0.49 (0.28–0.85)*	0.92 (0.47–1.83)
Low appraisal of service	0.67 (0.44–1.03)	0.84 (0.48–1.48)	0.36 (0.25–0.52)**	0.63 (0.40–1.00)
No need for assistance	0.70 (0.45–1.10)	1.14 (0.65–1.98)	0.34 (0.24–0.50)**	0.55 (0.35–0.88)*
Poor fit with service	1.06 (0.66–1.71)	1.67 (0.85–3.27)	0.52 (0.34–0.77)**	1.02 (0.58–1.82)
Privacy concerns	0.74 (0.48–1.14)	1.14 (0.67–1.96)	0.27 (0.19–0.39)**	0.44 (0.28–0.69)**
Barrier items (dichotomized ≥2 vs. <2)				
Unsure of staff's motives	0.64 (0.42–0.98)*	0.56 (0.34–0.93)*	0.80 (0.57–1.13)	1.28 (0.82–1.99)
Have others who'll help me	0.56 (0.35–0.89)*	0.76 (0.44–1.31)	0.34 (0.24–0.50)**	0.54 (0.34–0.84)**

Note. ^aIntent to call was dichotomized as 4,5 (high) vs. 1,2,3 (low).

**p* < .05.

***p* < .01.

after their quit attempt. Seventeen percent reported they were abstinent at the 2-month assessment. Calling the quitline was not a significant predictor of abstinence (odds ratio [*OR*] = 1.37, 95% *CI* 0.82–2.29); however, the study was not powered to test this.

We fit univariate logistic regression models to predict calling the quitline from the baseline variables, including individual barrier items that did not load on any factor. As seen in Table 2, none of the barrier factors prospectively predicted calling the quitline. However, the odds of calling decreased significantly when participants endorsed two barrier items that did not load on any barrier factor, “I’m not sure of the true motives of the quit line staff” and “I have people around me who will help me quit, so I don’t need any other help.” (We subsequently refer to these items as “unsure of staff’s motives” and “have others who’ll help me.”) Blacks and Hispanics, relative to Whites, were more likely to call, as were participants who reported higher intentions of calling (the odds of calling increased 1.7 times with each unit increase in intentions). Participants who had already heard of the quitline were less likely to call.

In the multivariate logistic regression that included significant univariate predictors and all barrier factors, the barrier item “unsure of staff’s motives” remained a significant predictor of calling the quitline (*OR* = 0.56), with those who endorsed it less likely to call. Being Hispanic and having higher intentions to call remained significant predictors of calling (*OR* = 2.40 and 1.64, respectively). Because of concern that intentions to call might be a mediator, we also fit the multivariate model without this variable, and the results remained essentially the same. Additionally, we examined whether the number of barrier factors endorsed predicted calling, and it did not (*OR* = 0.90, 95% *CI* 0.78–1.04).

Given that the odds of calling the quitline increased substantially for each unit increase in intentions to call, we fit similar logistic regression models using baseline intentions to call the quitline in the next 30 days as the outcome. As seen in Table 2, in the univariate regressions, higher scores on all the barrier factors and on the individual barrier item “have others who’ll help me” were associated with lower intentions to call.

Table 3. Ms and SDs of significant group differences on barrier scores for demographic variables (*n* = 641 who completed baseline assessment)

Barrier item/factor					<i>p</i> value
Age (years)	18–29 (<i>n</i> = 52)	30–60 (<i>n</i> = 468)	>60 (<i>n</i> = 115)		
Stigma	1.5 (0.6) ^a	1.3 (0.5) ^b	1.3 (0.5) ^b		.03
Have others who'll help me	1.7 (0.9) ^a	1.4 (0.7) ^b	1.4 (0.8) ^b		.03
Gender	Male (<i>n</i> = 290)	Female (<i>n</i> = 350)			
No need for assistance	1.9 (0.7)	1.7 (0.6)			<.001
Privacy concerns	1.9 (0.9)	1.7 (0.7)			.02
Have others who'll help me	1.5 (0.8)	1.3 (0.6)			.003
Race	Black (<i>n</i> = 158)	Hispanic (<i>n</i> = 48)	White (<i>n</i> = 409)	Other (<i>n</i> = 25)	
Low appraisal of service	1.7 (0.6) ^b	1.8 (0.7)	1.9 (0.7) ^a	1.8 (0.7)	.001
Privacy concerns	1.6 (0.7) ^b	1.7 (0.6)	1.9 (0.8) ^a	1.9 (0.9)	.004
Cigarettes per day	Regression coefficient per 10 cigarettes per day increase (<i>SE</i>)				
Low appraisal of service	0.07 (0.02)				.002
Poor fit with service	0.06 (0.02)				.007

Note. Different superscripts denote where significant differences lie ("a significantly greater than b").

In the multivariate logistic regression on intentions to call, two barrier factors—no need for assistance and privacy concerns—remained significant (*OR* = 0.55 and 0.44, respectively), along with the barrier item "have others who'll help me" (*OR* = 0.54) and ever called the quitline (*OR* = 3.58).

Barrier factor endorsement by demographic and smoking variables

We examined whether scores on the barrier factors or items differed by age, gender, race/ethnicity, or baseline cigarettes smoked per day. As seen in Table 3, younger participants more strongly endorsed the stigma factor and the item "have others who'll help me" compared with older participants. Men more highly endorsed the no-need-for-assistance and privacy-concerns factors and the item "have others who'll help me." Whites, compared with Blacks, gave stronger endorsements to the low-appraisal-of-the-service and privacy-concerns factors. Heavier smokers had higher endorsements of the low-appraisal-of-the-service and poor-fit-with-the-service barrier factors.

We also explored whether interactions between the demographic/smoking variables and the barrier factors/items predicted calling the quitline. The only significant interaction was for gender on the item "have others who'll help me" (*p* = .04). Women who endorsed this item were less likely to call the quitline, whereas the likelihood of calling by men was independent of their endorsement of this item.

Discussion

Findings from this study document, once again, that there are barriers to calling a smoking quitline. Although 78% of participants made a quit attempt during the 2-month study period, 22% (26% of those who tried to quit) called a quitline following repeated prompts. This percentage is higher than what is found in the literature (Shiffman et al., 2008), but it still raises questions about what cognitive barriers deter calling.

Why the majority failed to call is not well explained by our barriers measure. Endorsement of barrier items was low despite

a thorough measurement of development process that involved extensive item generation and subsequent removal of items that were infrequently endorsed. Mean scores for the five barrier factors ranged from 1.3 to 1.8 on a 4-point scale. Others have found similar low endorsement of social and environmental barriers to cessation aids, although stronger endorsement of no need for assistance (Gross et al., 2008). It is possible that social demand characteristics or inflated personal expectations were operating, as 56% of the sample reported high intentions to call a quitline within 30 days, double the number that actually did so during their quit attempt.

Several barriers were associated with baseline intentions to call a quitline. In the multivariate analysis, no need for assistance, privacy concerns, and the single item "have others who'll help me" predicted lower intentions to call. Together, they may reflect an over-estimation of one's ability to quit on one's own or with indigenous support and a reluctance to seek help from a stranger. These results are consistent with those from other studies (Balmford & Borland, 2008; Hammond et al., 2004; Mohr et al., 2006; Tucker et al., 2004). All three of these barriers were more strongly endorsed by men than women, privacy concerns by Whites than Blacks, and "have others who'll help me" by younger smokers.

Although several barriers were associated with baseline intentions to call a quitline, and intentions to call predicted actual calling, intentions did not mediate a relationship between barriers and actual calling. In fact, the only barrier that was predictive of actual calling was the single, non-factor-loading item "I am not sure of the true motives of the quit line staff," an item unrelated to intentions to call. This suggests that, more than any other barrier, a distrust of the quitline staff's intentions deters calling. This distrust was not endorsed more heavily by any segment of our sample and has not been isolated as a barrier to treatment in prior studies. If replicated, it suggests a need to address the credibility of a quitline sponsor and/or to demystify the quitline staff, however possible, in promotional materials.

The only demographic characteristic associated with a greater likelihood of calling the quitline in the multivariate analysis was being Hispanic. This finding is contrary to some prior reports

(Sood, Andoh, Rajoli, Hopkings-Price, & Verhulst, 2008); however, it should be viewed with caution, given that only 51 participants (8% of our sample) self-identified as Hispanic.

The most notable outcome of this study is the paucity of significant predictors of calling a quitline. Our methodology corrected several limitations noted in the literature (Gross et al., 2008). We developed our barriers measure through extensive formative research, tailored the barriers to a single cessation aid (i.e., a toll-free quitline), conducted our main study prospectively, recruited an adequate sample, prompted participants to call by repeatedly giving them the toll-free number, and examined a behavioral outcome (i.e., calling rather than just intentions to call). The fact that we relied on self-report of quitline calling is a limitation of this study and could have inflated the outcome, although the 22% who reported calling was substantially lower than the percentage who reported high baseline intentions to call. Beyond that, we are unsure how we could have designed our study better to determine cognitive barriers to calling a quitline. We did not ask those who had high intentions to call but did not do so why they did not call at the end of the study. Such an inquiry might have generated further understanding, especially if it confronted participants with their own inconsistency. However, attempts to extract causal explanations for behavior from study participants typically result in explanations that are no more accurate than those provided by observers (Nisbett & Wilson, 1977). It is possible that the significant associations found between certain barriers and intentions to call, but not with actual calling, reflect the fact that participants simply report what seems plausible to them. They may not know what actually influences their behavior. If this is true, it is important that future studies continue to assess actual behavior, not just intentions, when exploring barriers to use.

Alternatively, if smokers are unable to report accurately barriers to calling, perhaps an experimental approach would prove useful. Smokers interested in quitting could be randomized to read descriptions of quitlines that differed on certain characteristics (e.g., credibility of the sponsor, smoking status of the staff) and then participants could be assessed at a later point to determine which descriptions elicited the highest percentage actually calling. This method might bypass social demand characteristics and/or the effect of inflated personal expectations on self-report.

Finally, this study did not explore reasons why some smokers do call smoking quitlines. Examination of the perceived benefits of calling a quitline might help differentiate callers from noncallers and provide guidance on ways to inspire more smokers to seek assistance.

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Declaration of Interests

JRH is currently employed by the University of Vermont and Fletcher Allen Health Care. In the past 3 years, he received research grants from the National Institutes of Health and Pfizer Pharma-

ceuticals and accepted honoraria or consulting fees from Abbot Pharmaceuticals, Academy for Educational Development, Acrux DDS, Aradigm, American Academy of Addiction Psychiatry, American Psychiatric Association, Atrium, Cambridge Consulting, Celtic Pharmaceuticals: Cline, Davis, and Mann; Constella Group; Concepts in Medicine; Consultants in Behavior Change; Cowen Inc.; Cygnus; Edelman PR; EPI-Q; Evotec; Exchange Limited; Fagerstrom Consulting; Free and Clear; Health Learning Systems; Healthwise; Insyght; Invivodata; Johns Hopkins University; J Reckner; Maine Medical Center; McNeil Pharmaceuticals; Nabi Pharmaceuticals; Novartis Pharmaceuticals; Ogilvy Health PR; Pfizer Pharmaceuticals; Pinney Associates; Reuters; Shire Health London; Temple University of Health Sciences; United Biosource; University of Arkansas; University of Auckland; University of Cantabria; University of Greifswald; University of Kentucky; University of Madrid Medical School; U.S. National Institutes of Health; Xenova; and ZS Associates. J-FE has received support from Pfizer Pharmaceuticals and Novartis Pharmaceuticals in the past 3 years. None of the other authors have competing interests.

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