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Efficacy of a tobacco quitline among adult cancer survivors

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Abstract

Objective—The purpose of the study (conducted 2010–2013) was to determine the efficacy of two common types of tobacco quitlines in adult cancer survivors who regularly smoked cigarettes.

Method—Adult onset cancer survivors in Memphis, Tennessee ($n = 427$, 67% female, 60% Caucasian) were randomized either to a Proactive (i.e., counselor-initiated calls) or Reactive (i.e., participant-initiated calls) quitline. Both conditions also received nicotine replacement therapy. The primary outcome was biochemically-verified (i.e., salivary cotinine) smoking cessation.

Results—While 12-month self-reported abstinence was consistent with other published studies of smoking cessation (22% and 26% point prevalence abstinence for Proactive and Reactive conditions, respectively), 48% of participants who were tested for cotinine failed biochemical verification, indicating a considerable falsification of self-reported cessation. Adjusted cessation rates were less than 5% in both intervention conditions.

Conclusion—Our results are consistent with other studies indicating that traditional smoking cessation interventions are ineffective among cancer survivors. Moreover, self-reports of cessation were unreliable in cancer survivors participating in a quitline intervention, indicating that future studies should include biochemical verification. Given the importance of smoking cessation among cancer survivors and low cessation rates in the current study, it may be necessary to design alternative interventions for this population.

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Conflict of interest statement

The authors declare that there are no conflicts of interest.

Keywords

Smoking cessation; Adults; Cancer; Survivors; Intervention studies

Introduction

Negative health consequences of cigarette smoking are well-documented (U.S. Department of Health and Human Services, 2014). In particular, smoking is a key contributor to the development of many types of cancers (U.S. Department of Health and Human Services, 2014), including lung, liver, and colorectal cancer. Smoking cessation among cancer survivors is an escalating concern, as the number of cancer survivors in the United States is growing (de Moor et al., 2013).

In 2012, it was estimated that there were 13.7 million cancer survivors, with 98% of these individuals receiving a cancer diagnosis as an adult (Siegel et al., 2012). Among cancer survivors, it is estimated that 18.7% smoke post-diagnosis (Mayer and Carlson, 2011). There are numerous benefits to smoking cessation, even after a cancer diagnosis, including a greater response to treatment protocols (Browman et al., 1993; Kumar et al., 2008; U.S. Department of Health and Human Services, 2014) and reduced risk of mortality (Browman et al., 1993; Parsons et al., 2010; U.S. Department of Health and Human Services, 2014). Given the large population of cancer survivors who smoke and the importance of smoking cessation in this population, it is crucial that there are smoking cessation interventions that are easily accessible.

There have been few randomized controlled trials of smoking cessation interventions for adult cancer survivors, and the studies have been generally small and focused within the health care setting (de Moor et al., 2008; Nayan et al., 2013). However, most interventions have not resulted in increased rates of smoking cessation (Nayan et al., 2013). Indeed, a recent review and meta-analysis concluded that “tobacco cessation interventions in the oncology populations, in both the short-term and long-term follow-up groups, do not significantly affect cessation rates” (Nayan et al., 2013; pg. 200).

As tobacco quitlines (QLs) have been demonstrated to be both efficacious and cost effective (Hollis et al., 2007; Joyce et al., 2008; Tomson et al., 2004), they present an interesting opportunity to provide a smoking cessation intervention outside of the health care setting for cancer survivors. QLs also have the advantage of being easily accessed, a major strength, in particular, for individuals that live in rural or otherwise medically underserved areas. Given the growing number of cancer survivors and the benefits of smoking cessation, a QL approach could have an important public health impact. QLs, however, present a more population-based approach to smoking cessation as compared to the previous interventions that have been largely based in traditional health care settings (de Moor et al., 2008; Nayan et al., 2013). Some have therefore questioned whether biochemical verification of the cessation is necessary or even feasible in population-based studies, as there would be less pressure for study participants to inaccurately self-report cessation if the intervention is removed from the health care setting (Benowitz et al., 2002; de Moor et al., 2008). On the other hand, a QL targeted to cancer survivors may need biochemical verification due to the

possibility that cancer survivors may falsify their tobacco status because of social desirability.

While support for Proactive QLs (i.e., counselors call participants) is more abundant (Fiore, 2008; Hollis et al., 2007; Stead et al., 2013; Tzelepis et al., 2011; Zhu et al., 2002), even Reactive QLs (i.e., participants call counselors) are efficacious (Ossip-Klein et al., 1991; Zhu et al., 2002). The current study examined the efficacy of a Proactive QL compared to a Reactive QL on smoking cessation rates in adult cancer survivors and verified the smoking status using cotinine assays to determine the validity of the self-report in this study population.

Methods

Recruitment, eligibility, and enrollment

Face-to-face recruitment through multiple locations of a cancer treatment facility served as the primary method of recruitment for this trial that was conducted from 2010 to 2013 in Memphis, Tennessee. In addition, we also recruited using more passive methods (i.e., pamphlets and posters in cancer treatment centers, print advertising such as newspaper and magazines, television, and internet such as Google ads and the study website). For participants recruited using any of the passive methods, they were able to express interest in the study by either calling the study office or completing an interest form on the study website.

The 442 participants who expressed a preliminary interest were given a detailed description of the study and their interest in study enrollment was determined. If they were not interested ($n = 2$), they were encouraged to quit smoking, were given a list of nationally available cessation resources (e.g., the National Quit Line number), and were briefly counseled regarding the benefits of quitting. Research staff called those who were interested ($n = 440$) to determine eligibility. The participants were considered eligible if they were adult cancer survivors (based on the NCI definition — “a person is considered to be a survivor from the time of diagnosis until the end of life” National Cancer Institute Dictionary of Cancer Terms, 2014), had smoked regularly for a year or more, were at least 21 years old, spoke English, and had access to a telephone. (Like a traditional QL, all individuals who perceived themselves as “regular smokers” were considered eligible without a minimum number of cigarettes smoked per day). Any histologic subtype of cancer was qualified for entry into this study. The participants who were unable to understand the consent procedures or who communicated an unwillingness to be randomized were excluded. Fig. 1 presents the consort diagram (Turner et al., 2012).

After determining the eligibility, the staff then obtained a verbal consent, administered baseline measures, collected contact information, and randomized participants. A letter was sent to the enrolled participants, which included an overview of the research study and its risk and benefits, the assigned randomization condition, and a confidentiality statement. The letter also stated that the participant's health care would not be affected by choosing to participate or not to participate. The participants were randomized to the Proactive or the Reactive condition in a 1:1 ratio using a computer-based random number-producing

algorithm. The statistician generated the randomization sequence, which was not accessible to those allocating the participants to conditions. The study protocol was approved by the Institutional Review Board of St. Jude Children's Research Hospital.

Behavioral intervention

All the participants received the same behavioral intervention regardless of the treatment assignment. The intervention is an empirically validated cognitive behavioral intervention that was based on evidence-based methods for smoking cessation and follows Clinical Practice Guidelines' strategies for smoking cessation in three phases (Fiore, 2008): (1) preparing to quit (e.g., reducing number of cigarettes per day, setting a quit date), (2) the quitting process itself (e.g., eliminating cues to smoke, dealing with withdrawal symptoms), and (3) both short and long term relapse prevention (e.g., dealing with high risk situations, alternatives to smoking, handling urges to smoke). If the participants failed to quit smoking on their targeted quit date, the counselors negotiated with the participants to set another quit date. If the participants failed to quit smoking and were reluctant to set another quit date, counselors initiated a smoking rate reduction protocol, which has been shown to enhance long term cessation, even in participants unwilling to quit smoking (Asfar et al., 2011). However, the vast majority of the participants reportedly quit on their quit date (or set another quit date), so the number of participants getting the rate reduction protocol was small, although greater in the Proactive condition (Proactive: $n = 14$; Reactive: 1, $p < 0.0001$).

The key difference between the treatment conditions was whether the sessions were scheduled and initiated by the counselor (i.e., Proactive) or initiated by the participant calling the QL during the designated hours (i.e., Reactive), as described in greater detail below.

The participants in the Proactive condition were scheduled for six counseling sessions over eight weeks. Trained counselors would then contact the participants and deliver the intervention. In the event that the participant was not reached, the counselors attempted to contact the participant at least three times until they reached the participant and the intervention was delivered. If they were unsuccessful, a letter or e-mail was sent, encouraging the participants to re-contact the study staff.

The participants in the Reactive condition were asked to call the QL (1.877.4SJ.QUIT) up to six times over the same eight weeks. Phones were manned between 8 am and 8 pm CST with trained counselors available to deliver the intervention. If participants indeed contacted the QL during the eight-week window, they received the same behavioral intervention as the Proactive participants.

Nicotine replacement therapy

It is common for QLs to provide free or low cost nicotine replacement therapy (NRT) to participants (North American Quitline Consortium). For participants to be eligible to receive the NRT component, they had to meet the following inclusion/exclusion criteria. The participants were not eligible to receive NRT if they had a sensitivity or allergy to nicotine or were currently pregnant, breastfeeding or planning to become pregnant within the next

two months. Because the study participants were cancer survivors and are at a greater risk for some medical complications, NRT was not provided for the participants with a reported history of the following medical conditions: severe arrhythmias, myocardial infarction, unstable angina, cerebrovascular incident, blood vessel disease, pheochromocytoma, diabetes, hyperthyroidism, abnormal kidney or liver function, gastritis or peptic ulcers. Finally, participants who smoked less than five cigarettes per day also did not receive NRT. We included the individuals in the behavioral interventions who could not receive NRT because QLs follow a similar procedure (North American Quitline Consortium, 2009). A total of 17 participants did not receive NRT (Proactive: $n = 5$; Reactive: $n = 12$; $p = 0.08$).

The Proactive participants were mailed a four-week supply of patches followed by another supply three weeks later if they had successfully stopped smoking on their quit date. The Reactive participants received a starter package including two weeks' worth of patches and a brochure detailing proper patch use to enhance safety. At that time, we also encouraged Reactive participants to purchase the patch for six additional weeks. Both NRT conditions mirror state QLs that include both free and discounted NRT, including the "starter kits" such as were given to the Reactive participants. The NRT patches were dosed based on the baseline number of cigarettes per day, consistent with the Clinical Practice Guidelines for pharmacologic interventions (Fiore, 2008).

The participants ($n = 15$) who received the rate reduction protocol (i.e., those failing to quit smoking and who refused to reset their quit date), received six boxes of 4 mg gum to use as a substitute for smoking.

Measures

At all assessment points, questionnaires were administered by telephone. Baseline questionnaires were used to collect information on demographic characteristics, health behaviors, and smoking background and history. Additionally, nicotine dependence was determined by the Fagerstrom Scale of Nicotine Dependence (Heatherton et al., 1991). At the end of treatment (8-week follow-up) and at the 12-month follow-up, two measures of smoking cessation were obtained in line with Society for Research of Nicotine and Tobacco (SRNT) guidelines (Hughes et al., 2003). First, *point prevalence abstinence* was evaluated by asking participants if they had smoked ("even a puff") in the past seven days. Second, *continuous abstinence* was evaluated by asking the participants if they had smoked ("even a puff") since their quit date. Point prevalence abstinence can be biochemically verified, while only self-reported continuous abstinence can be obtained given that no assay reliably measures smoking status for longer than seven days (Benowitz et al., 2002).

The primary outcome measure was cotinine-verified point prevalence smoking cessation at 12-month follow-up. Cotinine is a direct metabolite of nicotine; a rate of 3 ng/ml and higher has been set as the cutpoint for those who are smoking (Benowitz et al., 2009). For participants who self-reported point prevalence abstinence at 12-month follow-up, salivary cotinine was obtained by Examination Management Services, Inc. (EMSI), a company that specializes in mobile specimen and data collection (URL: <http://www.emsinet.com/research.aspx>). The assay used was the NicAlert™ salivary cotinine testing system. NicAlert™ is a valid and reliable method for verifying smoking status, with a specificity of

95%, a sensitivity of 93%, a positive predictive value of 95%, and a negative predictive value of 93% (95% CI 86%–100%) (Cooke et al., 2008).

The participants with at least 10 ng/ml cotinine in their saliva were considered “smokers.” As the cutoff of 3 ng/ml is considered the criteria for a “smoker” (Benowitz et al., 2009), this cutoff was a very liberal definition of declaring participants as a “nonsmoker” and eliminates the vast majority of nonsmokers who are exposed to secondhand smoke only (Benowitz et al., 2009). Those that refused the cotinine test or who were not reached by EMSI within the 3-month window after the 12-month follow-up (even after we successfully contacted them for self-reported cessation) were considered “smokers.”

The secondary outcome measures in this study were self-reported point prevalence and continuous abstinence at the end of treatment (8 weeks) and at 12-month follow-up.

Statistical approach

We compared the characteristics of the participants randomized to the two conditions and the characteristics of the participants who completed the 12-month follow-up and those who did not using chi-square tests for categorical variables and two-sample t-tests for continuous variables. The primary focus of the study was to determine if the pharmacologically-verified tobacco quit rate (e.g., self-report cessation verified by cotinine test) would be higher in the participants randomized to the Proactive condition compared to those randomized to the Reactive condition at 12-month follow-up. Quit rates for the two conditions were compared using Fisher's exact test for comparing two binomial proportions. In addition, self-reported point prevalence and continuous abstinence were collected at 8-week and 12-month follow-up and were compared using the Fisher's exact test. The total number of completed counseling sessions (0–6 sessions) was compared between the two conditions using Exact Chi-square test and Monte Carlo estimate of p-value was reported. All analyses were conducted using SAS software package (SAS v9.3 and StatXact, SAS Institute, NC).

Results

Table 1 presents the sample characteristics for the total sample and by condition. There were no significant differences between the Proactive and Reactive conditions on any characteristic.

At 12-month follow-up, 155 (36%) participants were lost to follow-up. Of those who did not complete data collection at 12-month follow-up, 82 (53%) were deceased and another 73 (47%) could not be located. While the overall follow-up rate was 64%, when adjusted for participant mortality, the follow-up rate is 79%. The follow-up rates did not differ between the Proactive (77%) and Reactive conditions (80%), and the participant characteristics of those retained and those not retained at 12 months (Supplemental Table 1) were not significantly different.

Primary outcome: biochemically (cotinine) — verified cessation rates

Out of the 65 participants who reported that they had quit smoking at 12-month follow-up (Proactive, n = 29; Reactive, n = 36), 17 refused the cotinine test (Proactive, n = 8; Reactive,

n = 9). In addition, 19 participants did not receive tests for several reasons (i.e., unable to contact, n = 10; follow-up completed after the deadline, n = 1; cotinine test was not applicable due to use of other nicotine product, n = 3; death, n = 1; other, n = 4). A total of 29 participants completed the biochemical verification, and 15 (52%) had rates of cotinine smoking under 10 ng/ml (Proactive: 54%; Reactive: 50%, $p > 0.05$). Thus, 48% of those who reported abstinence had cotinine values clearly indicating that they were using tobacco products.

Among the 214 Proactive participants, 7 (4.1%) tested cotinine negative, compared to 8 (4.6%) of the 213 Reactive participants who tested cotinine negative (OR = 0.89, CI = 0.27–2.87). Thus, adjusted cessation rates in both conditions were less than 5%.

In the above analysis, we conservatively assumed that all those who did not receive cotinine testing were smokers, as participants were told they would receive cotinine testing. However, we re-ran the analysis assuming that all those without cotinine testing (n = 36) had the same cessation rate as the cotinine-verified participants (Proactive: 54%; Reactive: 50%). In this analysis, the adjusted cessation rates (Proactive: 8%; Reactive: 9%) were again not significantly different (OR = 0.89, CI = 0.41–1.94). Next, using the most liberal assumption that *all* participants who did not receive the cotinine tests had indeed all quit smoking yielded adjusted cessation rates of 11% in the Proactive condition and 13% in the Reactive condition (OR = 0.81, CI = 0.42–1.54). Thus, no matter how liberal the assumptions regarding those participants who self-reported the cessation but did not receive cotinine assays, the cessation rates were extremely low and were not significantly different between the Proactive and Reactive conditions.

Secondary outcome variables

The secondary outcome measures in this study included self-reported point prevalence and continuous abstinence at both the end of the treatment (8-weeks) and at 12-month follow-up. These results are presented in Table 2. At 8-week follow-up, 20 individuals (Proactive: 9, Reactive: 10) were removed from the analysis because they were deceased, and one individual was removed because of ineligibility. At 12-month follow-up, 82 individuals (including those 20 individuals excluded at 8-week follow-up; overall Proactive: 43, Reactive: 39) were removed from the analysis because they were deceased.

Not surprisingly, given the high rates of falsification, self-reported cessation rates are much higher than cotinine-verified rates. However, at 8-week follow-up, there was no significant difference between the conditions in point prevalence abstinence (Proactive: 28%, Reactive: 25%). Similarly, there was no significant difference in reported continuous abstinence rate at 8-week follow-up (Proactive: 17%, Reactive: 14%). At 12-month follow-up, neither self-reported point prevalence (Proactive: 22%, Reactive: 26%) nor continuous abstinence (Proactive: 13%, Reactive: 14%) were significantly different by condition.

Adherence analyses

One proposed mechanism for general superiority of Proactive QLs over Reactive QLs is that participants with access to Proactive QLs receive more of the intended intervention than

those with access to Reactive QLs. Given the lack of differences between the two treatment conditions, we examined behavioral adherence in both conditions, based on intervention records of completed sessions. Overall, the participants in the Proactive condition completed significantly more counseling sessions compared to those in the Reactive condition, among those who completed the 12-month follow-up ($p < 0.0001$) (Table 2). Of those in the Reactive condition, 82.8% of participants completed one session or fewer, compared to 25.8% participants in Proactive condition. In addition, 10.6% of those in the Proactive condition completed all six sessions, while only 0.7% of the participants in the Reactive condition completed all the six sessions.

Discussion

There are several novel findings from the current investigation. First, consistent with previous findings regarding smoking cessation interventions in oncology populations (Nayan et al., 2013), we observed very low cessation rates after provision of a QL with NRT. Second, in contrast to the extant literature on tobacco QLs (Hollis et al., 2007; Zhu et al., 2002), we failed to observe cessation rates favoring the Proactive condition. Finally, we found a high falsification of cessation rates among these adult cancer survivors. Specifically, 48% of participants who claimed abstinence from cigarettes failed the cotinine test, indicating that they were falsifying their smoking status. The smoking cessation rates at 12-month follow-up (adjusted for falsification) were less than 5%, and thus, do not exceed a cessation rate that one would expect from a spontaneous cessation among untreated smokers (Fiore, 2008).

The findings from the current study stand in contrast to the vast majority of studies *in the general population* that have found that combined behavioral and pharmacological interventions for smoking cessation are efficacious (Fiore, 2008). However, our results are consistent with reviews and meta-analyses of smoking cessation interventions in adult cancer survivors that have shown nonsignificant outcomes (de Moor et al., 2008; Nayan et al., 2013). Nonetheless, these negative findings do not preclude the need for efficacious smoking cessation programs in this high-risk population; it will be important in future research to design and test novel interventions that may be efficacious for cancer survivors.

Previous research has found that the vast majority of smokers accurately report their smoking status (Vartiainen et al., 2002; Wong et al., 2012), including a review focused on cancer survivors (Nayan et al., 2013). The current study is inconsistent with these previous findings but is consistent with research suggesting that certain groups (such as those with a significant medical condition) may have much higher falsification rates (Benowitz et al., 2002; Velicer et al., 1992). The current findings indicate that nearly half of our participants who were reached for cotinine tests had values clearly indicating that they were smoking. It is unknown whether the high falsification rates generalize to other medically high-risk populations; this question will be important to explore in future studies. It would be particularly interesting to replicate these findings in other patient populations with a condition closely related to tobacco use (e.g., emphysema) versus those less related to smoking (e.g., diabetes). Perhaps the knowledge that smoking is causing (and exacerbating) participants' medical conditions leads to greater falsification rates. Indeed, as participation

rates were extremely high, 99% (427 of 429 eligible) of the cancer survivors in the current study provided the socially desirable response that they “should” be participating in stop smoking efforts and “should” be quitting smoking.

There are several strengths and weakness that should be noted about the current study. First, in terms of study strengths, we were able to recruit a large sample size and had good participant retention throughout the 12-month study, after adjustment for mortality. In addition, we obtained cotinine verification of cessation, an aspect of the study design that appears to be incredibly important among cancer survivors. However, this study had a few limitations, including the fact that we were not able to verify all self-reported smoking cessation through cotinine tests. While it is likely that many of these participants were actively avoiding the cotinine test (i.e., refusals, being unavailable), it is possible that additional incentives are necessary to increase cotinine test adherence rates. Secondly, we observed that more participants were assigned to rate reduction in the Proactive versus the Reactive condition, which could have altered the study results. However, this difference is likely due to the increased contact we have with the participants in this condition. Third, the cotinine testing occurred as soon as it was possible after the 12-month follow-up; however, for many participants, it took several weeks to obtain the sample. Thus, it is possible that the time interval between the self-report of abstinence and cotinine testing impacted the falsification rates (i.e., some participants may have relapsed during this interval). While smoking relapse after 12 months of abstinence is rare (Hughes et al., 2008), we cannot eliminate this as a possibility. Fourth, although we examined the self-reported abstinence stratified by number of sessions completed, session completion is confounded with condition assignment, so we are not able to make conclusions about the impact of the number of intervention sessions attended on abstinence rates. Finally, it is important to note our high rates of participant mortality. It is possible that the high rates of mortality were due to our use of the strict definition of a cancer survivor (i.e., one becomes a survivor at the time of diagnosis) (National Cancer Institute Dictionary of Cancer Terms, 2014). For this reason, future studies might consider excluding participants with a poor prognosis (e.g., Stage 3–4 cancers). On the other hand, despite the high mortality rates, these participants are at the greatest need for smoking cessation. Future studies may wish to consider the best balance between the relatively high mortality rates among some survivors versus the ethical considerations of excluding participants at greatest need for quitting smoking.

Conclusion

In summary, the rates of biochemically verified smoking cessation were extremely low, and the falsification rates of cessation were extremely high in this sample of adult cancer survivors. Future research with smokers who are cancer survivors may wish to test novel and more aggressive smoking cessation interventions that may be efficacious in this population and to biochemically verify self-reported cessation.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- We examine the efficacy of two types of quitlines in adult cancer survivors.
- Self-reported abstinence at 12-months was 22% (Proactive) and 26% (Reactive).
- 48% failed biochemical verification; adjusted cessation rates were less than 5%.
- Quitlines were ineffective among adult cancer survivors.
- Self-reported cessation was unreliable in adult cancer survivors.

*One participant did not report 12 month abstinence status

Fig. 1.
Quitline study consort diagram.

Table 1

Participant characteristics at baseline (study conducted in Memphis, TN 2010-2013).

Factors	Total N (%)	Reactive N (%)	Proactive N (%)	p-Value
Sex				
Female	286 (67.0)	141 (66.2)	145 (67.8)	0.76
Male	141 (33.0)	72 (33.8)	69 (32.2)	
Race group				
Others	172 (40.3)	88 (41.3)	84 (39.3)	0.66
White	255 (59.7)	125 (58.7)	130 (60.7)	
Relationship status				
Married/living as married	215 (50.4)	105 (49.3)	110 (51.4)	0.90
Single	95 (22.2)	49 (23.0)	46 (21.5)	
Widowed/divorced/separated or no longer living as married	117 (27.4)	59 (27.7)	58 (27.1)	
Employment status				
Working full-time/part-time	101 (23.7)	51 (23.9)	50 (23.4)	0.89
Not employed and looking for work	38 (8.9)	19 (8.9)	19 (8.9)	
Caring for home or family (not seeking paid work)	10 (2.3)	6 (2.8)	4 (1.9)	
Student/retired/other	77 (18.0)	41 (19.2)	36 (16.8)	
Unable to work due to illness or disability	201 (47.1)	96 (45.1)	105 (49.1)	
Education				
Less than high school	117 (27.5)	56 (26.4)	61 (28.5)	0.70
Completed high school	137 (32.2)	72 (34.0)	65 (30.4)	
Some college/technical training	128 (30.0)	65 (30.7)	63 (29.4)	
4-year college graduate/post graduate level	44 (10.3)	19 (9.0)	25 (11.7)	
Total family income				
Less than \$20,000	269 (63.0)	135 (63.4)	134 (62.6)	0.89
At least \$20,000 but less than \$40,000	79 (18.5)	41 (19.2)	38 (17.8)	
At least \$40,000 but less than \$60,000	37 (8.7)	16 (7.5)	21 (9.8)	
At least \$60,000	39 (9.1)	19 (8.9)	20 (9.3)	
NA/Refused	3 (0.7)	2 (0.9)	1 (0.5)	
Fagerstrom score				
Highly dependent	96 (22.8)	45 (21.5)	51 (24.1)	0.32
Moderately dependent	206 (48.9)	98 (46.9)	108 (50.9)	
Minimally dependent	119 (28.3)	66 (31.6)	53 (25.0)	
Previous quit attempts				
Zero	168 (39.6)	77 (36.3)	91 (42.9)	0.40
1	167 (39.4)	93 (43.9)	74 (34.9)	
2	34 (8.0)	15 (7.1)	19 (9.0)	
3	35 (8.3)	18 (8.5)	17 (8.0)	
4 or more	20 (4.7)	9 (4.2)	11 (5.2)	
On average, how many cigarettes do you smoke each day?	Total mean (SD)	Reactive mean (SD)	Proactive mean (SD)	0.24
	17(9)	16.7 (9.4)	17.8 (9.5)	

Table 2

Self-reported abstinence at end of treatment (8 weeks) and at 12-month follow-up.

Secondary endpoints	Reactive N (%)	Proactive N (%)	Fisher's exact p-value *
Reporting point prevalence abstinence at 8 weeks?			0.54
No (total)	123 (75.5)	126 (72.0)	
0 sessions completed	56.9%	15.1%	
1-2 sessions completed	40.7%	44.4%	
3-4 sessions completed	2.4%	31.0%	
5-6 sessions completed	0.0%	9.5%	
Yes (total)	40 (24.5)	49 (28.0)	
0 sessions completed	42.5%	4.1%	
1-2 sessions completed	40.0%	24.5%	
3-4 sessions completed	15.0%	40.8%	
5-6 sessions completed	0.3%	30.6%	
Reporting continuous abstinence at 8 weeks?			0.58
Continuous abstinence (total)	29 (14.4)	34 (16.6)	
0 sessions completed	34.5%	2.9%	
1-2 sessions completed	41.4%	17.7%	
3-4 sessions completed	20.7%	50.0%	
5-6 sessions completed	3.5%	29.4%	
Smoking or did not set a quit date (total)	173 (85.6)	171 (83.4)	
0 sessions completed	59.0%	15.2%	
1-2 sessions completed	39.3%	45.6%	
3-4 sessions completed	1.7%	28.1%	
5-6 sessions completed	0.0%	11.1%	
Reporting point prevalence abstinence at 12 months?			0.57
No (total)	104 (74.3)	102 (77.9)	
0 sessions completed	55.8%	9.8%	
1-2 sessions completed	37.5%	40.2%	
3-4 sessions completed	5.8%	33.3%	
5-6 sessions completed	1.0%	16.7%	
Yes (total)	36 (25.7)	29 (22.1)	
0 sessions completed	38.9%	13.8%	
1-2 sessions completed	52.8%	17.2%	
3-4 sessions completed	8.3%	44.8%	
5-6 sessions completed	0.0%	24.2%	
Reporting continuous abstinence at 12 months?			0.87
Continuous abstinence (total)	24 (13.9)	22 (12.9)	
0 sessions completed	41.7%	18.2%	
1-2 sessions completed	50.0%	13.6%	
3-4 sessions completed	8.3%	45.5%	
5-6 sessions completed	0.0%	22.7%	

Secondary endpoints	Reactive N (%)	Proactive N (%)	Fisher's exact p-value *
Smoking or did not set a quit date (total)	149 (86.1)	149 (87.1)	
0 sessions completed	56.4%	12.1%	
1-2 sessions completed	38.3%	43.0%	
3-4 sessions completed	4.7%	31.5%	
5-6 sessions completed	0.7%	13.4%	

*
p-Values reflect comparison of Reactive versus Proactive conditions.