Title: Predictors of Client Retention in a State-Based Tobacco Quitline

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Conflict of Interest

The authors do not have any conflicts of interest

Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All procedures contributing to this work comply with the ethical standards of the relevant national and institutional guides on the care and use of laboratory animals.

Abstract

Introduction: Quitlines are standard care for smoking cessation, however retaining clients in services is a problem. Little is known about factors that may predict dropout. **Aims:** To examine predictors of retention while in-program and at follow-up for clients enrolling in a state quitline. **Methods**: This was a retrospective analysis of quitline enrolled clients from 2011-2017 (N=49,347). Client retention in-program was categorized as (a) low adherence to treatment (receiving zero coaching calls), moderate (1-2 calls), and high adherence (3+ calls). Dropout at follow-up included participants who were not reached for the 7-month follow-up. **Results**: More than half the sample dropped out during treatment; 61% were not reached for follow-up. Women [OR=1.21;95% CI=1.16, 127] and those with high levels of nicotine dependence [OR=1.03;95% CI=1.02, 1.04] were more likely to have moderate adherence to treatment (1-2 coaching calls). Dropout at follow-up was more likely amongst clients who used nicotine replacement therapy (OR =1.14;95% CI =1.09, 1.19) and less likely amongst those who had high treatment adherence. (OR=0.41;95% CI =0.39, 0.42)]. **Conclusion**: Given the relapsing nature of tobacco use and the harms related to tobacco use, quitlines can improve their impact by offering tailored services to enhance client engagement and retention in-treatment and at follow-up.

Introduction

Smoking continues to be the leading preventable cause of death and disease, causing over 480,000 annual deaths in the U.S (US Department of Health and Human Services, 2014). Developing effective cessation interventions is an important public health priority. Over the past few decades, smoking cessation quitlines have emerged as standard care for smoking cessation (Fiore et al., 2008). As a population-based strategy for reducing tobacco prevalence, quitlines have intuitive appeal; they eliminate barriers in access to care (e.g., transportation, cost), increase access to evidence-based treatment for underserved and disparate populations, and have public health impact due to their cost-effectiveness and broad reach (Hollis et al., 2007; Zhu et al., 2012). Once enrolled into quitline services, clients typically receive a series of proactive (quitline initiated) and/or reactive (client initiated) calls with a behavioral counselor (Cummins et al., 2007). Phone sessions typically promote skills building focused on developing behavioral and cognitive urge management coping strategies, preparation to quit, and relapse prevention. The multi-session behavioral counseling component is often supplemented by provision of pharmacotherapy (nicotine gum, patches, or lozenges), the combination of which represents an evidence-based approach associated with higher quit outcomes (Hartmann-Boyce et al., 2018; Hollis et al., 2007; Macleod et al., 2003).

Quitlines structure behavioral counseling sessions around a set number of sessions with follow-up data collection occurring around 7-months post-enrollment (Lichtenstein et al., 2010; North American Quitline Consortium, 2015). An important issue facing quitlines nationally is client retention (Søgaard et al., 2004). Among North American quitlines, client retention at 7-month follow-up ranges between 20% - 57% (North American Quitline Consortium, 2018), with most not reaching the 50% target recommended by the North American Quitline Consortium (NAQC) (North American Quitline Consortium, 2015). The difficulty in reaching clients at follow-up may be an extension of attrition in-treatment. Currently, limited information exists around the reasons why clients drop out early while in treatment and/or are not reached for follow-up.

Psychosocial, demographic, and smoking-related factors have been linked to retention in smoking intervention studies. Specifically, more recent quit attempts, lower levels of nicotine dependence, and higher motivation and confidence to quit are associated with study retention (Bahadir et al., 2016a; Courtney et al., 2017). Factors associated with dropout include younger age, higher levels of education, depression, and drug use (Courtney et al., 2017; Curtin et al., 2000; El-Khorazaty et al., 2007) while research on cigarettes smoked per day and gender are mixed (Belita & Sidani, 2015; Curtin et al., 2000).

Disadvantaged and underserved populations (e.g., those from a low socio-economic status, presence of a mental health condition, belonging to racial and/or ethnic minority groups, Medicaid beneficiaries) have lower participation rates in general (Bonevski et al., 2014; Leak et al., 2015), and once enrolled are also more likely to drop out of smoking programs. This is largely due to characteristics that may make follow-up more difficult, such as housing instability, intermitted phone access, and lower health literacy (Leak et al., 2015; Ramos-Gomez et al., 2008). However, factors that predict client retention in population-level programs such as tobacco quitlines is an unexplored area of research.

Given that smoking is a chronic relapsing disorder, retaining clients in treatment is imperative to maximize smoking behavior change. High attrition can threaten the internal validity of study findings compromising the generalizability of outcomes (Leon et al., 2007; Szklo & Nieto, 2014) leading to incorrect inferences about treatment effects. The primary purpose of this study is to examine factors that predict dropout for clients enrolled in a state-based tobacco quitline. Information on determinants of treatment dropout can assist in designing quitline services that attract and retain clients.

Methods

Participants

Data were collected from clients enrolled in ASHLine (Arizona Smoker's Helpline- Arizona's state quitline) between 2011- 2017. All assessments were completed by staff trained in standardized interviewing protocols. Participants who exited the program due to death or relocation, or who enrolled only for nicotine replacement therapy (NRT) were excluded. Client information collected at the time of program enrollment included demographic characteristics, tobacco use history, and self-reported physical and/or mental health conditions.

Procedures

Upon enrollment, an assigned tobacco cessation coach contacted the client within 24-48 hours for their first counseling session. The quitline's standard treatment goal was to engage participants in weekly to biweekly calls until clients were smoke-free for 90 days. At the time of this study, eligibility for receiving NRT at the ASHLine was based on state residency and insurance status. Specifically, due to an existing comprehensive benefit available through the state's Medicaid program (12-week coverage of FDA approved tobacco cessation medications), Medicaid beneficiaries received the same telephone-based behavior change support, but were navigated to their health plan for NRT provision. Coaching protocols have been described in more detail elsewhere (Nair, Bell, et al., 2018; Nair, Reikowsky, et al., 2018). In

keeping with NAQC-recommended guidelines, all clients who provide consent are contacted 7-months post-enrollment for follow-up assessment. Since the study used de-identified client data, the study protocol was reviewed and deemed exempt by the University of Arizona's Institutional Review Board (IRB # 1507981689).

Measures

Client dropout was operationalized as retention while in-program and dropout at 7-month follow-up. Retention in program was defined as adherence to treatment and categorized as low treatment adherence (receiving 0 coaching calls), moderate adherence (receiving 1-2 coaching calls), and high adherence (receiving three or more calls). Systematic reviews have indicated a dose-response relationship, with three or more calls increasing the likelihood of quitting (Stead et al., 2013). Dropout at follow-up included participants who enrolled into services but were not reached for the 7-month follow-up.

Predictor Variables

Adherence to treatment. Informed by previous literature, we included the following baseline factors as potential predictor variables for adherence to treatment: age (continuous) and gender (International Agency for Research on Cancer, 2008), education (less than high school/high school or greater) (Zhuang et al., 2015), race/ethnicity (non-Hispanic white/Hispanic/other) (International Agency for Research on Cancer, 2008), and health insurance (private/uninsured/Medicaid) (Lent et al., 2018; Zhu et al., 2017). Social support related to quitting derived from a five point scale dichotomized as (0= no or low support, 1= good, very good, or excellent support). Additional variables included confidence to quit for at least 24 hours (Mathew et al., 2015) (0= not or somewhat confident, 1= confident, very confident, or extremely confident), nicotine dependence (Lindberg et al., 2015) assessed using the Fagerstrom test of nicotine dependence (Heatherton et al., 1991) (possible range 0 – 10, higher scores indicate higher dependence), and having a chronic health condition (asthma, COPD, diabetes, heart disease, hypertension, or cancer) (Nair, Bell, et al., 2018) assessed as presence or absence of chronic health condition (yes/no) or a mental health condition at the time of enrollment (Nair, Bell, et al., 2018; Schwindt et al., 2017; Vickerman et al., 2015). Presence of a mental health condition was assessed dichotomously (yes/no) as having anxiety disorder, depression, bipolar disorder, substance use, or schizophrenia.

Dropout at follow-up. In addition to the above-mentioned variables, in-treatment factors that included use of nicotine replacement therapy (NRT) and number of coaching calls (dichotomized as <3, 3 or more calls) were included in the model that predicted dropout at 7-month follow-up.

Statistical Analyses

For clients who enrolled in the program more than once during the study period, we analyzed only the most recent enrollment to avoid statistical challenges associated with non-independence of observations. Descriptive summary statistics were reported on baseline demographics, psychosocial characteristics of the sample, and in-treatment variables (prior use of NRT, request of NRT in program; days in program; and completion of the 7-month follow-up interview). Summaries were conditioned on the number of coaching sessions prior to exiting, collapsed into 3 levels: 0, 1-2, and 3 or more completed calls. We also examined the unadjusted joint distribution of number of coaching sessions received and completion of follow-up survey. Multinomial logistic regression was used to identify baseline factors associated with in-treatment dropout. Three levels were used to measure treatment adherence: low treatment adherence (0 coaching calls), moderate treatment adherence (1 or 2 coaching calls), and high treatment adherence (3 or more coaching calls); the latter was used as the reference category. Logistic regression analyses were used to examine factors predicting drop-out at 7-month follow-up. Since the Fagerstrom test for nicotine dependence, confidence to quit, and social support were collected during the first coaching session (after enrollment) for clients before 2014, these variables were expected to contain a substantial amount of missing values. Therefore, we performed multiple imputation by fully conditional specification to estimate the odds ratios of dropout (van Buuren, 2007). The imputation model included all variables included in the logistic regression models. We used 25 imputations. To examine the robustness of our conclusions to assumptions about missing data, we performed a sensitivity analysis including only the complete cases. Clients with missing data in other covariates were excluded, and analysis were performed in SAS 9.4.

Results

Baseline characteristics of the sample (N=49,347) are presented in Table 1. Approximately 57% of clients were female, 70% were non-Hispanic Whites, and 84.7% reported at least a high school education. About half the sample were either uninsured or on Medicaid (26% uninsured and 29% on Medicaid). More than half the sample reported having a chronic health condition at the time of enrollment and 41% reported a mental health condition.

INSERT TABLE 1 HERE

Overall, 53.3% did not complete at least 3 coaching calls; 61.1% dropped out before the 7-month follow-up. Approximately 15% had low treatment adherence (did not receive any coaching calls), while 38% had moderate treatment adherence (1-2 coaching calls). Figure 1 shows the percentage of clients by number of coaching calls completed and whether follow-up at 7-months was completed. The number of coaching calls in-treatment was associated with a lower likelihood of dropout at follow-up. Specifically, among those who received less than three coaching calls, only 72% dropped out at follow-up. Among clients who completed three coaching calls or more, 51% completed follow-up. The overall model was statistically significant, p<0.0001 for the likelihood ratio test of the global hypothesis that all parameters were 0."

INSERT FIGURE 1 HERE

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[1]***Adherence to treatment***

The odds ratios (OR) from the multinomial logistic regression of factors predicting treatment adherence are presented in Table 2. The overall model was statistically significant, p<0.0001 for the likelihood ratio test of the global hypothesis that all parameters were 0. ORs are reported with reference category of high treatment adherence, defined as completion of 3 coaching calls or more. Low (receiving 0 calls) and moderate adherence (1-2 calls) was associated with being female (OR = 1.30, 95% CI = [1.23, 1.38], and 1.20 [1.15, 1.25] respectively), and reporting high nicotine dependence (1.02 [1.01, 1.04] and 1.03 [1.02, 1.04]). Confidence to quit was also positively associated with having low treatment adherence (receiving 0 coaching calls) (1.48 [1.31, 1.66]). Finally, clients on Medicaid were more likely to have low treatment adherence than the uninsured (1.61 [1.49, 1.73]). Factors associated with completing fewer than 3 calls were older age, private insurance status and reporting a mental health condition at enrollment. Having strong social support lowered the odds of having low (0.71 [0.63, 0.78]) and moderate adherence (0.94

[1] *Multiple imputation analysis accounting for missing data and sensitivity analysis using only complete cases did not show meaningful changes in our odds ratio estimates.*

[0.89, 0.98]). Hispanics were less likely than non-Hispanic whites to have moderate treatment adherence (receiving 1-2 coaching calls) (0.91 [0.86, 0.97]).

INSERT TABLE 2 HERE

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[1]Dropout at follow-up

Factors associated with drop-out at the 7-month follow-up using logistic regression are presented in Table 3. The overall model was statistically significant, p<0.0001 for the likelihood ratio test of the global hypothesis that all parameters were 0. Number of coaching calls and age were associated with lower dropout at follow-up. Specifically, completion of at least 3 coaching calls was associated with lower odds of dropout at follow-up (OR = 0.41, 95% CI = [0.39, 0.42]) and a 10 year increase in age was associated with a 15% reduction in odds of dropout (0.85 [0.84, 0.86]). Being Hispanic, having high confidence to quit and holding private insurance reduced the odds of dropout as well. Clients on Medicaid had increased odds of dropout (1.13 [1.06, 1.20]). Interestingly, use of nicotine replacement therapy during treatment increased the odds of dropout (1.14 [1.09, 1.19]). Just as with adherence to coaching sessions, female clients and clients with greater levels of nicotine dependence were associated with dropout at follow-up (1.09 [1.05, 1.14]) and 1.02 [1.01, 1.03] respectively). Results from the sensitivity analysis including only complete cases did not show meaningful change in the odds ratio estimates.

INSERT TABLE 3 HERE

Discussion

The purpose of this study was to examine factors that predict dropout among clients enrolling in a state quitline to assist in tailoring quitline services to engage and retain clients. More than half the sample dropped out of the program prior to completing at least 3 coaching calls; 61.1% dropped out before the 7-month follow-up. These rates are similar to other quitlines where dropout rates range from 44-80% with only six states reporting >50% retention (North American Quitline Consortium, 2018). Identifying as female, being younger, uninsured, and having greater nicotine dependence were associated with dropout during treatment and at follow-up. At 7-month follow-up, program utilization that included

having high treatment adherence (receiving 3 or more coaching sessions), and older age were associated with lower likelihood of program dropout. While some studies have examined factors associated with dropout in randomized controlled studies (Courtney et al., 2017; Jacquart et al., 2017; López-Torrecillas et al., 2014), ours in the first to examine factors that predict dropout in-treatment and at follow-up among clients at a state quitline.

Congruent with other tobacco cessation literature, our results indicate that women were more likely than men to have poor program adherence and were less likely to be reached at follow-up (A. M. Allen et al., 2019; Borrelli et al., 2002; Curtin et al., 2000). Although women are more likely to enroll into quitline services (Campbell et al., 2014), historically, they experience greater difficulty in quitting than men when participating in a cessation program, perhaps a result of receiving fewer coaching sessions (A. M. Allen et al., 2019). In a previous quitline study, almost half of all enrolled clients completed only one coaching session, and being female was a significant predictor of completing a single session (Burns et al., 2012). This differential attrition could be a result of differences in smoking behaviors among men and women. For example, while men generally smoke for the pharmacological reinforcement properties of nicotine, women tend to smoke to manage mood, anxiety, and negative affect (Perkins, 2001; Shiffman & Paton, 1999). In part due to sociocultural factors and gender norms around weight and body image (Mintz & Betz, 1988), compared to men, women are also more likely to smoke for weight control (White et al., 2007), have concerns around weight after quitting (Clark et al., 2006), with weight concerns associated with treatment drop-out and relapse concerns (Borrelli et al., 2002; Clark et al., 2006). Moreover, there is burgeoning evidence of the role of ovarian/sex hormones on smoking cessation among women (al'Absi et al., 2015; S. S. Allen et al., 2016). Given research that points to the role of these factors in smoking behaviors, quit outcomes, and program utilization when enrolled in quitline services, it is possible that they may also be potential factors that contribute to differential attrition while in-program and at follow-up.

Nicotine dependence was associated with increased dropout in-treatment and at follow-up. Often implicated in successful smoking behavior change, severity of nicotine dependence is an important predictor of smoking cessation (Vangeli et al., 2011). Smokers with higher levels of nicotine dependence often experience withdrawal symptoms, especially in the initial weeks of treatment/abstinence (Stapleton et al., 1995), possibly contributing to in-treatment dropout in our sample. However, other studies have suggested that lower nicotine dependence is associated with higher dropout (Bahadir et al.,

2016). Given these mixed findings, more research is warranted to better examine how nicotine dependence may influence retention in smoking cessation services.

Insurance status was associated with treatment adherence; compared to clients on Medicaid, clients with private insurance were less likely to drop out in-program. The association between insurance status and program retention could be a result of the provision of pharmacotherapy provided through the quitline. During the study period, ASHLine's nicotine replacement therapy benefit was restricted to clients who were uninsured or to those with private insurance. To increase engagement in counseling, clients are encouraged to complete at least one phone session with their counselor prior to receiving NRT. Medicaid-insured clients were directed to obtain their cessation medication through their state-funded health plan. Given this protocol, it seems logical that uninsured clients and those with private insurance were more likely to engage in coaching services. In the state quitline setting, distribution of nicotine replacement therapy at no cost to clients results in higher client quit rates when compared to clients who do not receive quitline-provided medication (Cummings et al.; Tinkelman, Wilson, Willett, & Sweeney, 2007). This may indicate that increasing access to medication can facilitate quitting by eliminating barriers to access to care which can increase client motivation to quit and enhance retention in cessation programs.

Presence of a self-reported mental health condition was associated with lower odds of dropping out during treatment, but not at 7-month follow-up. The self-medication hypothesis—that smokers need to smoke to manage their mental health symptoms—combined with perceptions that tobacco use is a chronic concern have been significant barriers to treating tobacco use in mental health settings (McDermott et al., 2013). Our results indicate that clients with mental health conditions have greater engagement in program, compared to those without, indicating that this group of high-risk smokers are interested in seeking and engaging in cessation services. In fact, research suggests that similar to the general population, individuals with a mental health condition who smoke are motivated to set a quit date (McClave et al., 2010; Scott Acton et al., 2001), are more likely to make quit attempts, and are optimistic about quitting and often use smoking cessation treatments (Morris et al., 2014). Our study did not examine additional program engagement factors such as motivation to quit, reasons to quit, familiarity of seeking treatment or engaging in help seeking behavior, or education and messaging from health care providers to enroll in a quit program. However, compared to studies examining retention in an in-person or online program (Christensen et al., 2009; Melville et al., 2010; Prinz et al., 2001), ours is the first study examining the role of mental health and retention in a telephone-based program

suggesting that this is an area that warrants additional research. Approximately 40% in our population reported having a mental health condition. While higher than the general population, our numbers are similar to that of the individuals with mental health condition who use tobacco and report having a mental health condition (range between 37%-62%) (Dickerson et al., 2013, 2018; Stanton et al., 2016). Moreover, in a study of treatment seeking smokers, only 26.5% reported no history of a mental health condition (Piper et al., 2010). When combined with recent evidence suggesting that quitting smoking is associated with improvements in mental health, including reductions in depression, anxiety, and PTSD symptoms (McFall et al., 2010; Prochaska, 2010, 2011), our findings underpin the need to increase reach and access to cessation services among tobacco users with mental health conditions.

Greater perceived social support at the time of enrollment was associated with higher in-program retention, but not at follow-up. Evidence exists on the role of social support in smoking behavior change through both explicit (Christakis & Fowler, 2008) (social networks) and implicit (Dohnke et al., 2011) (social norms) social influence. Our results may indicate that social support can influence in-program retention, possibly through social norms around smoking or support through peer and social network influence. While these mechanisms were not examined in our study, future research could explore the influence of types of social support in engagement and retention in smoking cessation programs. Age was also related to retention with older clients more likely to be retained in-program and at follow-up. This fits with finding that younger individuals smoke because they may be socially marginalized and lack supportive social networks (Ennett et al., 2006). Moreover, they may report feeling the need to postpone quitting until they are older and better able to control and improve their social influence or circumstance (Kleinjan et al., 2009). While, we did not examine types of social support (e.g., explicit vs. implicit) or conduct social network analyses, these results indicate that future studies could look at how types of social support and social networks may influence younger clients' interest in quitting as well as their tobacco behavior change habits. Finally, engagement in behavioral counseling (completing 3 or more coaching calls) significantly increased the odds of retaining clients at 7-month follow-up. Client engagement in services has been associated with positive treatment experiences and outcomes (LeBeau et al., 2013); high engagers are often clients who participate frequently in treatment, complete treatment, or are likely to stay in treatment for a longer duration. Interestingly, use of NRT in-treatment was associated with higher drop-out at follow-up. This study did not examine other process measures that could be associated with program engagement such as the therapeutic relationship, motivation to participate, or self-efficacy. Future studies could examine relationships between these factors, in-program engagement, and long-term treatment outcomes.

Strengths and Limitations

The strengths of our study were a large sample of quitline clients over a seven-year period (2011-2017) who received standardized protocols for tobacco cessation. Our study has a few limitations. First, in order to capture key psychosocial factors (confidence to quit, social support) while minimizing client burden, these assessments were moved to the first coaching call mid-way through the study period. However, our multiple imputation analysis accounting for missing data and sensitivity analysis using only complete cases did not show meaningful changes in our odds ratio estimates. Second, the study did not assess for psychological factors known to be associated with retention such as baseline motivation or self-efficacy or process measures that could influence dropout such as program satisfaction. Third, we were unable to assess type of NRT, the duration of usage, or reasons for discontinuing use. More information about usage may have helped to elucidate the relationship between NRT and dropout within our sample. Next, we used a single-item yes-or-no measure to assess mental health; this precluded our ability to assess differences in dropout rate by type of mental health condition. Next, our analysis did not account for differences in dropout between how clients enrolled with the quitline, i.e., clients who proactively enrolled into services compared to those who were quitline initiated enrollees (e.g., provider referrals the quitline). Future studies can examine how mode of entry into the quitline would influence adherence to treatment and dropout. Finally, our analysis did not account for differences in dropout between clients who proactively enrolled into versus and those who were quitline initiated enrollees.

Conclusion

Client dropout in quitlines continues to be an issue that warrants attention. Given the relapsing nature of tobacco use and the harms related to tobacco use, it is important to engage and retain clients to maximize the chances of successful behavior change. In our study, almost half the sample dropped out prior to completing three coaching calls and 61% dropped out before the 7-month follow-up. We found that female, younger, and Medicaid-insured clients, and those who had high nicotine dependence and low social support were more likely to drop out. Based on our findings, some recommendations that quitlines could undertake may include tailored services to female clients that address their unique barriers to cessation (e.g., weight concerns, negative affect), including understanding the role of the menstrual cycle on quitting smoking (e.g., Nair & Allen, 2019). Understanding that younger clients may need multi-modal strategies for engagement in cessation program, quitlines could supplement phone-based counseling with text and/or self-guided web applications. Similarly, clients screening for high

levels of nicotine dependence could benefit from either 8-12 weeks of NRT or combining cessation medications like varenicline and NRT (Anthenelli et al., 2016). Finally, understanding that Medicaid beneficiaries face unique barriers to cessation, quitlines could enhance service provision to eliminate barriers in access to care (e.g., mailing medication to clients' homes, assistance in navigating clients to primary health care providers for additional pharmacotherapy) or bolster counseling to meet their unique stressors (e.g., low social support, increased stressors). Systematic reviews examining retention in randomized and longitudinal trials have determined increasing flexibility in appointments, incentivizing participation, and focusing on the benefits of participation and community involvement can improve retention, with more number of strategies associated with greater retention (Abshire et al., 2017; Robinson et al., 2007); however research on what retention strategies work best for population-based interventions such as quitlines is lacking. Given that quitlines have emerged as standard care for smoking cessation, future studies in this area need to focus on developing tailored strategies while outlining the cost effectiveness and evaluation of each of these strategies for tobacco quitlines.

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Table 1. Baseline and in-treatment characteristics for clients enrolled in the Arizona Smokers' Helpline (N=49347)

	Low Adherence (0 Calls) (N=7643)	**Moderate Adherence (1-2 calls) (N=18636)**	**High Adherence (3+ Calls) (N=23068)**	**Total (N=49347)**
Age in years, mean (std)	45.6 (13.8)	47.3 (13.9)	52.4 (13.8)	49.4 (14.1)
Gender, N (%)				
Male	3022 (39.4)	7816 (41.9)	10255 (44.5)	21093 (42.7)
Female	4621 (60.5)	10820 (58.1)	12813 (55.5)	28254 (57.3)
Educational attainment, N (%)				
Less than high school	1253 (16.4)	2860 (15.4)	3424 (14.8)	7537 (15.3)
High school or more	6390 (83.6)	15776 (84.7)	19644 (85.2)	41810 (84.7)
Race/ethnicity, N (%)				
Non-Hispanic white	5130 (67.1)	13072 (70.1)	16363 (70.9)	34565 (70.0)
Hispanic	1418 (18.6)	3056 (16.4)	3719 (16.1)	8193 (16.6)
Other	1095 (14.3)	2508 (13.5)	2986 (12.9)	6589 (13.4)
Insurance, N (%)				
Medicaid	3037 (39.7)	5070 (27.2)	6089 (26.4)	14196 (28.8)
Private	2722 (35.6)	7922 (42.5)	11720 (50.8)	22364 (45.3)
Uninsured	1884 (24.7)	5644 (30.3)	5259 (22.8)	12787 (25.9)
Chronic condition, N (%)	4231 (55.4)	10160 (54.4)	13984 (60.6)	28375 (57.5)
Mental health condition, N (%)	3397 (44.5)	7589 (40.7)	9386 (40.7)	20372 (41.3)
Social support[a], N (%)	2241 (73.5)	12688 (77.7)	16413 (77.6)	31342 (77.4)
Confidence to quit [b], N (%)	2649 (86.6)	13196(81.6)	17224 (81.9)	33069 (82.1)
Nicotine dependence (Fagerstrom) [c], mean (SD)	4.8 (2.3)	4.8 (2.3)	4.7 (2.3)	4.8 (2.3)
Nicotine replacement therapy, N (%)				
Prior use	223 (2.9)	1006 (5.4)	1767 (7.7)	2996 (6.1)
Requested in program	2408 (31.5)	12462 (66.9)	15479 (67.1)	30349 (61.5)
Use in program	4 (0.1)	10244 (55.0)	14422 (62.5)	24670 (50.0)
Days in program, mean (SD)	20.0 (14.4)	40.1 (21.8)	99.3 (57.7)	64.7 (53.5)
Completed 7-month follow-up, N (%)	1754 (23.0)	5671 (30.4)	11766 (51.0)	19191 (38.9)

[a] Support was rated on a 5-point scale of poor, fair, good, very good, and excellent. Scale was dichotomized to low support = {poor, fair} and high support = {fair, good, very good}. Percentages reflect those reporting high social support

[b] Confidence to quit was rated on a 5-point scale of not, somewhat, confident, very, and extremely confident. Scale was dichotomized to low confidence = {not or somewhat confident} and high confidence {confident, very confident, or extremely confident}. Percentages reflect those reporting high confidence.

[c] Fagerstrom possible range 0-10

Percentages that do not add to 100% are due to missing data. Percentages are calculated using the number of non-missing values as the denominator. For variables with missing data, the missing rates were: NRT variables 'prior use' and 'requested in program' = 32%; Fagerstrom = 17%; confidence = 18%; and support = 18%. Abbrev: SD = standard deviation.

Table 2. Results of multinomial regression of client factors predicting drop-out in-treatment. The reference category is high treatment adherence (3 coaching calls or more) (N=49,347).

	Low Adherence (0 coaching calls) (n=7643)	**Moderate Adherence (1 or 2 coaching calls (n=18636)**
Predictor	**OR (95% CI)**	**OR (95% CI)**
Age (10-year increase)	0.70 (0.69, 0.72)	0.77 (0.76, 0.78)
Gender (female)	1.30 (1.23, 1.38)	1.20 (1.15, 1.25)
Race (Hispanic vs. white)	1.06 (0.99, 1.14)	0.91 (0.86, 0.97)
Race (non-White vs. white)	1.01 (0.93, 1.09)	0.99 (0.93, 1.05)
Education (no HS diploma)	0.96 (0.88, 1.03)	0.99 (0.93, 1.04)
Insurance (Medicaid vs. uninsured)	1.61 (1.49, 1.73)	0.86 (0.81, 0.91)
Insurance (Private vs. uninsured)	0.85 (0.79, 0.91)	0.77 (0.73, 0.81)
Chronic condition	1.04 (0.98, 1.10)	1.01 (0.96, 1.05)
Mental health condition	0.92 (0.87, 0.97)	0.92 (0.88, 0.96)
Support (high vs. low)	0.71 (0.63, 0.78)	0.94 (0.89, 0.98)
Confidence to quit (high vs. low)	1.48 (1.31, 1.66)	0.98 (0.92, 1.03)
Fagerstrom test of nicotine dependence	1.02 (1.01, 1.04)	1.03 (1.02, 1.04)

[a] Support was rated on a 5-point scale of poor, fair, good, very good, and excellent. Scale was dichotomized to low = {poor, fair} and high = {fair, good, very good}.
[b] Confidence to quit was rated on a 5-point scale of not, somewhat, confident, very, and extremely confident. Scale was dichotomized to low confidence = {not or somewhat confident} and high confidence {confident, very confident, or extremely confident}.
[c] Fagerstrom possible range 0-10

Table 3. Odds ratios (OR) and 95% confidence intervals (CI) for failure to complete 7-month follow-up (N=49347)

	Dropout at 7 month follow-up
Predictor	**OR (95% CI)**
High treatment adherence (completed 3+ coaching calls)	0.41 (0.39, 0.42)
Use of NRT in treatment	1.14 (1.09, 1.19)
Age (10-year increase)	0.85 (0.84, 0.86)
Gender (female)	1.09 (1.05, 1.14)
Race (Hispanic vs. white)	0.94 (0.89, 0.99)
Race (non-white/Hispanic vs. white)	1.03 (0.96, 1.08)
Education (no HS diploma)	0.98 (0.92, 1.03)
Insurance (Medicaid vs. uninsured)	1.13 (1.06, 1.20)
Insurance (private vs. uninsured)	0.80 (0.77, 0.84)
Chronic condition	1.02 (0.98, 1.07)

Mental health condition	1.01 (0.97, 1.05)
Support (high vs. low)	1.02 (0.97, 1.07)
Confidence to quit (high vs. low)	0.83 (0.79, 0.88)
Fagerstrom test of nicotine dependence	1.02 (1.01, 1.03)

[a] Support was rated on a 5-point scale of poor, fair, good, very good, and excellent. Scale was dichotomized to low = {poor, fair} and high = {fair, good, very good}.
[b] Confidence to quit was rated on a 5-point scale of not, somewhat, confident, very, and extremely confident. Scale was dichotomized to low confidence = {not or somewhat confident} and high confidence {confident, very confident, or extremely confident}.
[c]Fagerstrom possible range 0-10

Figure 1: Percentage of clients who were reached for the 7-month follow-up by the number of phone calls completed.