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Proactive Telephone Counseling for Adolescent Smokers: Comparing Regular Smokers with Infrequent and Occasional Smokers on Treatment Receptivity, Engagement, and Outcomes

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Abstract

Background—Adolescent smoking cessation efforts to date have tended to focus on regular smokers. Consequently, infrequent and occasional smokers' receptivity and response to smoking cessation interventions is unknown. To address this gap, this study examines data from the Hutchinson Study of High School Smoking--a randomized trial that examined the effectiveness of a telephone-delivered smoking cessation intervention for a large, population-based cohort of adolescent smokers proactively recruited in an educational setting.

Methods—The study population included 1,837 proactively identified high school smokers. Intervention receptivity, engagement, and outcomes were examined among adolescent infrequent (1-4 days/month) and occasional (5-19 days/month) smokers and compared with regular smokers (20 or more days/month).

Results—With regard to treatment receptivity, intervention recruitment did not differ by smoking frequency. For engagement, intervention completion rates were higher for infrequent

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Contributors

Jaimee Heffner and Kathleen Kealey drafted the manuscript as co-first authors. Patrick Marek was responsible for data collection and management, and performed the statistical analyses. Kathleen Kealey, Jonathan Bricker and Evette Ludman made significant contributions to the design and conduct of the study. Kathleen Kealey managed the delivery of the intervention. Arthur Peterson, Jr., principal investigator of the Hutchinson Study of High School Smoking, was responsible for securing study funding, and leading the design and conduct of the study and the analyses. All authors contributed to the interpretation of the results and the writing of the manuscript and approved the final draft.

Conflict of Interest

The authors have no competing interests to disclose.

smokers (80.5%) compared with occasional (63.8%) and regular smokers (61.5%, $p<.01$). Intervention effect sizes were not statistically different across groups.

Conclusions—Adolescent infrequent and occasional smokers are at least as receptive to a proactively delivered smoking cessation intervention as regular smokers and can benefit just as much from it. Including these adolescent smokers in cessation programs and research—with the goal of interrupting progression of smoking before young adulthood—should help reduce the high smoking prevalence among young adults.

Keywords

smoking cessation; tobacco; nicotine; adolescent; motivational interviewing

1. INTRODUCTION

The majority of adolescent smokers are infrequent or occasional smokers (CDC, 2015; Johnston et al., 2011; Kann et al., 2014), and they are at high risk for smoking escalation in young adulthood (Bachmann et al., 2012; Fuemmeler et al., 2013; Tercyak et al., 2007). A growing body of research suggests that a contributing factor may be that even infrequent and occasional smokers can be addicted to nicotine. Multiple studies have reported that some teen smokers experience their first symptoms of nicotine dependence well before initiating daily smoking (Doubeni et al., 2010; Rose et al., 2010; DiFranza et al., 2007).

Once the infrequent or occasional adolescent smoker becomes a regular, daily smoker, a window of opportunity to prevent the budding addiction from becoming entrenched is lost, and cessation becomes more difficult to achieve. Only 5% of young people who smoke daily by age 20–21 are able to completely quit smoking for at least one year by age 25 (Chassin et al., 2000). Furthermore, among adolescents who reached one half pack of cigarettes per day before graduating from high school, fewer than 10% had quit smoking entirely 1–2 years later (Bachman et al., 1997).

Because infrequent and occasional smokers (a) form the majority of adolescent smokers, (b) can be addicted to nicotine, and (c) are at risk for escalation at which point quitting is difficult, intervening with them *before* they transition to regular, daily smoking is an important public health goal. However, infrequent and occasional smokers are often excluded from the smoking cessation trials that are needed to inform practice and policy. In a review of 66 adolescent tobacco use cessation trials, smoking was defined as at least one cigarette per day in 71% (n=40) of the 56 studies that reported it and, in general, the participants in these studies were fairly heavy smokers (Sussman, 2002). Subsequent meta-analyses of teen smoking cessation studies reported the average level of baseline smoking was one half pack per day (Sussman et al., 2006; Sussman and Sun, 2009), with a smoker generally being defined as an adolescent who reports at least weekly smoking (Stanton and Grimshaw, 2013)—a definition that would exclude infrequent smokers from participation.

Although there are some adolescent cessation studies that have included less frequent smokers (e.g., Espada et al., 2016; Idrisov et al., 2013; Sussman et al., 2001), the emphasis in the treatment literature is on adolescents who are heavier, more frequent smokers.

Additionally, previous studies that have included less frequent smokers have not reported outcomes separately for this group (e.g., Sun et al., 2007). This has resulted in a gap in knowledge that has critical implications for practice and policy. Specifically, little is known about to what extent infrequent and occasional smokers engage with, and benefit from, smoking cessation interventions.

Cross-sectional research provides some evidence that infrequent and occasional adolescent smokers differ from regular smokers on readiness to quit, which may translate into different receptivity to or success in a cessation intervention. For example, several studies have demonstrated that, compared to daily smokers, infrequent and occasional smokers report greater motivation to quit (Carpenter et al., 2009; Stone and Kristeller, 1992; Turner et al., 2005) and greater confidence in their ability to quit (Carpenter et al., 2009; Rubinstein et al., 2014). These cross-sectional findings suggest that receptivity to and potential benefits of a smoking cessation intervention may be at least similar, if not greater, among adolescent infrequent and occasional smokers compared with regular smokers. However, longitudinal studies are needed to evaluate this possibility, and there have been no prior longitudinal investigations on this topic.

To answer the question of whether infrequent and occasional smokers demonstrate differential treatment receptivity, engagement, and outcomes in a longitudinal smoking cessation intervention study, the present analyses utilize data from the Hutchinson Study of High School Smoking (HS)--a large, group-randomized trial that examined the effectiveness of an individually tailored, telephone-delivered smoking cessation intervention for adolescent smokers proactively recruited in an educational setting (Peterson et al., 2009). The results of that trial indicated that the intervention increased 6-month prolonged cessation rate at one year (21.8% vs. 17.8%, p=.06) (Peterson et al., 2009). The HS trial is one of few randomized intervention trials with available data to examine these questions in a large, representative, population-based cohort of adolescent smokers proactively recruited, without regard to readiness to quit, to a smoking cessation intervention.

2. MATERIALS AND METHODS

Data for this study are from a cohort of adolescent smokers from the Hutchinson Study of High School Smoking (HS). As previously described (Liu et al., 2007; Peterson et al., 2009), 50 Washington State high schools were randomly selected, and using matched pair randomization, 25 schools were assigned to each of two experimental conditions (intervention or assessment-only control). All enrolled 11th grade students (juniors) in the 50 high schools were targeted for participation. Ineligible were 1,188 of 14,230 juniors who were foreign exchange students, enrolled only in off-campus classes, or unable to read/ understand simple English. Among those eligible, 12,141 students (93.1%) completed confidential baseline surveys and 2,151 self-identified as smokers. All smokers and a selected sample of nonsmokers were identified as trial participants. Including nonsmokers protected participants' privacy and ensured that participation did not automatically label a teen as a smoker (Moolchan and Mermelstein, 2002), while also providing two intervention functions: (1) reinforcement of smoking abstinence among nonsmokers, and (2)

enhancement of motivations, skills and confidence for supporting peers' efforts to quit smoking (Liu et al., 2007).

2.1. Study Population

This paper focuses on the subset of the 2,151 self-identified smokers at baseline who gave valid responses to two items that focused on the number of days with smoking in the past 30 days. These consisted of an initial item that asked if the respondent smoked one or more cigarettes in the last 30 days, followed by a skip, for those who responded affirmatively, to an item that asked about the number of days on which the respondent smoked. Of the baseline smokers, 314 responded negatively to the first item (even though they gave other evidence of atleast-monthly smoking), or skipped incorrectly, or gave inconsistent or invalid responses to the items. Thus, the cohort for this study consists of those 1,837 (15.1 %) baseline survey respondents who (1) reported current at-least-monthly smoking in response to the following question on the (baseline) Survey of High School Juniors: "Have you smoked one or more cigarettes in the last 30 days?," Responded "yes," and (2) provided a valid response to the question, "On how many days in the last 30 days have you smoked at least one cigarette?" with possible responses, "every day," "20-29 days," "10-19 days," "5-9 days," "2-4 days," and "1 day." We defined (1) as *infrequent* smokers, those who reported '2-4 days" or 1 day'; (2) as *occasional* smokers, those who reported '5-9 days' or '10-19 days'; and, (3) as *regular* smokers, those who reported '20-29 days' or 'every day'. These definitions were chosen to be comparable to those used by Turner et al. (2005) in their study of infrequent and occasional smokers. Among the 1,837 study participants in this cohort, 900 were in the experimental arm; 937 were in the control arm.

2.2. Study Procedures

2.2.1. Baseline data collection—For trial management reasons, all activities of the study were phased in over three waves of high schools. Accordingly, baseline data were collected in three waves, between March, 2002 and June, 2004. Parents of high school juniors were informed of the baseline survey three weeks in advance via a first class letter mailed by the study to the family address. The letter offered parents a toll-free telephone number to call to ask questions about the survey or decline their teen's participation. The survey was administered by trained study data collectors, with in-class, mail, and telephone follow-up of absentees. Staff data collectors explained survey procedures to students in advance; students could ask questions or decline survey participation. Using the "pipeline" technique to enhance the accuracy of self-reported smoking (Murray and Perry, 1987), students completing an in-class survey were asked to provide a saliva sample for possible cotinine testing (with 96.5% agreeing and providing a sample). Data collectors also informed students that they might be invited to participate in future research activities; students had the option to decline future contact. Smokers and the sample of nonsmokers were identified from the baseline survey.

2.2.2. Determination of eligibility for intervention—For smokers (and the sample of nonsmokers) in the 25 experimental high schools, we determined eligibility for intervention using the following procedures (Kealey et al., 2007): Prior to contacting prospective participants, the study sought active consent from parents of potential

participants younger than age18, via letter mailed to the home address with telephone follow-up of non-responders. The study informed parents of teens ≥ age 18 of the research activity by letter and offered a toll-free number to call should they have questions. Parental consent activities occurred during the summer months, between the junior and senior years of high school. Teens ≥ age 18 and teens < age 18 for whom parents provided informed consent were eligible for the trial.

2.2.3 Intervention recruitment and retention—Smokers (and the sample of nonsmokers) in the 25 experimental high schools were proactively contacted by counselors and invited to participate in counseling calls, using the following sequence (Kealey et al., 2007): (1) The study mailed an informational letter and brochure to all teens eligible for intervention either by age or parental consent. The letter provided an introduction to the intervention phase of the study (i.e., to the "Matchbreaker" program). Matchbreaker was described as a program that would solicit teens' perceptions of smoking and non-smoking, provide access to information about smoking-related topics, and offer assistance with quitting to any teen who happened to be a smoker and was interested in receiving such assistance. The letter and all study materials stated that the Matchbreaker program was targeting both smokers and non-smokers. Shortly thereafter, trained telephone counselors called and invited the teens' participation. In this call, counselors stressed the value of learning each teen's honest opinions and experiences. Counselors also assured teens that smokers would not be pressured to quit smoking, but if they were interested in quitting, the counselors would provide help and support. (2) Counselors conducted informed consent/assent with interested teens, using a documented, IRB-approved procedure. (3) Once consent/assent was provided, the intervention was delivered one-to-one via counselor-initiated telephone calls. The intervention was tailored on the adolescent's readiness to change smoking, incorporating principles of motivational interviewing (Miller and Rollnick, 2002) and cognitive-behavioral skills training (Baer et al., 1999; Marlatt et al., 1985). Up to ten 15-minute calls were allowable under the protocol—three sessions of motivational enhancement, and for those who were ready to make a quit attempt, one session of quit preparation and six sessions of cessation support. All intervention activities occurred during the senior year of high school; students who dropped out or otherwise left school after their junior year were still included. (Full intervention details are reported in Kealey et al., 2009).

Important to the study of infrequent and occasional smokers reported here, these procedures *proactively* identified smokers liberally, at least monthly smoking, and *proactively* contacted them for recruitment to the intervention. This provided a broad population-based sample for investigating the four research question posed in this study.

2.2.4. Outcome data collection—Outcome data for the three study waves were collected between September, 2003 and September, 2006. These data were collected 12 months following the initiation of the intervention, which always occurred during the participant's senior year of high school but could have started anytime between September and June, depending on batch assignment. The outcome assessment was timed to start one year after the batch start date. This method kept the duration between initiation of treatment and outcome follow-up consistent across participants. As previously described (Peterson et

al., 2009), the study used address and telephone information provided by schools, trial participants, parents, and the United States Postal Service, to (1) contact parents/guardians by mail with telephone follow-up, to request current address information for their son or daughter, and (2) mail a survey packet to the trial participant that included the survey, a $10 prepaid incentive and a pre-addressed, stamped survey return envelope. Follow-up of non-responders consisted of a reminder postcard mailing, up to three non-responder survey mailings (the second and third of which included a promise of $20 upon receipt of a completed survey), and to those still not responding/not reached by mail, telephone calls that also included a promise of $20 upon completing the survey by phone. Use of these methods resulted in an 88.8% overall return rate, which did not differ significantly by treatment arm.

All trial materials and procedures were reviewed and approved by the FHCRC Institutional Review Board prior to initial implementation and annually thereafter.

2.3 Evaluation

2.3.1 Receptivity to intervention recruitment—Receptivity was operationalized as acceptance of the offer of the telephone counseling intervention among those who were eligible to participate (n=801). The following outcomes were compared by smoking frequency group: (1) percent of smokers who allowed us to reach them by telephone, and, (2) percent of smokers who agreed to participate in the intervention.

2.3.2 Engagement with the intervention—Treatment engagement outcomes are reported by smoking frequency for the smoker population in the treatment arm of the trial who were eligible for the intervention (N=801). Engagement outcomes included: (1) percent of adolescents who participated in one or more counseling calls, and (2) percent who completed the full intervention.

2.3.3 Cessation outcome measures at 12 months post-intervention initiation —Three items on the outcome survey measured abstinence outcomes: (1) “When was the last time you smoked, or even tried, a cigarette?” with possible responses, “I have never smoked, or even tried, a cigarette” (included as a response option for baseline non-smokers), “earlier today,” “1 – 7 days ago,” “8 – 30 days ago,” “between 1 and 3 months ago,” “between 3 and 6 months ago,” and “more than 6 months ago.” (2) “How often do you currently smoke cigarettes?” with possible responses, “not at all,” “less than once a month,” “once a month or more, but less than once a week,” and “at least daily.” (3) “Think about the last 30 days. On how many of the last 30 days have you smoked one or more cigarettes?” with possible responses, “Every day,” “20 – 29 days,” “10 – 19 days,” “5 – 9 days,” “2 – 4 days,” “1 day,” and “0 days.” To increase the reliability of self-reported outcomes, abstinence was defined as consistent reporting of non-smoking on *all three* of these items (Peterson et al., 2009).

2.3.4 Statistical analysis—The Cochran-Armitage trend test (Armitage, 1955) was used to test for differences among infrequent smokers, occasional smokers, and regular smokers in baseline characteristics (Table 1) and intervention receptivity and engagement (Table 2). Estimates of intervention impact and 95% confidence intervals for infrequent

smokers, occasional smokers, and regular smokers were obtained from permutation procedures (Edgington, 1987; Lehmann, 1975; Gail et al., 1992) that accommodate intraclass correlation. Generalized Estimating Equations (GEE; e.g., Prentice, 1988), with interchangeable (compound symmetric) working covariance matrix to accommodate intraclass correlation among individuals from the same school, were used to obtain *p*-values for trend of intervention impact on smoking abstinence (a test of interaction) from logistic regression models. Cessation outcome analyses followed the intent-to-treat principle, with randomized participants analyzed in the group to which they were assigned regardless of their post-randomization disposition, with no assumptions made about missing data (e.g., Fisher et al., 1990).

3. RESULTS

Among these 1,837 high school smokers, 627 (34.1%) were classified as infrequent smokers for this report, having smoked on fewer than five days in the past month; 420 (22.9 %) were classified as occasional smokers, having smoked on 5-19 days in the past month; and 790 (43.0%) were classified as regular smokers, having smoked on 20 or more days in the past month. A test for trend using the Cochran-Armitage trend test demonstrated conclusive evidence (all *p*-values <0.01) that fewer infrequent and occasional smokers than regular smokers had tried their first cigarette before age 13, had smoked >100 cigarettes in their lifetime, were baseline daily smokers, and had used other forms of tobacco. Table 1 shows comparisons of baseline demographic characteristics and smoking history by smoking frequency.

3.1. Eligibility for Recruitment to Intervention

Percent of smoker participants eligible for intervention either by age (≥18) or parental consent (required for the 73.3% of participants who were minor age) did not differ by smoking frequency. Among the 900 smokers in the experimental cohort, 801 (89%) were eligible for intervention recruitment: 240 (26.7%) were eligible by age because they were age 18 or older. Among the 660 minor-age smokers, 85% became eligible when their parents provided active consent.

3.2. Receptivity to Recruitment

Reported in Table 2 is receptivity to intervention recruitment, by smoking frequency category. Shown for each step are both the overall percentages and the step-to-step transition rates for the 801 smokers in the intervention cohort who provided consent/assent to participate in that phase of the study. In general, there was no evidence that infrequent and occasional smokers differed from regular smokers in success of intervention recruitment contact or consent to receive the intervention.

3.3. Engagement with the Intervention

Of the intervention-eligible teens included in these analyses, 72% (577/801) completed one or more calls. The overall median length of intervention contact time was 17.9 minutes (1st quartile=8.7 minutes, 3rd quartile=34.1 minutes). As reported in Table 2, once enrolled in the intervention, the rates of completing at least one intervention counseling call did not differ

significantly between regular smokers and infrequent and occasional smokers (p=.51). However, for infrequent smokers, the rate of transition from intervention participation to completion (80.5%) was greater than the rate for occasional and regular smokers (63.8%, and 61.5%, respectively; *p-value for trend*: <.01; see Table 2).

3.4. Cessation Outcomes

Among the 1,837 smokers in this study, 1,631 (88.7%) were successfully located at follow-up, approximately two years post-baseline (≥12 months post-intervention-eligibility), and completed the outcome survey. Nearly all participants (96.8%) were age 18-19 at the time of outcome survey participation, with an average age of 19 years and 20 months (range: 17–21 years; SD =138 days). Follow-up rates for infrequent, occasional, and regular smokers were 88.7%, 88.6 %, and 89.0%, respectively, showing no evidence (p=.87) of trend by smoking frequency.

Table 3 reports abstinence outcomes for treatment vs. control group smokers by smoking category. All abstinence outcomes were measured at approximately the same time point at one year post-intervention-eligibility. The main abstinence outcome was 6-month prolonged abstinence [as defined by Velicer et al (1992)]. Also reported, as recommended in the literature (Hughes et al., 2003), are three-month, one-month, and 7-day prolonged abstinence, and duration since last cigarette. There was no evidence of a trend by baseline smoking category for the difference (delta) in intervention impact as measured either as 6-month prolonged smoking cessation (p=.97) or the other abstinence outcomes (p=.49; p=.40; p=.07; p=.52).

4. DISCUSSION

This study aimed to determine whether adolescent infrequent and occasional smokers differed from regular smokers on receptivity, engagement, and outcomes from a proactive telephone-delivered cessation intervention. With regard to intervention receptivity and engagement, infrequent and occasional smokers were no less likely than regular smokers to either (a) accept the offer of proactively delivered smoking cessation counseling, or (b) complete at least one counseling session once enrolled. Furthermore, a greater proportion of infrequent smokers (80.5%) than occasional (63.8%) and regular smokers (61.5%) were treatment completers. These results demonstrate that infrequent and occasional smokers will consent to and participate in a proactively delivered smoking cessation intervention at rates similar to regular smokers. Infrequent smokers' higher likelihood of completing the treatment program is consistent with prior cross-sectional research showing that lower-frequency smokers reported higher motivation to quit (Carpenter et al., 2009; Stone and Kristeller, 1992; Turner et al., 2005).

Another key finding from this study was that participants in each of the smoking frequency categories benefitted similarly from a proactively delivered intervention. This calls into question the common practice of excluding lower-frequency adolescent smokers from smoking cessation interventions (Stanton and Grimshaw, 2013; Sussman, 2002). Our results suggest that they can be helped just as much as regular smokers, which is quite important in

light of the benefits of helping these smokers quit before they transition to more entrenched patterns of use (Bachman et al., 1997; Chassin et al., 2000).

This study had numerous strengths, including its large study population and strong follow-up. The smoker population for this study was drawn from a population-based cohort of 12,141 high school juniors from 50 Washington State high schools. Over 93% of eligible high school juniors in the trial completed baseline surveys; 1,837 of 2,151 self-identified smokers were eligible for this study. Furthermore, the rate of follow-up was good: outcome data were successfully collected from 88.8% of the smokers.

A potential limitation of the study was that biochemical validation was not used to confirm participant self-reports of cessation outcomes. There is much literature (although not unanimous) that biochemical validation is not needed among large (N≥1,000) population-based cessation studies, or for those with special populations, like adolescents, where all outcome data collection is done by mail and telephone (Benowitz et al., 2002; Velicer et al., 1992; Glasgow et al., 1993; Patrick et al., 1994; COMMIT Research Group, 1995), as was done in this study. Additionally, these validation methods lack sensitivity for light and intermittent smoking (Benowitz et al., 2002). In lieu of biochemical validation, the trial used multiple duration-specific abstinence outcome measures, each requiring consistent reporting, to minimize the potential for social desirability and other response bias (Benowitz et al., 2002). Also, the study emphasized to participants the importance of answering accurately and honestly, and provided assurances of participant confidentiality and that data would be reported only in aggregate. Another study limitation is that the trial was not powered to detect small differences in treatment outcomes among subgroups of adolescent smokers. However, setting aside the question of *statistically significant* differences, the absolute difference in quit rates for intervention vs. control group participants across the 3 smoking frequency categories (see Table 3) provide little reason to believe that infrequent and occasional smokers received less benefit from the intervention than regular smokers.

Further longitudinal research is needed in this understudied area. Given that no prior studies have evaluated differences in intervention receptivity, engagement, and outcomes among adolescent infrequent, occasional, and regular smokers in the context of a proactively-delivered counseling intervention, our novel set of results need to be replicated. Also, it would be useful to know whether these results would generalize to a reactive model of intervention delivery that required the adolescent to take the first step to initiate treatment.

In summary, just like their regular smoking peers, adolescent infrequent and occasional smokers will consent to, participate in, and benefit from smoking cessation intervention. Consequently, including these adolescent smokers in cessation programs and research—with the goal of interrupting progression from infrequent or occasional to regular smoking *before* young adulthood—provides a good opportunity to help reduce the current high smoking prevalence among young adults.

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Highlights

- Teen infrequent and occasional smokers will engage in proactive tobacco counseling
- Treatment completion rates were highest among infrequent and occasional smokers
- Intervention effectiveness did not differ by smoking frequency

Table 1
Percent baseline characteristics of adolescent smokers by smoking frequency

Baseline variable	Infrequent Smokers[a] N=627	Occasional Smokers[b] N=420	Regular Smokers[c] N=790
Demographic Variables			
Gender			
Female	50.6%	44.0%	50.0%
Male	49.4%	56.0%	50.0%
p-value[d] for gender:			0.94
Ethnicity/Race			
White	75.1%	75.5%	76.2%
American Indian/Alaska Native	2.2%	2.4%	3.3%
Asian	3.7%	6.9%	3.5%
Black or African American	1.8%	2.6%	1.9%
Hispanic ethnicity	5.3 %	3.3%	3.0%
Native Hawaiian or Other Pacific Islander	1.3%	1.9%	0.9%
Other Race	1.4%	1.2%	0.8%
Multiple Races/Ethnicities	7.2%	5.2%	7.8 %
p-value[d] for % White			0.50
Age at baseline data collection			
<16 years old	0.0%	0.0%	0.1%
16 years old	31.6%	32.1%	28.6%
17 years old	63.6%	61.0%	63.4%
> 17 years old	4.8%	6.9%	7.8 %
p-value[d] for > 17 years old:			0.02
Smoking history and current smoking			
Age at first cigarette			
≤ 8 years old	4.0%	7.4%	11.8%
9-12 years old	24.6%	27.4%	35.7%
13-16 years old	55.7%	56.4%	48.2%
> 16 years old	15.3%	8.3%	3.7%
p-value[d] for % first use before age 13:			<0.01
Number of cigarettes smoked in lifetime			
≤ 1	6.2%	0.5%	1.0%
2-100	72.6%	44.8%	6.5%
101-400	10.7%	33.6 %	19.6%
> 400	9.1%	19.8%	70.4%
p-value[d] for % > 100 cigarettes:			<0.01

Baseline variable	Infrequent Smokers[a] N=627	Occasional Smokers[b] N=420	Regular Smokers[c] N=790
Current use of other tobacco products[e]			
Not at all	44.8%	39.5%	36.5%
Less than monthly	27.8%	19.5%	24.6%
At least monthly, but not daily	19.9%	28.8%	16.7%
Daily	4.9%	9.0%	18.7%
p-value[d] for % Not at all:			*<0.01*

[a] Infrequent smokers defined as having smoked on 1-4 days in the last month.

[b] Occasional smokers defined as having smoked on 5-19 days in the last month.

[c] Regular smokers defined as having smoked on 20 or more days in the last month.

[d] *p*-value for trend: H_0: Same (true) percentage for all 3 smoking frequency categories.

[e] Current use of other tobacco products: frequency of use of chewing tobacco/snuff, cigars, bidis or clove cigarettes, or pipe tobacco.

Table 2

Intervention receptivity and engagement, by baseline smoking category (Experimental cohort only who were eligible for the intervention: n = 801)

	Transition Rates[a]			
	Infrequent N =263	**Occasional N =186**	**Regular N =352**	***p-value* for trend[b]**
Intervention receptivity				
Eligible smokers successfully contacted for intervention (N=716)	90.1% (n=237)	88.7% (n=165)	89.2% (n=314)	$p = 0.74$
Contacted smokers who accepted intervention offer (N=616)	88.6% (n=210)	86.1% (n=142)	84.1% (n=264)	$p = 0.14$
Intervention engagement				
Accepting smokers who participated in 1 or more counseling calls (N=577)	95.2% (n=200)	91.5% (n=130)	93.6% (n=247)	$p = 0.51$
Participating smokers who completed full intervention (N=396)	80.5% (n=160)	63.8% (n=83)	61.5% (n=152)	$p < 0.01$

[a] Transition rate = # reaching outcome / # reaching previous outcome

[b] *p*-value for transition rate trend using Cochran-Armitage Trend test (Armitage, 1955).

[d] Total smokers eligible for intervention recruitment (801) = 240 age ≥ 18, plus 561 age <18 with parental consent. Parental consent rates were 87.2% for infrequent smokers, 87.2% for occasional smokers, and 82.1% for regular smokers (trend test: $p = 0.20$).

Table 3

Percent of baseline smokers with complete outcome data (N=1631)[a] who achieved smoking abstinence, and effect size[b], measured at 12-months post-intervention eligibility, by smoking category

	Infrequent Smokers		Occasional Smokers		Regular Smokers		
Outcomes	**Control (N=311)**	**Experimental (N=245)**	**Control (N=189)**	**Experimental (N=183)**	**Control (N=355)**	**Experimental (N=348)**	***p*-value[c]**
6-mo. prolonged abstinence	22.5%	27.7%	18.3%	18.4%	7.3%	10.1 %	
	Δ =5.42% (−1.07, 11.87)		Δ = 0.16% (−8.27, 8.52)		Δ = 2.71% (−2.34, 7.14)		*p*=0.97
3-mo. smoking abstinence	30.9%	34.3%	22.6%	21.8%	10.2%	14.4%	
	Δ = 3.72% (−3.04, 10.61)		Δ = −0.79% (−8.93, 7.13)		Δ = 4.20% (−1.77, 9.64)		*p*=0.49
1-mo. smoking abstinence	35.7%	42.9%	31.2%	31.3 %	13.8%	21.3%	
	Δ = 7.52% (−0.02, 14.94)		Δ = 0.10% (−9.96, 9.76)		Δ = 7.46% (0.54, 13.84)		*p*=0.40
7-day smoking abstinence	54.9%	56.3%	40.2%	48.9%	18.6%	27.3%	
	Δ = 1.51% (−6.15, 9.89)		Δ = 8.69% (−0.01, 16.54)		Δ = 8.71% (2.17, 14.95)		*p*=0.07
Duration since last cigarette[d]	3.17	3.36	2.72	2.82	1.76	2.08	
	Δ = 0.21 (−0.12, 0.55)		Δ = 0.10 (−0.28, 0.45)		Δ = 0.32 (0.05, 0.57)		*p*=0.52

[a] Included in Table 3 are all baseline smokers who completed an outcome survey and provided codable responses to the abstinence items. Quit rates are based on intent-to-treat analyses.

[b] Effect size: % smoking abstinence in experimental group minus that in control group, with 95% confidence interval in parentheses.

[c] p-value for trend, testing the hypothesis that the intervention effect size (Δ) differs by smoking category. For this test, infrequent smokers were coded as 0, occasional = 1, and regular = 2.

[d] Duration since last cigarette: 1 = earlier today; 2 = 1-7 days ago; 3 = 8-30 days ago; 4 = 1-3 months ago; 5 = 3-6 months ago; 6 = more than 6 months ago; 7 = never smoked.