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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 1837 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 smokers (80.5%) compared with occasional (63.8%) and regular smokers (61.5%, $p < 0.01$). 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.

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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 (Bachman 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, interven-

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ing 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%, $p=0.06$) (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 1188 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 2151 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 2151 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 at-least-monthly smoking), or skipped incorrectly, or gave inconsistent or invalid responses to the items. Thus, the cohort for this study consists of those 1837 (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" period. 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 1837 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.

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