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ADOLESCENT SMOKING CESSATION: THE INFLUENCE OF PEERS

by

Khatidja Ali

A Dissertation

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

Major: Psychology

The University of Memphis

August 2011

ABSTRACT

Ali, Khatidja. Ph.D. The University of Memphis. August 2011. Adolescent Smoking Cessation: The Influence of Peers. Major Professor: Leslie A. Robinson, Ph.D.

Given the link between peer smoking and the onset of tobacco use, it seems reasonable to expect that peer behaviors may also influence smoking cessation. This study examined friends' reactions to adolescents' attempts to reduce smoking and determined normative data on the presence of these behaviors. Overall, approximately 80% of adolescents informed their peers about their attempt(s) to reduce smoking. Peers responded in several potentially helpful ways (i.e., talked or listened to the teen, stopped smoking around the teen, or attempted to reduce smoking with the teen) and several potentially harmful ways (i.e., teased the teen, smoked around the teen, or offered the teen cigarettes) to adolescents' attempts to reduce smoking. This study also examined the association of these peer behaviors with short-term changes in number of cigarettes and smoking cessation. Peer behaviors were not associated with statistically significant change in number of cigarettes over time for adolescents who attempted to cut down smoking. The study also found those who had friends who talked and/or listened to them were more likely to have a successful quit attempt at one week. These results draw attention to the need to further examine peers' reactions to adolescents' attempts to reduce smoking and to develop smoking cessation interventions that account for the peer environment.

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Adolescent Smoking Cessation: The Influence of Peers

Cigarette smoking has long been established as the principle cause of lung cancer and has been known to increase the risk of heart disease, chronic bronchitis, emphysema, vascular disease, and stroke (American Cancer Society, 2005). Studies suggest that smoking causes diseases in nearly every organ in the body (U.S. Department of Health and Human Services [USDHHS], 2004). Despite the established health risks, approximately 3,600 children between the ages of 12 and 17 start smoking each day; thus, over 1,240,000 children will experiment with smoking each year (Substance Abuse and Mental Health Services Administration [SAMHSA], 2008). Further, one of the strongest predictors of tobacco addiction in adulthood is the initiation of tobacco use during adolescence (Choi, Gilpin, Farkas, & Pierce, 2001). In fact, almost 80% of all adults who are smokers reported having started smoking when they were adolescents (i.e., before the age of 18; SAMSHA, 2008). There is a clear need to focus attention on adolescent smokers.

Nicotine Dependence and Adolescents' Attempts to Reduce Smoking

Current research indicates that adolescents develop symptoms of withdrawal before the onset of daily smoking (DiFranza & Wellman, 2005; Prokhorov et al., 2001; Wellman, DiFranza, Savageau, & Dussault, 2004). Studies on adolescent smokers have demonstrated symptoms of nicotine dependence, such as impaired control and cravings, develop soon after the initiation of smoking (Gervais, O'Loughlin, Meshefedjian, Bancej, & Tremblay, 2006; O'Loughlin et al., 2003). In addition, adolescent smokers report difficulty and discomfort in the process of quitting (e.g., diminished autonomy; Savageau, Mowery, & DiFranza, 2008; Scragg, Wellman, Laugesen, & DiFranza, 2008).

Thus, emerging research suggests that the development of nicotine dependence occurs much earlier in smoking onset than expected (Colby, Tiffany, Shiffman, & Niaura, 2000; O'Loughlin et al., 2003; Savageau et al., 2008).

Adolescent smokers begin attempting to quit soon after they start to smoke (Bancej, O'Loughlin, Platt, Paradis, & Gervais, 2007). A recent review of adolescent smokers ($n = 52$ studies for early to late adolescents age range from 10 to 20 years) demonstrated that quit attempts are extremely common among younger adolescents (age < 16 years) and non-daily smokers (Bancej et al., 2007). Studies have found that non-daily smokers are more motivated to quit and make more quit attempts than daily smokers (Bancej et al., 2007; Leatherdale & McDonald, 2005; Oksuz, Mutlu, & Malhan, 2007; Scheffels & Lund, 2005). Bancej and colleagues (2007) reported that more than two-thirds of all adolescent smokers in the study initiated at least one quit attempt within a 12 month period (median: 68%; range: 43–92%). Unfortunately, 92% of these smokers relapsed within the year (Bancej et al., 2007). In addition to the high rate of quit attempts by adolescents, adolescent smokers also attempt to cut down smoking (Balch et al., 2004; Myers & MacPherson, 2004; Myers, MacPherson, Jones, & Aarons, 2007). In fact, researchers have reported that almost 80% of teens who attempt to quit smoking have utilized cutting down smoking as a strategy for smoking cessation (Myers & MacPherson, 2004; Myers et al., 2007). Differences between adolescents who attempt to quit smoking vs. cut down smoking are largely unexamined in the literature. Overall, many adolescent smokers attempt to quit smoking, and most of them are unsuccessful.

Adolescents' Smoking Cessation Programs

In an attempt to help adolescent smokers quit successfully, researchers have begun to design smoking cessation programs that specifically target teens. A wide range of programs have been developed during the last few decades; these programs have ranged from those that target individuals to those that target entire organizations or communities (Adelman, Duggan, Hauptman, & Joffe, 2001; Backinger, Fagan, Matthews, & Grana, 2003; Horn, Dino, Kalsekar, & Mody, 2005). Researchers have developed programs that utilize a range of treatment approaches, including motivational interviewing, acupuncture, and pharmacotherapy (Backinger et al., 2003).

A recent Cochrane review quantitatively evaluated smoking cessation interventions for adolescents (Grimshaw & Stanton, 2006). Stringent methodological criteria were applied to identify 15 trials that targeted adolescent smoking cessation (Grimshaw & Stanton, 2006). The review utilized pooled odds ratios to evaluate varying treatment approaches, including two pharmacotherapy interventions, three stages of change interventions, nine psychosocial (enhancement of motivation and behavioral management) interventions, and one multi-modal intervention (Grimshaw & Stanton, 2006). Overall, the review found that no intervention approach was associated with sustained quitting (Grimshaw & Stanton, 2006). Thus, adolescent smoking cessation programs are considerably less effective than smoking cessation interventions among adults (Grimshaw & Stanton, 2006; Lemmens, Oenema, Knut, & Brug, 2008). Clearly, more effective smoking cessation programs for teens are needed.

Peers and Adolescent Smoking

One area that merits particular attention is peer influence on adolescent smoking cessation (e.g., Fiore, Jorenby, Baker, 1997; Moolchan, Ernst, & Henningfield, 2000). Peer tobacco use has consistently been shown to play a critical role in adolescent smoking onset (Avenevoli & Merikangas, 2003; Moolchan et al., 2000; Okoli, Richardson, & Johnson, 2008; Robinson, Klesges, Zbikowski, & Glaser, 1997; Tucker, Ellickson, & Klein, 2002). The relation between peer behaviors and smoking cessation has received far less attention. In the following section, literature on peer influences on adolescent tobacco onset and progression will be reviewed. Next, research on the role of peers in smoking cessation will be examined.

Adolescent smoking onset and progression: Peer selection and influence. The peer environment is one of the strongest and most consistent correlates of smoking behavior (Okoli et al., 2008). Affiliation with smoking peers has been found to increase the likelihood of smoking onset (Robinson et al., 1997; Urberg, Degirmencioglu, & Pilgrim, 1997). A substantial body of literature indicates that adolescents are similar to their friends in terms of smoking behavior (e.g., Kobus, 2003; Okoli et al., 2008). Similarities in smoking behaviors among friends may occur as the result of two processes: (1) the selection of friends with similar smoking behaviors and/or (2) the adjustment of smoking behavior in response to the example of or direct pressure from friends. These two processes are known as selection and influence, respectively (Ennett & Bauman, 1994; Urberg et al., 1997).

The literature has shown that adolescent smokers befriend smokers, and non-smokers befriend other non-smokers (Ennett, Bauman, & Koch, 1994; Michell, 1997;

Urberg, Değirmencioglu, Tolson, & Halliday-Scher, 1995). In fact, drug use has been identified as an important dimension in group formation (Urberg et al., 1997). In addition, adolescents who wanted to experiment with smoking reported actively seeking out peers who smoked (Michell & West, 1996). Clearly, there is evidence for the process of selection among teens; however, it is also clear that the selection process does not operate independently. An increase in the level of smoking has been linked to friends' encouragement and approval of smoking behaviors (Flay, Hu, & Richardson, 1998; Lloyd-Richardson, Papandponatos, Kazura, Stanton, & Niaura, 2002). In addition, adolescents' perceptions of smoking prevalence influence initiation of smoking behaviors (Rowe, Chassin, Presson, Edwards, & Sherman, 1992). Overall, evidence has suggested that both selection processes (i.e., smokers selecting smokers as friends) and influence processes (e.g., peer behaviors, peer attitudes, and perceived norms) play a role in accounting for the similarities in smoking behavior among friends (Dishion & Owen, 2002; Ennett et al., 1994).

More recently, research has begun to focus on the relative contributions of selection and influence of peers on smoking behavior (Ennett & Bauman, 1994; Mercken, Candel, Willems, & de Vries, 2009; Simons-Morton & Chen, 2006). Ennett and Bauman (1994) utilized peer network analyses to examine smoking among 8th graders ($n = 945$); the researchers found that selection and influence accounted for equal levels of variance in peer group similarities. Simons-Morton and Chen (2006) found evidence for the relation of both selection and influence on adolescent substance use (alcohol and tobacco), but the impact of influence was more consistent over time. Similarly, Mercken and colleagues (2009) found that as adolescents grow older, smoking-based selection

processes (i.e., picking friends who smoke) decrease, whereas influence processes increase. Overall, there is clear evidence that both peer selection and influence impact adolescent tobacco onset and progression.

Smoking cessation and quit attempts: Peer smoking influences. Researchers have consistently found that adolescent smokers are less likely to quit if they have more exposure to peers who smoke (Burt & Peterson, 1998; Chen, White, & Pandina, 2001; Rose, Chassin, Presson, & Sherman, 1996; Tucker, Ellickson, Orlando, & Klein, 2005) and if they perceive a higher prevalence of smoking among peers (Rose et al., 1996; Tucker et al., 2002). In addition, some researchers have found that adolescents who spend more time with smoking friends tend to make fewer quit attempts (Jones, Schroeder, & Moolchan, 2004).

Given the link between peer smoking and adolescent patterns of quitting, it seems reasonable to speculate that other peer behaviors may also influence the success of smoking cessation. Some studies have provided evidence that peers may engage in activities aimed to influence others not to smoke. In a survey of Australian secondary school students ($n = 2451$), Stanton, Lowe, and Gillespie (1996) examined peer behaviors that were geared toward influencing other adolescents not to smoke, including: “told students to stop smoking,” “told students that smoking is bad for their health,” “told other students I don’t like smoking,” “tried to avoid students when they are smoking,” “told students [he/she] would help them give up smoking,” and “taken or kept cigarettes away from students.” The study found that 58% of all adolescents and 29% of smokers reported engaging in one or more of these behaviors (Stanton et al., 1996). Using data from the same survey, Stanton, Baade, and Moffatt (2006) found that smokers who

themselves engaged in helpful peer influences were 2.5 times more likely to try to quit than participants who had not engaged in helpful peer influences. Thus, there is some evidence that adolescents may attempt to provide smoking friends with disincentives to smoking.

McVea, Miller, Creswell, McEntarrfer, and Colman (2009) conducted semi-structured interviews with 15 adolescent smokers to explore participants' subjective experiences of making a quit attempt. This study found that most non-smoking friends actively expressed disapproval of smoking, and some non-smoking friends created restrictions on smoking behaviors (McVea et al., 2009). Additionally, adolescents reported that these peer behaviors provided some incentive for them to quit. Adolescents in the study reported difficulty quitting when their smoking peers engaged in harmful behaviors such as smoking in front of the quitter, teasing the quitter, and offering the quitter cigarettes (McVea et al., 2009). Thus, there is also some evidence that peers engage in behaviors that may adversely influence adolescent smoking outcomes.

In summary, the presence of smoking peers and time spent with smoking peers discourages attempts to reduce smoking (Jones et al., 2004; Tucker et al., 2005). Alternatively, researchers have found that peers may also engage in behaviors to encourage quit attempts (McVea et al., 2009; Stanton et al., 2006; Stanton et al., 1996). Thus, peers may provide both motivation for and disincentives for adolescents to initiate quit attempts. There is some qualitative evidence that peers who smoke engage in harmful behaviors when their friends try to quit (e.g., teasing behavior; McVea et al., 2009). Nevertheless, our knowledge of peer behaviors geared to influence adolescents' smoking cessation is limited, and studies are needed to establish base rates of these

behaviors. In addition, the relationship of these peer behaviors to smoking outcomes (e.g., success in smoking cessation) need to be examined in order to evaluate which peer behaviors support or impede adolescents' attempts to reduce smoking.

The Current Study

The present study sought to determine normative data on peer reactions to teens' attempts to quit or cut down smoking. Preliminary analyses examined: (a) how often teens inform friends of their attempts to reduce smoking, (b) the number of friends teens inform, (c) the level of perceived support from smoking friends, (d) the level of perceived support from non-smoking friends, (e) perceptions of friends' potentially helpful behaviors during attempts to reduce smoking, and (f) perceptions of friends' potentially harmful behaviors during attempts to reduce smoking. The varying rates of these behaviors in those who attempted to quit smoking vs. those who attempted to cut down smoking were also examined.

The second goal of this study was to examine whether the peer reactions above were related to adolescents' smoking outcomes (i.e., changes in the number of cigarettes smoked and success of quit attempts). Due to the inherent relationship of nicotine dependence and teens' smoking behavior, level of nicotine dependence was also considered within this relationship (Tucker et al., 2005). These relationships were examined during an active attempt to reduce smoking.

It was hypothesized that peers would provide both incentives and disincentives to adolescents during an attempt to reduce smoking. It was also hypothesized that potentially helpful peer behaviors would be related to higher levels of success in attempts to reduce smoking. Further, it was hypothesized that potentially harmful peer behaviors

would be related to a lack of success. This study is the first study to explore normative data regarding peer reactions to adolescents' attempts to reduce smoking. It is also the first quantitative study to explore the possible relationship between peer behaviors that might support or impede adolescents' attempts to reduce smoking and smoking outcomes.

Methods

Overview

Data were collected as part of the Adolescent Cessation and Evaluation Study (ACES), a larger study designed to investigate the acceptability of various intervention components designed to help adolescent smokers quit. Different components were evaluated by three different cohorts of adolescents. Participants in Year 1 and Year 2 were exposed to components designed to increase motivation for quitting and to provide information on strategies for quitting (see Table 1 for description of components). After being exposed to each component for their year in the program, participants were asked to evaluate each component. The most popular components were then selected to design the third year's curriculum (see Table 1). The current research relies on data collected prior to component exposure; thus, the intervention components did not affect this study's results.

Table 1

Motivational and Strategic Intervention Components for Adolescent Smokers

Year One	
*Finances: “The Price of Smoking”	Participants calculated the amount they spent on smoking during a typical day, week, month, and year; they then explored alternative ways they could spend the money (e.g., go to a movie, CDs/DVDs).
Manipulation by the Tobacco Industry	Participants were provided with evidence that the tobacco industry targets the “youth market” to support their business using advertising strategies (e.g., making you feel like you are part of the group).
*Quitting Education	Participants explored methods to quit, including a) cutting back before quitting and b) setting a quit date.
Stress and Mood and Smoking	Discussed the “relaxation effect,” which might be caused by a temporary reduction in withdrawal effects. Discussed appropriate ways to express and cope with emotions.
*Health Concerns	Discussed specific diseases and negative health effects caused by smoking.
Music	Participants examined three modern pop songs as they relate to addictive behavior and were asked to reflect on the lyrics as they apply to their own “relationship” with smoking.
Social Management and Social Relations	Participants explored how smoking impacts their social relationships and how social relationships impact their smoking. Provided participants an opportunity to talk about the experience of quitting.

Table 1 continued

Motivational and Strategic Intervention Components for Adolescent Smokers

Year Two	
*Coping with Withdrawal Effects	Participants a) were provided with basic information on withdrawal effects, b) were coached on identifying withdrawal symptoms, and c) were instructed in methods for dealing with cravings.
Stimulus Control	Participants received instruction in stimulus control (e.g., removing smoking materials from home).
Family Coping	Participants explored family reactions to both continued smoking and quitting. Explored how families' attitudes can help or hinder quitting. Discussed importance of developing positive support systems.
*Support from Family & Friends	Participants received a) instruction in methods for approaching family and friends for help and b) information on ways family/friends can help during quit attempts (e.g., avoid nagging).
Yoga as Exercise	Participants were introduced to yoga as an alternative, healthy way to manage symptoms of quitting.
*Self-Talk and Self-Reward	Participants received instructions a) in identifying positive and negative self-talk that impacts quitting and b) on the importance of recognizing their own efforts while quitting.
*Planning Your Quit	Participants discussed how to “problem solve” in order to deal with high risk situations.
*Indicates components in year three of the curriculum	

Participants

Participants were recruited from high schools in an urban Mid-South city. Eligible students were those who had violated their schools' tobacco policies. Students and their parents were offered reduced disciplinary measures by school administrators in exchange for participating in the project. A total of 195 participants enrolled in the ACES program. Of these, 91 participants reported a purposeful attempt to reduce smoking prior to the start of the intervention and thus met the inclusion criteria for the current investigation.

These 91 participants at baseline were not significantly different from the larger group of adolescents in the ACES program on gender, race, grade, and age ($\chi^2(1, n = 185) = 0.64, p = .423$, $\chi^2(1, n = 185) = 16.15, p = .365$, $\chi^2(4, n = 185) = 3.08, p = .544$, and $t(1,183) = 1.75, p = .082$, respectively). As expected, participants who reported having made an attempt to reduce smoking at baseline were less dependent smokers ($M = 2.66, SD = 1.50$) than participants who did not report having made an attempt to reduce smoking at baseline ($M = 3.20, SD = 1.54, t(1,183) = 2.43, p = .016$). The average age of our participants was 16.30 years ($SD = 1.18$). The gender representation of the sample was mostly males (71.4%); notably, in the United States, smoking rates among girls are lower than among boys (Morbidity and Mortality Weekly Report [MMWR], 2010). Please see Table 2 for descriptive statistics of sample demographics and initial smoking status.

Table 2

Sample Characteristics

Demographic Variable	Count (N = 91)	Percent
Gender		
Male	65	71.4%
Female	26	28.6%
Ethnicity		
White not Hispanic	49	53.8%
African American	39	42.9%
Other	3	3.3%
Current Grade Level		
Ninth	23	25.3%
Tenth	23	25.3%
Eleventh	19	20.9%
Twelfth	24	26.4%
Other	2	2.2%
Level of Smoking		
Smoke Daily	44	48.4%
One to six cigarettes/week	21	23.1%
One to three cigarettes/week	10	11.0%
Less than one cigarette/month	5	5.5%
Only one or a few in lifetime	11	12.1%

Procedure

Procedures for this study were approved by The University of Memphis Institutional Review Board. Signed parental consent and student assent were required before students were recruited into the study (see Appendix A). Student participants were asked to attend four weekly individual 50-minute sessions with a trained health educator provided by the project. All health educators were graduate students in clinical or counseling psychology. Stringent confidentiality procedures were utilized in the study (e.g., having participants seal the envelope with their data and having health educators sign a confidentiality contract); these procedures were reviewed with the participants in order to increase validity of self-report of smoking behavior (Bauman, Koch, & Bryan, 1982; Dolcini, Adler, Lee, & Bauman, 2003).

After providing assent, participants completed baseline assessment measures that examined their smoking behavior (e.g., level of dependence; see Appendix B and Appendix C). At the baseline session (i.e., Session 1), participants who made a quit attempt or purposefully cut down on their smoking were asked to answer questions about their friends' reactions to their changed behavior. Due to the low literacy levels of some participants, health educators read questions aloud and then marked participants' verbal responses on the surveys.

During the next weekly session (i.e., Session 2), participants were asked to indicate their current smoking status and to report their consumption of cigarettes during the past week. This survey was completed before exposure to any intervention components. Thus, the intervention was not responsible for changes in the teens' smoking behavior at Session 2. The remainder of Session 2 was devoted to the presentation and

rating of various components designed to help participants quit smoking (see Table 1). Session 3 and Session 4 followed the same procedure as Session 2; since data from these sessions were collected after the start of the intervention, they were not examined as part of the present study. Thus, the current study included data from Session 1 and Session 2; these sessions were generally 10 days apart ($M = 9.82$ days, $SD = 7.63$).

Measures

Sample demographics and initial smoking status. Participants provided general demographic information (e.g., gender, ethnicity, age, and grade) and smoking status through self-report (see Appendix B). Each participant's initial smoking status was assessed on a 5-point scale ranging from 0 to 4 (see Appendix C): (0) "Few cigarettes, just to try," (1) "Smoke less than one cigarette per month," (2) "Smoke 1 to 3 cigarettes per month," (3) "Smoke 1 to 6 cigarettes per week," and (4) "Smoke daily."

To further assess smoking status at Session 1, participants were asked "Which of the following is true for you?" (see Appendix C). The response options were "I'm still smoking," "I'm thinking about quitting," "I'm trying to cut down," or "I quit sometime within the past week." Participants were classified as having made a quit attempt (0) if they endorsed the response option "I quit sometime within the past week." Participants were classified as having made a cut down attempt (1) if they endorsed the response option "I'm trying to cut down." Only participants who reported a current purposeful attempt to reduce smoking (i.e., attempt to cut down or attempt to quit) were included in the study.

Dependence. An adapted version of the Fagerström Test for Nicotine Dependence (FTND) was used to assess participants' levels of dependence at baseline

(Fagerström & Schneider, 1989). Tests for internal consistency on the FTND have revealed alpha coefficient values ranging from 0.7 to 0.8 and test-retest reliability coefficients ranging from 0.7 to 0.9, which demonstrate adequate reliability (Etter, Duc, & Perneger, 1999). Studies on the validity of the FTND have indicated that all variables on the FTND are strongly associated with saliva cotinine in adult populations (Etter et al., 1999). To date, no measure has been considered the gold standard for measurement of adolescent dependence.

In our study, the FTND was modified to reflect smoking behaviors and to assess tobacco dependence in adolescents (see Appendix C). In order to determine when adolescents smoke their first cigarette of the day, participants were asked, “How soon after you wake up do you smoke your first cigarette?” The response options were modified to include longer time frames to reflect a possible lack of opportunity for adolescents to smoke at home in the mornings. The response option “Within the first 30 minutes” was scored as (1) and the following response options were scored as (0): “In the evenings,” “In the afternoon,” “More than 30 minutes after waking but before noon.” Difficulty refraining from smoking was assessed by asking adolescents two questions, “Do you find it difficult not to smoke in places where it is forbidden (church, library, movies, etc.)?” and “Do you still smoke if you are so ill that you are in bed most of the day?” The response options for these questions were (1) “Yes” and (0) “No.” The number of cigarettes smoked per day was assessed by directly asking adolescents, “How many cigarettes a day do you smoke?” The response options were modified to reflect lower level of smoking in adolescents vs. adults. The response option “Over 26 cigarettes a day” was scored as (2); “About 16-25 cigarettes a day” was scored as (1); and the

following response options were scored as (0): “About 1-15 cigarettes a day” and “Less than 1 a day.” Adolescents were also asked, “Which cigarette would you most hate to give up?” The response option, “First cigarette in the morning,” was scored as (1), whereas the following response options were scored as (0): “Any other cigarette before noon,” “Any other cigarette after noon,” or “Any other cigarette in the evening.” In addition, adolescents were asked a question regarding the inhalation of a cigarette (i.e., “How often do you inhale?”); this question from the original Fagerström Tolerance Questionnaire (FTQ) was included to reflect variability in adolescents’ smoking behavior (Heatherton, 1991). The response option “Always” was coded as (2); “Seldom” and “Quite Often” were scored as (1); and “Never” was scored as (0).

Overall, the adapted FTND contained six items. The total sum scores ranged from 0 to 8. In the present study, an alpha coefficient value of 0.60 demonstrated adequate internal consistency according to Nunnally and Bernstein (1994).

Independent variables. All participants were asked, “Do any of your friends know you are trying to quit or cut down?” (see Appendix D). Participants who endorsed having at least one friend who knew about their attempt to reduce smoking ($n = 72$) were asked, “How many (friends)?” Due to the skewed distribution of this item, the item was re-distributed for all analyses. Normative data were presented for the original item; whereas all analyses were conducted with the re-distributed item. This continuous variable was re-distributed as follows: (0) 1 friend, (1) 2 to 3 friends, (2) 4 friends, (3) 5 to 7 friends, (4) 8 to 10 friends, (5) 11 to 14 friends, and (6) 15 or more friends.

Two separate items assessed support from smoking vs. non-smoking friends by asking participants, “How supportive are your (smoking/non-smoking) friends of your

trying to quit/cut down smoking?” Participants indicated level of support using a 4-point Likert scale ranging from 0 (*not at all supportive*) to 3 (*very supportive*). Participants also indicated if they did not have any smoking/non-smoking friends or if none of their smoking/non-smoking friends knew of their attempt to reduce smoking.

Potentially helpful behaviors were assessed by three separate items that assessed support during their current attempt to reduce smoking. Teens were asked if friends had supported them by (a) talking or listening, (b) stopping smoking around the participant, or (c) trying to quit smoking along with the participant. The response options for each behavior were coded (1) “No” or (0) “Yes.” Potentially harmful behaviors were also assessed by three separate items. Teens were asked if friends had (a) teased them about trying to quit, (b) smoked around them, or (c) offered them cigarettes. The response options for each behavior were coded (1) “No” or (0) “Yes.” The internal consistencies of the measures developed to assess friends’ reactions were explored. The internal consistencies of both the potentially helpful behaviors items ($\alpha = 0.39$) and potentially harmful behaviors items ($\alpha = 0.44$) were inadequate (Nunnally & Bernstein, 1994). Therefore, the relations between each peer behavior and smoking outcomes were evaluated separately.

Smoking outcome variables. Separate dependent variables were examined for adolescents who attempted to quit vs. adolescents who attempted to cut down. The 7-day timeline follow-back instrument (TLFB; see Appendix C) was used to measure adolescent smoking for the past seven days. Participants were asked to report the number of cigarettes smoked each day by utilizing current reference points (i.e., anchors) on a calendar (e.g., school holiday, homecoming game). Preliminary studies indicate the

TLFB is a reliable and valid measure of adolescent' smoking patterns (Lewis-Esquerre et al., 2005). For participants who made an attempt to cut down, the change in number of cigarettes was assessed. For participants who made an attempt to quit, the success of the quit attempt was assessed.

Success of attempts to cut down. At each session, participants who reported an attempt to cut down indicated how many cigarettes they had smoked on each of the past seven days, using the TLFB. For each session, the cigarettes smoked each day of the week were summed in order to create a variable that reflected the total number of cigarettes smoked (i.e., number of cigarettes for the weeks preceding Session 1 and Session 2).

Success of attempts to quit. Weekly or daily smokers who reported a quit attempt at Session 1 completed a 7-day TLFB at Session 2 in order to determine if they were still quit. Due to our definition of smoking cessation (i.e., quit for one week), adolescents who smoked less than one cigarette a month or smoked only one or a few in lifetime were excluded from the analyses. Thus, only weekly or daily smokers were chosen to evaluate the success of attempts to quit. A successful quit attempt (0) was defined as not smoking for one week (i.e., no cigarettes smoked for one week prior to Session 2). An unsuccessful quit attempt (1) was defined as having smoked, even part of a cigarette, over the past week preceding Session 2.

Overview of Analyses

First, descriptive data on smokers' perceptions of their friends' reactions to their attempts to reduce smoking are presented. Both the proportion of teens who told their friends about their attempt to reduce smoking and the number of friends who were

informed were examined. We determined the frequency of supportive behaviors from smoking and non-smoking friends separately; we also compared differences among levels of support from smoking and non-smoking friends using paired samples *t* tests. In addition, we explored the frequency of potentially helpful peer behaviors (friends talking or listening to the participant, stopping smoking around the participant, or attempting to reduce smoking along with participant) and potentially harmful peer behaviors (friends teasing the participant, smoking around the participant, or offering the participant cigarettes). For all of the above peer behaviors, chi-squares analyses or independent samples *t* tests were conducted to examine the relationship of peer behaviors and participants' intent to reduce smoking at baseline (i.e., quit vs. cut down).

Next, separate repeated measures ANOVAs were conducted in which *each* of the peer behaviors above served as the between-subjects factor. For each analysis, number of cigarettes at Session 1 and number of cigarettes at Session 2 were the two levels of the repeated variable (i.e., within-subjects factor). Level of nicotine dependence (adapted FTND) served as a covariate in each analysis, due to prior research that indicated its relation with peer smoking behaviors (Tucker et al., 2005).

Finally, logistic regression analyses were conducted in which *each* peer behavior variable was used to predict quitting among weekly or daily smokers. The following items were reverse coded in order that the level assumed to be at greater risk was coded higher: number of friends, level of support, and possibly harmful peer behaviors. The level of nicotine dependence (adapted FTND) served as a covariate in these analyses. All statistical tests were performed at the .05 level of significance.

Results

Baseline Sample Characteristics

Of the 91 participants who reported having attempted to reduce smoking at Session 1, 62.6% attempted to cut down ($n = 57$) and 37.3% attempted to quit ($n = 34$). Participants who made an attempt to quit were not significantly different at baseline compared with adolescents who made an attempt to cut down in gender, race, and grade ($\chi^2(1, n = 91) = 0.12, p = .732$, $\chi^2(1, n = 91) = 5.70, p = .058$ and $\chi^2(4, n = 91) = 4.85, p = .303$, respectively). However, participants who made an attempt to quit were significantly younger ($M = 15.97$ years, $SD = 1.22$) compared to participants who made an attempt to cut down ($M = 16.49$ years, $SD = 1.12$, $t(1,89) = 2.08, p = .041$).

Overall, participants scored 2.66 ($SD = 1.50$) on the adapted FTND and smoked an average of 21.07 ($SD = 29.59$) cigarettes per week. As expected, participants who made an attempt to quit were less dependent smokers ($M = 1.91$ adapted FTND, $SD = 1.45$) than participants who attempted to cut down ($M = 3.11$ adapted FTND, $SD = 1.45$, $t(1,89) = 3.96, p < .001$).

Informing Friends of Attempts to Reduce Smoking

Approximately 80% of teens told their friends that they planned to reduce smoking. A chi-squares analysis was conducted to determine the relation between informing friends and quitting vs. cutting down. Friends' knowledge of the teens' attempt to reduce smoking was not related to whether a teen attempted to quit or attempted to cut down ($\chi^2(1, n = 90) = .05, p = .827$).

Of the 72 participants who informed their friends of their plan to reduce smoking, on average they informed 8.53 peers ($SD = 11.16$) with a reported range of 1 to 60 peers.

Most participants informed 4 peers that they were attempting to reduce smoking. All of these participants informed their smoking friends (100%), and 86.1% informed their non-smoking friends. Interestingly, 8% of participants reported they did not have any non-smoking friends, whereas all participants reported they had smoking friends. We conducted a paired samples t test to examine differences between informing smoking friends and informing non-smoking friends. Teens were significantly more likely to inform their smoking friends than their non-smoking friends of their attempts to reduce smoking, $t(1,66) = 2.55, p = .013$.

Next, we conducted an independent samples t test to examine whether the number of friends notified differed according to their change strategy (i.e., quitting or cutting down). The number of friends who knew about the teens' attempts to reduce smoking was significantly related to type of change attempted by the participant (i.e., quit vs. cut down; $t(1,70) = 2.66, p = .01$). Overall, participants who attempted to quit informed more friends than participants who attempted to cut down.

Peer Behaviors Regarding Adolescents' Attempts to Reduce Smoking

Perceived support of teens' attempts to reduce smoking. Of the participants who informed their non-smoking friends of their plans to reduce smoking, 54.8% perceived these friends to be very supportive. Of note, teens reported that only 15.5% of their smoking friends were very supportive. We conducted a paired samples t test to examine differences between support from smoking friends and support from non-smoking friends. As shown in Figure 1, teens perceived their non-smoking friends ($M = 2.17, SD = 1.05$) to be significantly more supportive of their attempts to reduce smoking than their smoking friends ($M = 1.20, SD = 1.03, t(1, 61) = 6.39, p = .005$).

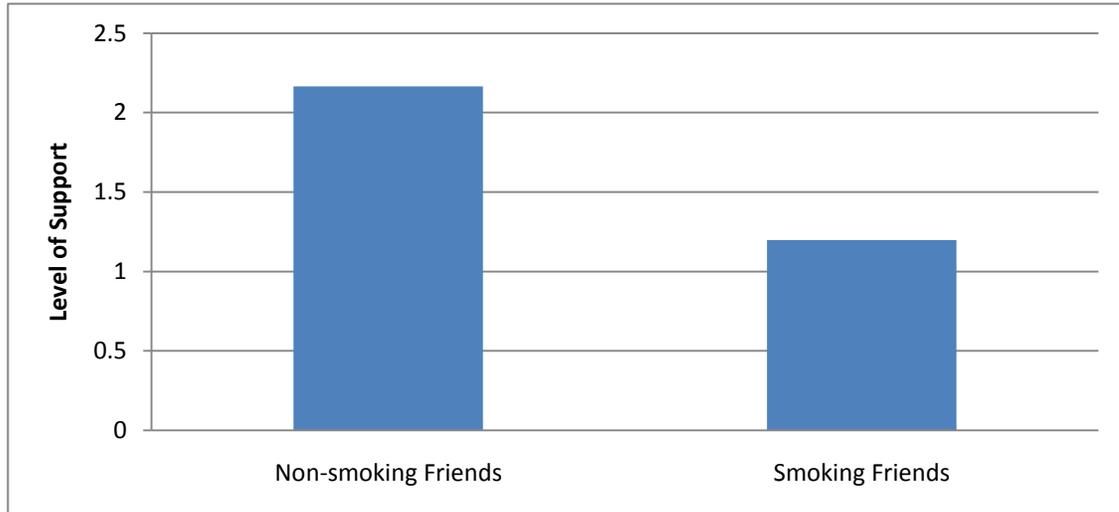


Figure 1. Level of support from smoking and non-smoking friends using a 4-point Likert scale ranging from 0 (*not at all supportive*) to 3 (*very supportive*).

We conducted two separate independent samples *t* tests to examine the relationship between support from friends and quitting or cutting down. Support from smoking friends was not related to whether a teen attempted to quit or attempted to cut down ($t(1,69) = 1.00, p = .319$); however, support from non-smoking friends was related to the type of change attempted by participants, $t(1,60) = 2.09, p = .041$. Participants who attempted to quit rated their non-smoking friends ($M = 2.50, SD = .88$) as more supportive than participants who attempted to cut down ($M = 1.95, SD = 1.09$).

Potentially helpful peer reactions to teens' attempts to reduce smoking. Most participants who told their peers they planned to reduce smoking reported that their peers talked or listened to them when they were having difficulties (56.9%). Participants reported that their peers attempted to reduce smoking along with them (59.7%). In

addition, 37.5% of participants reported their peers stopped smoking around them (see Table 3).

Table 3

Frequency of Peer Behaviors

Behaviors	Number Reporting Yes	Percent
Potentially Helpful Behaviors		
Friends talked/listened to teen	41	56.9%
Friends stopped smoking around teen	27	37.5%
Friends tried to quit smoking also	43	59.7%
Potentially Harmful Peer Behaviors		
Friends teased teen about quitting	13	18.1%
Friends smoked around teen	51	70.8%
Friends offered teen cigarettes	41	56.9%

A series of chi-square analyses were conducted to determine whether these behaviors were associated with quitting vs. cutting down. Having friends who talked/listened to the teen ($\chi^2 (1, n = 72) = .35, p = .554$) or having friends who stopped smoking around the teen ($\chi^2 (1, n = 72) = .40, p = .526$) was not related to whether a teen

attempted to quit or attempted to cut down. There was a trend such that adolescents whose peers attempted to reduce smoking along with them were more likely to make an attempt to cut down than an attempt to quit, $\chi^2(1, n = 72) = 3.11, p = .078$.

Potentially harmful peer reactions to teens' attempts to reduce smoking.

Most adolescents who told their peers they planned to reduce smoking reported their peers offered them cigarettes (56.9%). Participants reported that most of their peers (70.8%) continued to smoke around them. In addition, 18.1% of participants reported their peers teased them about trying to quit (see Table 3).

A series of chi-squares analyses were conducted to determine the relation between peer behaviors and quitting vs. cutting down. Having friends who teased the teen about trying to quit ($\chi^2(1, n = 72) = 1.17, p = .280$) or having friends who smoked around the teen ($\chi^2(1, n = 72) = 1.70, p = .192$) was not related to whether a teen attempted to quit or attempted to cut down. There was a trend such that adolescents whose peers offered them cigarettes were more likely to have made an attempt to cut down than an attempt to quit, $\chi^2(1, n = 72) = 3.56, p = .059$.

Predictors of Cutting Down Smoking

For participants who attempted to cut down ($n = 57$), change in the number of cigarettes over time was examined as a function of peer behaviors on 10 separate repeated measures ANOVAs with one between-groups measure (peer behavior) and one covariate (dependence). Thus, for each analysis, the between-groups effects included peer behavior and dependence. The within-groups effects included change in cigarettes smoked over time, time by dependence, and time by peer behavior.

The results of these 10 ANOVAs revealed a consistent pattern of results. For example, in no case was the effect of time statistically significant (all $ps > .05$), indicating that the number of cigarettes smoked did not change significantly over time. Further, there were no statistically significant interactions between time and dependence, again indicating that initial dependence did not predict changes in cigarettes smoked (all $ps > .05$). In addition, there were no statistically significant interactions between time and peer behaviors, thus providing no evidence that peer behaviors changed the number of cigarettes smoked over time (all $ps > .05$). Turning to the between-groups section of the design, we found that in every case, there was a significant effect of dependence, such that higher dependence was associated with consuming more cigarettes overall, regardless of time (all $ps < .05$). Notably, there were no main effects of the independent variables, peer behaviors (all $ps > .05$).

Predictors of Quitting Smoking

For weekly or daily smokers who made an attempt to quit smoking ($n = 22$), logistic regression analyses were conducted in which each of the 10 peer behaviors was used in separate equations to predict success in quitting at Session 2 (i.e., successful vs. non-successful quit attempt). Level of nicotine dependence (adapted FTND) served as a covariate in each analysis.

Overall, these participants scored 2.32 ($SD = 1.29$) on the adapted FTND. Once again, the results of these 10 logistic regression analyses were fairly consistent. In every case, dependence was not significantly related to success in quitting. Most peer behaviors were also not significant as predictors of quitting. One exception was a variable measuring the presence or absence of friends who talked/listened to the teen. Adolescents

whose peers listened to them were 9.89 times more likely to successfully quit than those whose peers did not listen to them, $\beta = 2.29$, $p = .049$.

Discussion

It has been well established in the literature that peer influence plays an important role in establishing and maintaining adolescent smoking (Okoli et al., 2008). Hence, peer behaviors might influence adolescents' attempts to reduce smoking. The primary goal of the current study was to assess peer behaviors during adolescents' attempts to reduce smoking. The results of the current study indicated that (a) most adolescents told their peers about their attempts to reduce smoking and were more likely to share this information with smoking peers than with non-smoking peers, (b) adolescents' non-smoking friends were more supportive of their attempts to reduce smoking than their smoking friends, (c) peers responded in several potentially helpful ways to their friends who were attempting to reduce smoking (i.e., talked or listened to the teen, stopped smoking around the teen, or attempted to reduce smoking with the teen), and (d) peers also responded in ways that might interfere with adolescents' attempts to reduce smoking (i.e., teased the teen, smoked around the teen, or offered the teen cigarettes).

The second goal of this study was to examine whether these peer reactions were related to change in number of cigarettes smoked in adolescents' attempts to cut down and to success in adolescents' attempts to quit. Peer behaviors were not associated with statistically significant changes in the number of cigarettes smoked over time for adolescents who attempted to cut down smoking. Conversely, for weekly or daily smokers who made an actual quit attempt, the presence of peers who talked or listened to them was significantly related to a successful quit attempt at one week.

This study contributes to the literature by providing information on peer behaviors during adolescents' attempts to reduce smoking. Specifically, we found that 80% of adolescents informed their friends of their plans to reduce smoking and notified on average 8.5 peers. Consistent with our findings, researchers who examined strategies employed by adolescents to reduce smoking found that adolescents reliably seek social support (Myers et al., 2007).

Although teens were significantly less likely to inform their non-smoking friends, they reported their non-smoking friends were significantly more supportive. In addition, increased support from non-smoking friends was related to adolescents' attempts to quit but not to attempts to cut down. This finding is consistent with McVea et al.'s (2009) qualitative study, which found behaviors of non-smoking friends provided some incentive for adolescents to quit. Their study found that non-smoking friends verbalized disapproval of smoking and imposed restrictions on smokers. Given these findings, it seems reasonable that non-smoking friends might provide adolescents with encouragement to quit smoking.

The role of smoking friends in adolescents' cessation attempts is more complex. In our study, teens were significantly more likely to inform their smoking friends than non-smoking friends of their attempts to reduce smoking. Teens might seek more support from smoking friends both to mitigate the effects of their attempts to reduce smoking on their relationships and to encourage their smoking friends to reduce smoking (Stanton et al., 1996). Researchers have found that smoking peers may engage in behaviors to encourage quit attempts and that engaging in these behaviors is related to success in smoking cessation (Stanton et al., 2006; Stanton et al., 1996). In our study, despite

informing more smoking friends, adolescents reported these friends were significantly less supportive than non-smoking friends. This might be due to the smoking status of peers. Friends who are also attempting to reduce smoking might provide support; however, friends who are currently smoking might not offer support.

Most participants reported that their peers engaged in behaviors to assist them during their attempts to reduce smoking by talking and/or listening to them when they were having difficulties (56.9%) and by attempting to reduce smoking along with them (59.7%). Of the three possibly helpful peer behaviors, the least endorsed item involved quitting smoking around the participants (37.5%). As with previous findings of smoking friends, this might be due to the varying smoking status of peers (i.e., peers who are attempting to reduce smoking vs. peers who are currently smoking). Alternatively, teens might lack knowledge related to the importance of stimulus control in smoking cessation (Riedel, Robinson, Klesges, & McLain-Allen, 2002) and thus not engage in this potentially helpful behavior.

Overall, peers provide support for friends who are attempting to reduce smoking and engage in possibly helpful behaviors at high rates. Although these behaviors have not been examined in previous studies, there is some evidence consistent with our findings regarding peer support. Patten et al. (2004) found that non-smoking adolescents were willing to help their peers in their attempts to reduce smoking, and they reported providing support. Importantly, the manner in which this support was provided was not explored. Studies are needed to explore and to assess a broad range of possibly helpful peer behaviors in order to clarify the rates of these behaviors among smoking and non-smoking friends.

Researchers have reported that teens often report cutting down smoking as a strategy for smoking cessation (Myers & MacPherson, 2004; Myers et al., 2007). This might be due to adolescents' views that cutting down serves as a precursor to quitting. Teens might also believe that cutting down smoking is easier than quitting smoking. Alternatively, attempts to cut down might be more socially acceptable for adolescents. We found a trend such that adolescents reported their peers were more likely to join them in attempts to cut down smoking vs. join them in attempts to quit smoking. This finding suggests that adolescents' attempts to cut down smoking might be more accepted within teens' social environments than attempts to quit smoking. Studies are needed to explore the function that cutting down serves as opposed to quitting and to explore adolescents' willingness to accept attempts to cut down smoking.

Adolescents reported their smoking peers engaged in several behaviors that might undermine their attempts to reduce smoking, including offering them cigarettes (56.9%) and continuing to smoke around them (70.8%). Of note, over 18% of participants indicated their peers engaged in teasing behaviors related to their attempts to reduce smoking. Results from our study suggest that adolescents' social contexts might provide some barriers to reduction in smoking. Qualitative evidence suggests that these behaviors negatively impact smoking cessation, as adolescents have previously reported difficulty quitting smoking due to being tempted to smoke by friends (McVea et al., 2009). Given the high rates of these behaviors in our study and qualitative results that indicate these behaviors might deter quit attempts, it is important that smoking cessation programs account for these possible barriers and provide adolescents with strategies to counter these behaviors (e.g., prepare for teasing).

Most adolescents in our study attempted to cut down smoking ($n = 57$); for these participants, peer behaviors were not associated with statistically significant change in number of cigarettes over time. In addition, there were no between-group differences on any of the peer behaviors. These results do not support our hypothesis that peer behaviors would be related to change in number of cigarettes over time. It is possible that the short duration in which change in the number of cigarettes was measured (i.e., approximately one week) might not have allowed for significant change in smoking behavior. It is also possible that limits in the measurement of peer behaviors account for these non-significant results.

For participants in our study who were weekly or daily smokers that attempted to quit ($n = 22$), most peer behaviors were not associated with statistically significant differences in smoking cessation. In fact, only one peer behavior (teens that had friends who listened vs. teens that lacked friends who listened) was associated with a statistically significant difference in smoking cessation. These results provide minimal support for our hypothesis that peer behaviors would be related to smoking cessation. As with attempts to cut down smoking, these results might be due to limitations of measurements of peer behaviors and smoking cessation.

Adolescents whose peers listened to them had 10 times greater odds of successfully quitting than those whose peers did not listen to them. Importantly, adolescents who attempted to quit smoking were less dependent smokers than adolescents who attempted to cut down smoking ($M = 2.32$ adapted FTND, $M = 3.11$ adapted FTND, respectively). In addition, adolescents who attempted to quit smoking generally sought out greater amounts of peer support. As previously mentioned, teens

who attempted to quit informed more friends of their attempt to reduce smoking than teens who attempted to cut down. Research in adults has consistently found that participants who are successful in smoking cessation verbalize their intent to quit with others, thus increasing their accountability (West, Walia, Hyder, Shahab, & Michie, 2010). Having friends who talked or listened might be more beneficial to less dependent smokers who are motivated to seek support. For this group of smokers, peer-driven interventions may be particularly helpful.

It is important to note that results of this study are preliminary, and replication of results is necessary. In addition, this study has several important limitations. First, the small sample size might limit the possibility of finding significant differences between peer behaviors and smoking outcomes. Post hoc power analyses were conducted in order to determine the appropriate sample size for this study using G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007). The power analysis for the repeated measures ANOVAs suggested the sample was adequately powered to detect large effect size differences; however, the sample was not powered to detect small and medium effect size differences. The power analysis for the logistic regressions also suggested the sample was not adequately powered to detect small or medium odds ratio differences.

Another limitation was the lack of empirically validated measures to assess peer behavior during adolescents' attempts to reduce smoking. Given the lack of reliability in this study's measures, single items were used to assess peer behaviors; however, single item measures cannot capture the complexity of peer behaviors and their impact on smoking cessation. In addition, the use of dichotomous variables to examine possibly helpful and possibly harmful peer behaviors limits available data through the lack of

variability in responses. The use of one set of items to assess behaviors of both smoking and non-smoking friends limits adolescents' ability to report differences between these groups of friends. The item assessing peer support did not specify the potential type of support that could be offered by adolescents (Brock & Lawrence, 2009; Cutrona & Russell, 1990). We did not ask teens about the frequency and duration of their peers' behaviors. In addition, we did not assess the time adolescents spent with their peers who engaged in these behaviors. Finally, having reports from both adolescents who are attempting to reduce smoking and their friends would provide a clearer understanding of the social environment and would increase the validity of their self-reports (i.e., peer report verification; Brener, Billy, & Grady, 2003). Currently, there are no established practices for measuring peer reactions to adolescents' attempts to reduce smoking. The development of empirically validated measures that assess various dimensions of peer reactions to adolescents' attempts to reduce smoking are clearly necessary.

Another important limitation in our study is the measurement of smoking reduction. Although the timeline follow-back procedure provides a validated measure of smoking levels (Lewis-Esquerre et al., 2005), biochemical measurement of smoking status could help verify smoking cessation as well as increase the validity of self-report (Brener et al., 2003). In addition, measuring smoking for longer durations and over several time points would provide the opportunity to measure clinically significant levels of change in smoking status.

Finally, there are limits to the generalizability of the results. Only adolescents who were discovered violating their schools' tobacco policies were enrolled in the study; this may have led to greater amounts of motivation to reduce smoking. In addition, only

participants who reported attempting to reduce smoking during the first session were included in the study, and these participants were significantly less dependent than those who were not included in the analyses.

Despite these limitations, findings from the present study enhance our knowledge of peer behaviors during adolescents' attempts to reduce smoking and provide avenues for future research. It is suggested that future studies focus on the development of empirically validated measures to explore a range of peer behaviors that are related to adolescents' attempts to reduce smoking. In addition, correlates of peer behaviors and demographic differences in these behaviors need to be clarified. It is further suggested that future studies use peer-report verification (i.e., reports from both adolescents and their peers that are verified across participants) and a longitudinal study design with longer follow-up time periods. This would allow researchers to examine the experiences of adolescents who are attempting to reduce smoking and the reactions of their peers at multiple time points. In addition, this design would allow researchers to distinguish between expected peer behaviors and actual peer behaviors and to evaluate the impact of these behaviors on smoking cessation.

Given our results that suggest peers engage in high rates of possibly helpful and harmful behaviors, continued work in this area is needed to help develop targeted interventions for adolescent smoking cessation which consider peer influences. Current interventions for adolescent smoking cessation have not demonstrated sustained quitting (Grimshaw & Stanton, 2006). This might be due to the fact that these interventions do not account for the complex environment in which adolescents attempt to reduce smoking. This study attempted to explore this environment by examining peer influences in

smoking cessation. It is important to note that this study does not necessarily suggest that peer-only interventions should be employed; instead, all interventions should account for this complex environment in order to attempt to increase rates of adolescent smoking cessation.

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Appendix A

ACES – Adolescent Cessation and Evaluation Study

The University of Memphis

STUDENT CONSENT FORM

This research is being conducted by the University of Memphis at high schools in the Memphis City and Shelby County School Systems. If you have been caught with tobacco at school you may participate in this study.

The purpose of this study is to understand what types of programs might help teens stop smoking. In addition, we want to understand teens' experiences with quitting, including what motivates a quit attempt and what barriers interfere with success. Your feedback is important, even if you do not smoke cigarettes regularly.

To participate in this program, you will be asked to attend four meetings at school over a four-week period. Each meeting will last 1-1 ½ hours. Each of these meetings will take place with a health educator from the ACES office. This Health Educator will ask you to fill out a number of forms. The information you provide on these forms will be confidential to the fullest extent of the law. This means that the information you provide during this program will not be released to anyone connected with the school system. If the results from this research are published, your name will never be used and there will be no way for anyone to identify you.

The type of questions we will ask you will differ, depending on which year of the program you are in. During the first two years of the program, our goal is to have students give us feedback on the barriers and motivators for quitting. If you are participating during these first two years, you will be asked to complete surveys about your history of smoking and any quit attempt you may have made. Other questionnaires will ask you what factors might motivate quitting, and what barriers teen experience.

If you are referred in the third year of this program, you will participate in a program designed to help you quit smoking or stay quit if you have already quit. This program will be developed from feedback we received from teens in the first two years of the project. Over four sessions with a health educator individually assigned to you, you will learn about the latest methods for smoking cessation.

You will also be asked to have your level of carbon monoxide measured, to confirm whether or not you have been smoking. This procedure involves having you hold your breath for 15 seconds and then exhaling into a disposable tube attached to a small machine that indicates carbon monoxide levels in parts-per-million. This is a safe,

noninvasive procedure. Three months after the end of the program, we will ask you to repeat this procedure so we can see how much the project helped students stop smoking. This information is also confidential to the fullest extent of the law.

If you participate in this research program, you will receive special credit, in that schools adjust the consequences of your tobacco use at school. Schools vary in how they do this, and your Health Educator can explain your particular school's policy in more detail.

Your participation in this program is voluntary. You can withdraw at any time from the program, although you would not receive the school credit in this case. If you have any questions about this program, you could contact the Principal Investigator of the study, Dr. Leslie Robinson, at 678-1667. In addition, you could contact the Chair of the University of Memphis Institutional Review Board at 678-2533.

I have read this consent form and I agree to participate in this research program. I will be given a copy of this form.

Participant's signature Date

Witness' signature Date

ACES – Adolescent Cessation and Evaluation Study

The University of Memphis

PARENT CONSENT FORM

This research is being conducted by the University of Memphis at high schools in the Memphis City and Shelby County School Systems. If your child has been caught with tobacco at school s/he may participate in this study.

The purpose of this study is to understand what types of programs might help teens stop smoking. In addition, we want to understand teens' experiences with quitting, including what motivates a quit attempt and what barriers interfere with success. Their feedback is important, even if you do not smoke cigarettes regularly.

To participate in this program, students will be asked to attend four meetings at school over a four-week period. Each meeting will last 1-1 ½ hours. Each of these meetings will take place with a health educator from the ACES office. This Health Educator will ask them to fill out a number of forms. The information they provide on these forms will be confidential to the fullest extent of the law. This means that the information they provide during this program will not be released to anyone connected with the school system. If the results from this research are published, the student's name will never be used and there will be no way for anyone to identify them.

The type of questions we will ask you will differ, depending on which year of the program your child is in. During the first two years of the program, our goal is to have students give us feedback on the barriers and motivators for quitting. If your child is participating during these first two years, s/he will be asked to complete surveys about his/her history of smoking and any quit attempt they may have made. Other questionnaires will ask what factors might motivate quitting, and what barriers teen experience.

If your child is referred in the third year of this program, s/he will participate in a program designed to help them quit smoking or stay quit if they have already quit. This program will be developed from feedback we received from teens in the first two years of the project. Over four sessions with a health educator individually assigned to your child, s/he will learn about the latest methods for smoking cessation.

Your child will also be asked to have his/her level of carbon monoxide measured, to confirm whether or not they have been smoking. This procedure involves them having to you hold their breath for 15 seconds and then exhaling into a disposable tube attached to a small machine that indicates carbon monoxide levels in parts-per-million. This is a safe, noninvasive procedure. Three months after the end of the program, we will ask them to repeat this procedure so we can see how much the project helped students stop smoking. This information is also confidential to the fullest extent of the law.

If your child participates in this research program, s/he will receive special credit, in that schools adjust the consequences of your tobacco use at school. Schools vary in how they do this, and your Health Educator can explain your particular school's policy in more detail.

Your child's participation in this program is voluntary. Students can withdraw at any time from the program, although you would not receive the school credit in this case. If you have any questions about this program, you could contact the Principal Investigator of the study, Dr. Leslie Robinson, at 678-1667. In addition, you could contact the Chair of the University of Memphis Institutional Review Board at 678-2533.

I have read this consent form and I agree to participate in this research program. I will be given a copy of this form.

Parent's signature Date

Witness' signature Date

Appendix B

Demographic Questionnaire

FOR OFFICE USE ONLY (complete before session)

1. Student ID					2. School Code			3. Health Educator Code	
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)

4. Date of survey						5. Session #
M	M	D	D	Y	Y	
(0)	(0)	(0)	(0)	(0)	(0)	(1)
(1)	(1)	(1)	(1)		(1)	(2)
	(2)	(2)	(2)		(2)	(3)
	(3)	(3)	(3)		(3)	(4)
	(4)	(4)	(4)		(4)	(5)
	(5)	(5)	(5)		(5)	(6)
	(6)	(6)	(6)		(6)	
	(7)	(7)	(7)			
	(8)	(8)	(8)			
	(9)	(9)	(9)			

6a. Case status at previous session

- Session 1
- Not quit or cut down
- Cutting down
- Quit

6b. Case status at end of current session

- Not quit or cut down
- Cutting down
- Quit

Demographics - ADMINISTER To Session I ONLY

7. Zip Code

(0)	(0)	(0)	(0)	(0)
(1)	(1)	(1)	(1)	(1)
(2)	(2)	(2)	(2)	(2)
(3)	(3)	(3)	(3)	(3)
(4)	(4)	(4)	(4)	(4)
(5)	(5)	(5)	(5)	(5)
(6)	(6)	(6)	(6)	(6)
(7)	(7)	(7)	(7)	(7)
(8)	(8)	(8)	(8)	(8)
(9)	(9)	(9)	(9)	(9)

8. Age

(0)	(0)
(1)	(1)
(2)	(2)
(3)	(3)
(4)	(4)
(5)	(5)
(6)	(6)
(7)	(7)
(8)	(8)
(9)	(9)

9. DOB

M	M	D	D	Y	Y
(0)	(0)	(0)	(0)	(0)	(0)
(1)	(1)	(1)	(1)	(1)	(1)
(2)	(2)	(2)	(2)	(2)	(2)
(3)	(3)	(3)	(3)	(3)	(3)
(4)	(4)	(4)	(4)	(4)	(4)
(5)	(5)	(5)	(5)	(5)	(5)
(6)	(6)	(6)	(6)	(6)	(6)
(7)	(7)	(7)	(7)	(7)	(7)
(8)	(8)	(8)	(8)	(8)	(8)
(9)	(9)	(9)	(9)	(9)	(9)

10. Height

Ft	In	In
(0)	(0)	(0)
(1)	(1)	(1)
(2)	(2)	(2)
(3)	(3)	(3)
(4)	(4)	(4)
(5)	(5)	(5)
(6)	(6)	(6)
(7)	(7)	(7)
(8)	(8)	(8)
(9)	(9)	(9)

11. Weight

(0)	(0)	(0)
(1)	(1)	(1)
(2)	(2)	(2)
(3)	(3)	(3)
(4)	(4)	(4)
(5)	(5)	(5)
(6)	(6)	(6)
(7)	(7)	(7)
(8)	(8)	(8)
(9)	(9)	(9)

12. Gender

- Male
- Female

13. Ethnicity

- Hispanic/Latino
- NOT Hispanic/Latino

14. Race

- Hispanic/Latino
- American Indian/Alaskan Native
- Asian/Pacific Islander
- Black/African American
- White/Caucasian

15. Current grade?

- 9th
- 10th
- 11th
- 12th
- Other _____

16. Highest education level of the person you live with?

- 11th grade or lower
- High school diploma or GED
- Some college
- Graduate from college (bachelor's degree)
- Some graduate school
- Master's degree
- Higher degree

Appendix C

Tobacco Use Questionnaire

SECTION 1: SESSION 1 : History of Tobacco Use

1. How long has it been since you smoked your first cigarette?

- | | | | | |
|----|----------------------|----------------------|----|------------------------------------|
| | <input type="text"/> | <input type="text"/> | | |
| a. | (0) | (0) | b. | <input type="radio"/> days |
| | (1) | (1) | | <input type="radio"/> weeks |
| | (2) | (2) | | <input type="radio"/> years |
| | (3) | (3) | | <input type="radio"/> never smoked |
| | (4) | (4) | | |
| | (5) | (5) | | |
| | (6) | (6) | | |
| | (7) | (7) | | |
| | (8) | (8) | | |
| | (9) | (9) | | |

2. Which of the following is true about how much you smoke?

- You have smoked only one cigarette or a few cigarettes, just to try. **(GO TO Q5)**
- You smoke, but less than one cigarette a month. **(GO TO Q5)**
- You smoke about 1 to 3 cigarettes a month. **(GO TO Q5)**
- You smoke about 1 to 6 cigarettes per week. **(GO TO Q3)**
- You smoke daily. **(GO TO Q4)**

3. How long have you been smoking weekly?

(GO TO Q5)

- Less than six months
- Six to eleven months
- At least one year but less than two years
- Two years or more

4. How long have you been smoking daily?

- Less than six months
- Six to eleven months
- At least one year but less than two years
- Two years or more

5. How often do you inhale?

- Always
- Quite often
- Seldom
- Never

- 6. How soon after you wake up do you smoke your first cigarette?**
- Within the first 30 minutes
 - More than 30 minutes after waking but before noon
 - In the afternoon
 - In the evening
- 7. Which cigarette would you most hate to give up?**
- First cigarette in the morning
 - Any other cigarette before noon
 - Any other cigarette after noon
 - Any other cigarette in the evening
- 8. Do you find it difficult not to smoke in places where it is forbidden (church, library, movies, etc.)?**
- Yes, very difficult
 - Yes, somewhat difficult
 - No, not usually difficult
 - No, not at all difficult
- 9. Do you still smoke if you are so ill that you are in bed most of the day?**
- Yes, always
 - Yes, quite often
 - No, not usually
 - No, never
- 10. What tobacco products have you used in the past 3 months?**
- cigarettes
 - cigars
 - spit tobacco
 - bidis
 - clove cigarettes
- 11. During the past 30 days, how many cigarettes per day did you smoke?**
- _____
- (0) (0)
 - (1) (1)
 - (2) (2)
 - (3) (3)
 - (4) (4)
 - (5) (5)
 - (6) (6)
 - (7) (7)
 - (8) (8)
 - (9) (9)

12. a. Have you ever tried to quit smoking?
- No (GO TO SECTION 2)
 - Yes → b. In the past year, how many times have you quit smoking for at least 24 hrs?
 - once
 - twice
 - three times
 - four times
 - five times
 - six times or more
- c. In the past year, what is the longest time you were able to stop smoking cigarettes on purpose?
- less than 24 hours
 - 2-3 days
 - 4-6 days
 - 1-2 weeks
 - 3-4 weeks
 - more than a month

Section 2: Smoking calendar – ADMINISTER TO ALL

13. Record below the number of cigarettes smoked on each day:

a. Today = DO		b. Yesterday = D-1		c. D-2		d. D-3		e. D-4		f. D-5		g. D-6		h. D-7	
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)
Code if zero		Code if zero		Code if zero		Code if zero		Code if zero		Code if zero		Code if zero		Code if zero	
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)
(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)

Section 3: ALL SESSIONS: CURRENT tobacco use

14 a. Which of the following is true for you?

- I'm still smoking
- I'm thinking about quitting
- I'm trying to cut down
- I quit sometime within the past week (even if I later started again)

**IF NO Q/CD REPORTED, END OF SURVEY
IF Q/CD REPORTED, CONTINUE**

Appendix D

Friends' Reactions Questionnaire

Friends' Reactions

1. Do any of your friends know you are trying to quit or cut down?

- No → (SKIP SECTION)
- Yes → b. how many?

(0)	(0)
(1)	(1)
(2)	(2)
(3)	(3)
(4)	(4)
(5)	(5)
(6)	(6)
(7)	(7)
(8)	(8)
(9)	(9)

2. Think about your non-smoking friends. How supportive are they of your trying to quit/cut down smoking?

- Very supportive
- Supportive
- Slightly supportive
- Not at all supportive
- I don't have any of these friends
- None of these friends know

3. Think about your smoking friends. How supportive are they of your trying to quit/cut down smoking?

- Very supportive
- Supportive
- Slightly supportive
- Not at all supportive
- I don't have any of these friends
- None of these friends know

4. Did any of your friends do anything of the following things to help you Q/CD?	YES	NO
a. Talk/listen to you when you were having difficulty?	0	0
b. Stop smoking around you?	0	0
c. Try to quit smoking or cut down also?	0	0
d. Anything else? Specify:	0	0

5. Did any of your friends do anything that made your Q/CD more difficult?	YES	NO
a. Tease you about trying to quit?	0	0
b. Smoke around you?	0	0
c. Offer you a cigarette?	0	0
d. Anything else? Specify:	0	0
