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Adolescent First Lapse Following Smoking Cessation: Situation Characteristics, Precipitants and Proximal Influences

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Abstract

Despite increased attention to adolescent smoking cessation, little is known about adolescent relapse following a quit attempt. To address this issue, the present study was designed to provide initial information regarding the characteristics of adolescent lapses to smoking following abstinence. Included in the present study were 204 adolescent participants in four independent smoking cessation trials. For the full sample, participants averaged 15.99 (1.27) years of age; 56% were female and 78% were white. Lapse characteristics and precipitants were assessed using the Adolescent Smoking Relapse Review. Three domains of the lapse experience were assessed: lapse situation characteristics, precipitants of use in the situation, and proximal influences (i.e., potential precipitants occurring on the same day, prior to the lapse situation). Participant reports indicated that the modal lapse situation occurred in the evening while socializing with friends at home. Urges or cravings and social pressure were commonly endorsed as occurring in lapse situations. The most frequently reported proximal influence was desire for a cigarette, followed by abstinence-violation cognitions (okay to smoke occasionally, wanted to see what it would be like) and negative emotions. The findings indicate that a broad range of factors appear to influence adolescent smoking lapse and commend the value of incorporating content relevant to managing social and affective cues, strategies for inhibiting the prepotent response to ask for a cigarette, addressing cognitions regarding the difficulty of not smoking (i.e., cessation expectancies) and combating perceptions of the ability to smoke occasionally.

Keywords

Adolescents; Smoking cessation; Relapse; High risk situation; Nicotine dependence

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1. Introduction

1.1 Adolescent Smoking Cessation

Despite a decline in prevalence in the last decade, adolescent cigarette smoking remains an important public health problem. Approximately 7% of 8th graders, 12% of 10th graders, and 20% of 12th graders are current smokers (smoked in past 30 days) and 3%, 6%, and 11% respectively are daily smokers (Johnston, O'Malley, Bachman, & Schulenberg, 2009). When examined by gender, current smoking prevalence is equivalent for 8th graders, but boys report a higher prevalence than girls in 10th (12.7% versus 11.9%, respectively) and 12th (21.5% versus 19.1%, respectively) grades (Johnston, et al., 2009). Similar patterns are reported for daily use, with prevalence for boys increasing relative to girls from 8th through 12th grade. Although adolescents generally report a desire to quit and often make quit attempts (Bancej, O'Loughlin, Platt, Paradis, & Gervais, 2007), these attempts typically end in failure, even when state of the art smoking cessation treatments are administered (Grimshaw & Stanton, 2006; Sussman, Sun, & Dent, 2006). Despite the importance of smoking cessation, we know little about the natural history of quit attempts and relapse among adolescents. Improving smoking cessation rates among adolescent smokers may be achieved by gaining a better understanding of the factors that underlie a return to smoking following quit attempts (Colby & Gwaltney, 2007; Gwaltney, Bartolomei, Colby, & Kahler, 2008; Myers, MacPherson, Jones, & Aarons, 2007).

1.2 Models of relapse

Prominent social-learning models of relapse (Marlatt & Donovan, 2005; Piasecki, Fiore, McCarthy, & Baker, 2002; Shiffman, 1989) focus primarily on the emergent situations that immediately precede lapses to smoking ("high-risk situations" or "relapse crises"). In the present context, a lapse refers to the initial smoking event following a period of abstinence (Shiffman, Hickcox, et al., 1996). In contrast, relapse is conceived more broadly as a return to a previous pattern of use following a cessation effort (Marlatt & Gordon, 1985). Thus, a lapse represents part of the relapse process, yet does not necessarily lead to relapse.

Though research on the adolescent smoking relapse process is limited, studies of relapse to other addictive substances provide a number of potentially relevant and important findings. Specifically, such studies have consistently identified developmental differences between adults and youth in the relapse process (Brown & Ramo, 2006). For example, social situations comprise the majority of adolescent addictive lapse situations (Brown, Vik, & Creamer, 1989; Myers, Brown, & Mott, 1993) while negative affect, a frequent precipitant of adult lapses (Shiffman & Waters, 2004), was rarely reported by adolescents as a precipitating factor. Such findings of developmental differences serve as a caution against application of adult-derived knowledge in the design of adolescent interventions and highlight the importance of identifying adolescent-specific factors that influence smoking cessation efforts.

1.3 Influences on lapse to smoking

The dearth of knowledge regarding adolescent lapse to smoking commends that initial investigations address key aspects of such events: characteristics of the initial smoking situation; situational influences, or precipitants, in the lapse situation; and proximal factors preceding the lapse situation that may have influenced the decision to smoke a cigarette. In addition to situational precipitants and proximal influences, Shiffman (1989) has identified individual differences (e.g., nicotine dependence, psychiatric disorders) as playing an important role in the occurrence of lapses.

Several studies have identified lapse situations among adult smokers (O'Connell, 1987; Shiffman, Gnys, et al., 1996). For example, negative affect and smoking cues are potent contexts for lapsing among adult smokers (Shiffman, Gnys, et al., 1996). However, little work has examined lapse precipitants among adolescent smokers. One study of adolescents found that ready availability of cigarettes distinguished highly tempting situations that resulted in a lapse from tempting situations that did not lead to smoking (Burriss & O'Connell, 2003). In a subsequent qualitative study, adolescents frequently identified stress, craving, and exposure to smoking as highly tempting situations (Falkin, Fryer, & Mahadeo, 2007). These studies provide potential support for some common paths to relapse among adolescent smokers; additional information is needed to better catalogue the unique circumstances that precipitate lapses in this population.

More recent models of relapse highlight the interaction between stable individual differences and lapse precipitants in predicting lapses. For example, the revised relapse prevention model (Witkiewitz & Marlatt, 2004) suggests that individual differences confer a vulnerability to certain smokers that is then expressed under particular circumstances. The State by Trait Adaptive Response model of smoking (Gilbert, Sharpe, Ramanaiah, Detwiler, & Anderson, 2000) also suggests such person by situation interactions. Research using nonlinear dynamic statistical models (e.g., catastrophe models) has shown that the influence of proximal factors on relapse may be dependent upon distal factors, such as family history of drug use (Hufford, Witkiewitz, Shields, Kodya, & Caruso, 2003). In this study, we examine the interaction between an important individual difference measure – nicotine dependence – and episodic variables in predicting lapses. We chose to examine nicotine dependence because contexts for smoking may change as dependence develops. For example, smoking in response to a negative affective state and/or the belief that smoking alleviates negative affect may emerge as nicotine dependence develops (Brandon, 1994; Eissenberg, 2004). Therefore, more dependent adolescent smokers may be more likely to lapse in situations marked by strong negative affect.

1.4 The present study

The present study was designed to provide initial information regarding the characteristics of adolescent lapses to smoking following a cessation attempt. Identifying common situations associated with smoking lapse may have important treatment implications for adolescents. Similarly, identification of lapse precipitants and improved ability to predict high-risk situations could allow for more effective treatments. Therefore, gaining a preliminary understanding of the types of contextual factors associated with first lapses to smoking is a key goal of this study. To this end, characteristics of lapse situations are described, along with situational and proximal precipitants. A second goal was to compare lapse characteristics across levels of nicotine dependence. We hypothesized that less dependent adolescents would more often lapse in interpersonal/social situations, while more dependent adolescents would be more likely to lapse in negative affect/craving states. Finally, we examined the degree to which relapse precipitants differed across adolescent smokers in clinical settings and community settings. Therefore, we explored differences between these groups on relapse characteristics and precipitants with the goal of informing population-specific treatment design.

2. Methods

2.1 Participants and procedures

Included in the present study were 204 adolescents drawn from four studies of adolescent smoking cessation treatment who reported a cigarette smoking cessation attempt lasting at least 24 hours and subsequently returned to smoking. All assessments were conducted by

trained professional research assistants. The included subjects in each sample were those who completed an assessment of their first lapse during the study follow-up period. For the full sample, initial lapse situation data were available for 95% (204/215) of initial lapse situations. Within each study, informed consent/assent was obtained separately from adolescent participants and a parent/legal guardian (for those under 18 years of age). The protocol for each study was approved by the Institutional Review Board for the respective institutions through which these projects were administered. The first sample included 30 adolescent participants in studies of a multi-session intensive motivational and cognitive-behavioral smoking cessation intervention for adolescents receiving outpatient substance use disorder treatment conducted from 1996 – 2001 (Myers & Brown, 2005; Myers, Brown, & Kelly, 2000). Included were adolescents ages 13–18 who had smoked at least once per week. These participants were selected from a full sample of 92 adolescents of whom 33 reported an initial cessation attempt followed by a lapse episode. Data were available for 30 of the 33 adolescents who reported a lapse episode. The second sample consisted of 67 adolescent psychiatric inpatients participating in a treatment outcome study comparing brief advice with a motivational intervention for smoking cessation conducted from 1998 – 2003 (Brown, et al., 2003). Included were adolescents ages 13–18 who had smoked at least once per week. Participants included in this study were selected from a full sample of 191, of whom 69 reported a cessation attempt followed by a return to smoking. Complete data were available for 67 of the 69 adolescents who reported a lapse episode. Participants in these two studies of adolescents were combined to represent a “clinical sample” (i.e., youth with psychiatric and/or substance use disorders).

The third and fourth samples consisted of participants in two treatment outcome studies comparing brief advice with a motivational intervention for smoking cessation. One study was implemented in a hospital emergency department (ED) from 1997 to 1999, and the other recruited from both an ED (Colby, Monti, O’Leary Tevyaw, et al., 2005) and from public schools¹ from 1998 – 2003. The third sample was selected from a full sample of 85 adolescents (ages 14 to 19) who reported past-month daily smoking at baseline. Lapse data are available for all 38 adolescents who reported a cessation attempt followed by a return to smoking. The fourth sample was selected from a full sample of 162 (91 recruited from schools; 71 recruited from an ED) adolescents (ages 14 to 18) who reported smoking at least weekly at baseline; complete lapse data were available for 74 of 75 adolescents who reported a lapse episode. Based on the similarities in samples three and four, we combined these samples to represent a “community sample” of adolescent smokers (i.e., youth recruited from schools and emergency department settings).

Across studies, initial interviews were conducted in the setting from which participants were recruited (e.g., treatment setting, Emergency Department, schools). Follow-up interviews were conducted at the respective research offices or at participants homes or some other private location. For each study, participants were assessed at treatment completion. Participants from the first sample completed follow-up assessments either 1 and 3 months following the end of treatment, or 3 and 6 months following treatment completion. One month follow-ups were conducted by telephone, while 3 and 6-month interviews were conducted in person. For study two, participants were followed up at 1, 3, 6, 9 and 12-months following treatment completion. The 3 and 9 month interviews were conducted by telephone, with all others completed in-person. For the two studies with community samples, participants were followed up at 1, 3, and 6 months following treatment. Self-reported abstinence was confirmed with saliva cotinine assays and carbon monoxide testing across studies. Further details on the methods and procedures of each study are provided in

¹Results of this study, NIDA grant R01 DA011204, have yet to be published. For information on study methods and design contact Suzanne Colby: Suzanne_Colby@brown.edu.

the references listed for each sample respectively. Demographics and smoking variables are displayed by sample in Table 1.

2.2 Measures

Demographic and cigarette smoking variables for the present study were drawn from baseline interviews for each sample. All studies assessed recent cigarette use using the Time-Line Follow-Back procedure (TLFB) (Sobell, 1992). Information was collected using a calendar format to provide temporal cues (e.g. holidays) to assist in recall. An expert panel has recommended the TLFB procedure be used in studies of adolescent smoking (Mermelstein, et al.), and good reliability and stability has been demonstrated for the TLFB with adolescent smokers (Lewis-Esquerre, et al., 2005).

For the clinical samples, cigarette use history (e.g., age of onset, quitting history) was assessed using the Customary Drinking and Drug Use Record (Brown, et al., 1998). Cigarette use history for the community samples was assessed using the Adolescent Smoking History and Patterns Questionnaire (ASHPQ; Colby, Monti, Tevyaw, et al., 2005), a measure developed to assess cigarette and other tobacco use history. Items included in both studies are age at: first whole cigarette, 100 cigarettes, daily smoking; lifetime number of quit attempts, longest consecutive abstinence since, quit attempt in past month and past 6 months (yes/no), past 30 days other tobacco use.

For the clinical samples, nicotine dependence was measured using the Fagerstrom Tolerance Questionnaire modified for adolescents (mFTQ; Prokhorov, Pallonen, Fava, Ding, & Niaura, 1996). The mFTQ employs the original FTQ items with scoring adapted for adolescents. For the community samples, the Fagerstrom Tolerance Questionnaire (FTQ; Fagerstrom, 1978) was employed with Sample 3, and the Stanford Dependence Inventory (SDI; Rojas, Killen, Haydel, & Robinson, 1998) was administered to Sample 4. The SDI employs 5 of the FTQ items, with wording and scoring adapted for adolescents. Excluded are the items regarding number of cigarettes smoked per day and difficulty refraining from smoking when forbidden. In order to generate comparable scores across the disparate measures employed for the community samples we did the following: 1) excluded the “inhale” item since item wording and scoring could not be reconciled across the questionnaires, 2) used the cigarettes per day as assessed by the TLFB, and 3) utilized minutes to first cigarette that was assessed as a separate item in each study. This resulted in 6 comparable items. Finally, we scored the resulting nicotine dependence items employing Fagerstrom Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) scoring criteria. We chose to employ the FTND scoring criteria since it yielded a better range of scores and appeared more sensitive to lower levels of dependence.

Lapse characteristics and precipitants were assessed using the Adolescent Smoking Relapse Review. This measure was adapted for smoking from the Relapse Review (Brown, et al., 1989), an instrument designed for assessing adolescent alcohol and other drug lapse situations. The Adolescent Smoking Relapse Review assesses 3 domains of the lapse experience: lapse situation characteristics, precipitants of use in the situation, and proximal influences (i.e., potential precipitants occurring on the same day, prior to the lapse situation).

Participants first described the initial lapse episode in detail, with the interviewer then asking a series of structured questions for clarification. Evaluation of lapse precipitants was comparable to the procedure described by Marlatt and Gordon (1980). Episodes were scored according to common categories identified for adults: coping with a) negative emotional states b) negative physiological states, c) other intrapersonal states (e.g., temptations), d) interpersonal conflict and, e) social pressure. In contrast to Marlatt’s original scoring system,

each category was independently rated to evaluate the extent to which each of these factors was involved in the initial smoking experience following a cessation attempt.

Next, participants responded to a series of questions assessing lapse situation characteristics including: location; time of day; presence, age and smoking behaviors of others; type of activity (e.g., socializing, eating, driving, party, etc.); use of other substances; and how cigarettes were obtained.

Finally, participants were asked to describe what occurred in the hours before the lapse event. This description was recorded verbatim by the interviewer to permit objective evaluation by the researchers. Eight items were used to assess factors proximally prior to entering the lapse situation in relation to the lapse (scored as unrelated, probably related or definitely related). Items were queried directly regarding each precipitant, to provide a subjective evaluation (e.g., Did you smoke so that it would be easier or more fun to be around other people?) Assessed were: 1) external factors (facilitate a social experience; interpersonal conflict/stress); 2) internal factors (negative emotional states; passive emotional states, e.g., boredom; active emotional states, e.g., feeling good); 3) cigarette-related factors (desire for cigarette; non-problematic use, e.g., could smoke once in a while); and 4) abstinence-focused use (was it difficult to not smoke?). The extent to which factors were related to the lapse was evaluated by research staff based on a consensus review process. The review process considered both participant description of events proximal to the lapse as well as subjective responses to each item. Consensus was reached by research staff and investigators evaluating objective and subjective evidence for relatedness of proximal factors with the lapse event. The discussion centered on a) whether a given proximal precipitant was present, and if so, whether it was related to the lapse considering the objective and subjective responses.

3. Results

Chi-squared analyses were conducted to examine differences across clinical and community samples in situation characteristics, situational precipitants and proximal determinants.

3.1 Situation Characteristics

Characteristics of the situations in which adolescents initially returned to smoking following a cessation attempt are displayed separately for clinical (i.e., psychiatric and substance use disordered) and community (emergency department and school) sample participants in Table 2. As indicated in the table, for some characteristics analyses were conducted on a reduced number of categories (whereby categories with similar content were combined) in order to simplify presentation and interpretation. These data indicate that the initial lapse typically occurred at the adolescent's home with same age or older peers present. Evening was the most common time for lapse situations, but many took place in the morning and afternoon. The most frequently reported activity was socializing, and adolescents most often asked for a cigarette. Alcohol and other drug use were reported to occur in only 15% of lapse situations. No significant differences were found when comparing clinical and community samples on situation characteristics.

3.2 Situational Precipitants

As indicated in Table 3, for some precipitants analyses were conducted on a reduced number of categories (whereby categories with similar content were combined) in order to simplify presentation and interpretation. Ratings of participants' initial lapse descriptions revealed that other intrapersonal factors (94%), social pressure (67%) and negative intrapersonal emotion (57%) were the most commonly reported precipitant categories. Within these global

categories, the majority of other intrapersonal precipitants (89%) consisted of temptations (urges/cravings) in the presence or absence of cues. Most of the reported social pressure was indirect or perceived (i.e., being in the presence of smokers) (66%), with the remainder consisting of direct offers. For negative affect, the most commonly reported emotion was frustration (46%) followed by boredom (19%) and depression (12%). As shown in Table 3, no differences emerged between clinical and community sample adolescents on any of the situational precipitant categories.

3.3 Proximal Determinants

Factors occurring proximal to (in the hours before) the lapse event were examined across seven categories (see Table 4). Of these, urges or desire for cigarettes (90%) was the most commonly reported determinant occurring proximal to the lapse episode. Fifty-two percent of participants reported an abstinence-focused determinant (e.g., tired of not smoking, missing smoking). Also frequently reported were negative emotions (48%) and conflicts with others or stress (40%). Comparison of proximal determinants across the clinical and community samples revealed a number of differences. Community sample adolescents were more likely to report determinants related to social factors, conflicts and stress, and desire for a cigarette. Clinical adolescents were more likely to report active emotional states (feeling good, excitement), non-problematic use (e.g., okay to smoke occasionally, wanted to see what it would be like), and abstinence-focused determinants.

3.4 High versus low nicotine dependent smokers

Participants from the clinical studies were classified as high or low dependent smokers based on mFTQ summary scores; mFTQ scores ranged from 1 to 8 ($M=4.48$, $sd=1.9$), with a median score of 4. Using a median split, adolescents scoring 1 to 4 were classified as low dependent, while those with scores of 5 and higher were classified as high dependent. Demographic and cigarette smoking characteristics for high versus low dependent adolescents are shown in Table 5. Chi-squared analyses were conducted to examine differences high and low nicotine dependent smokers for situation characteristics, situational precipitants and proximal determinants.

Comparison of situation characteristics (Table 6) and situational precipitants (Table 7) by dependence level revealed no differences by level of dependence. In examining proximal determinants, high dependent youth were significantly more likely to report conflict and stress (χ^2 ($df=1$) = 4.97, $p = .026$), negative emotions (χ^2 ($df=1$) = 4.48, $p = .035$), and abstinence-focused factors (χ^2 ($df=1$) = 12.21, $p < .001$) than were those in the low dependence category.

The dependence measures for the community samples (FTQ and SDI) were scored employing FTND criteria, yielding dependence scores ranging from 0 to 7 ($M=3.88$, $sd=1.9$), 3.88 ($SD=1.6$), with a median score of 4.0. As with the clinical sample, participants were classified as low (0–4) and high (5–7) dependence using a median split. A chi squared analysis of situational precipitants by dependence level revealed no significant differences by level of dependence. For proximal precipitants, high dependence participants were more likely to have experienced active emotions (χ^2 ($df=1$) = 5.35, $p = .021$) and abstinence-focused cognitions (χ^2 ($df=1$) = 5.20, $p = .023$) than were low dependence youth.

4. Discussion

Adolescent smoking cessation interventions have been criticized for being adapted directly from adult cessation interventions without adequate consideration of factors and influences that may be unique to adolescent smoking, lapse, and relapse. In this study, we examined

characteristics and determinants of cigarette lapse situations following a cessation attempt among adolescent participants in four smoking cessation intervention studies. Importantly, adolescents included in the current analyses were drawn from clinical settings (psychiatric and substance abuse treatment) as well as community settings (hospital settings and public schools), providing an opportunity to identify the similarities and differences in lapse characteristics and precipitants across these common contexts for provision of smoking cessation treatment. Finally, we examined the influence of nicotine dependence on adolescent smoking lapses. Findings from this study have direct implications for the refinement of relapse prevention approaches for adolescent smokers.

A majority of initial lapses following a cessation attempt occurred in the presence of others and in the afternoon or evening, with few lapsing alone. Lapse situations predominantly involved social activities, with about a third taking place at the individual's home. The vast majority of these situations took place with cigarettes present in the situation (>90%) and the individual obtaining the cigarette from others (either asking for or being offered). This stands in contrast to adult smoking lapse situations, where the presence of other smokers is reported with much lower frequency (e.g., (Shiffman, 1997)). Despite the strong association observed between adolescent cigarette smoking and use of alcohol and other drugs (Eckhardt, Woodruff, & Elder, 1994; Orlando, Tucker, Ellickson, & Klein, 2005), alcohol and other drug use were uncommon in lapse situations, reported by only 15% of participants. As such, the modal lapse situation for adolescent smokers in the present study involved social contexts and is similar to that reported for adolescent lapse situations to alcohol and other drugs (Brown, et al., 1989; Myers, et al., 1993). The present findings highlight the importance of social influences in adolescent smoking and indicate the value of enhancing awareness of lapse characteristics in the context of relapse prevention. No significant differences emerged between clinical and community sample adolescents, suggesting that relapse prevention content focused on characteristics of high risk for lapse situations should be similar across these groups.

Situational precipitants associated with smoking lapses identified several frequent factors. Adolescents almost universally reported experiencing urges or cravings in lapse situations. Also common was direct or indirect social pressure, identified in two thirds of lapses, and negative affect was experienced in more than half of these situations. Over one third of adolescents also described experiencing negative intrapersonal circumstances, such as conflict or anxiety. As with earlier studies of adolescent addictive behavior lapse (Brown, et al., 1989; Cornelius, et al., 2003), social influence was a common precipitant in lapse situations. However, unlike these studies, negative affect emerged as a frequent situational precipitant of lapse to smoking in the present investigation. These findings indicate the importance of incorporating skills for managing social, affective and physiological cues for smoking in adolescent smoking relapse prevention. No differences were observed in situational precipitants between clinical and community samples, suggesting tailoring of intervention content may not be necessary when addressing this issue.

A number of potential proximal influences were identified as occurring in the hours before initial lapse following a cessation attempt. Desire for a cigarette was associated with 90% of the lapse situations. Other frequently occurring proximal factors included perceived difficulty of not smoking, negative emotions and conflicts or life stress. These emergent experiences can be broadly construed as contributors to sustained negative affect and suggest a potential final common pathway to escalating risk for relapse among adolescents. Recent studies identify a strong role for proximal affective states in predicting adult smoking lapse (Shiffman & Waters, 2004). Viewed in this context, the present findings support the value of including affect management strategies in adolescent smoking cessation interventions, and the usefulness of proactive coping with these circumstances to prevent

lapses. Numerous differences emerged when comparing proximal precipitants between clinical and community samples. Adolescents in the community samples were significantly more likely to report external factors such as smoking for social facilitation and managing conflicts or life stress. Youth in the clinical samples were significantly more likely to identify cigarette-related factors such as difficulty being abstinent and viewing occasional smoking as acceptable. In addition, clinical youth more frequently reported active emotional precipitants, suggesting smoking to enhance positive affect may be a more powerful influence on lapse for this group. Finally, community youth were more likely to identify desire for a cigarette as a proximal influence; however, this factor was the most frequently cited by both groups. Interestingly, and in contrast with expectations, almost half of both clinical and community youth identified negative affect preceding the lapse episode. Viewed in concert, the present findings indicate that techniques for managing negative affect and desire for a cigarette may be important for smoking adolescents in general. However, community youth may benefit from a particular focus on external factors, such as social facilitation and managing conflicts and life stress. Clinical adolescents may be more vulnerable to lapse in the face of positive affect and cognitions regarding non-problematic smoking, and difficulties of abstinence should be addressed in the context of treatment.

Nicotine dependence level was examined in relation to proximal lapse precipitants, separately for clinical and community samples. No differences emerged by level of nicotine dependence for either community or clinical adolescents when examining situational precipitants. This finding is in contrast with adult studies that demonstrate higher levels of urges and negative affect in lapse situations of smokers higher in nicotine dependence (Shiffman, 1997). However, differences in assessment may explain this discrepancy in that the present study examined the presence or absence of these factors, whereas the adult study compared levels of urge and negative affect. Dimensional assessment of urges and negative affect may reveal similar patterns for adolescents and adults. This difference could also reflect that levels of nicotine dependence among the high dependent youth in this study may have been lower than highly dependent adult smokers. For the clinical sample, high dependent adolescents were more likely to experience conflicts/life stress, negative affect and difficulty not smoking proximal to their lapse situation. For community adolescents, the only difference emerging by dependence level was for active emotions, such that high dependent youth were more likely to experience positive affect prior to their lapse.

The present findings must be considered in the context of study limitations. All participants had received treatment, and active and control conditions differed across studies, which may introduce unknown bias into the lapse events. Retrospective reporting has been criticized, since the occurrence of a lapse may bias recall. However, recent studies employing ecological momentary assessment (EMA) indicate that proximal precipitants identified with this methodology are consistent with findings reported from retrospective recall (Shiffman & Waters, 2004). In contrast with EMA studies, lapse precipitants were assessed in a binary fashion (present/absent) rather than dimensionally. This reflects the retrospective nature of the present data and makes direct comparison with EMA studies of adult lapse difficult. In addition, the lack of assessment of non-use situations (e.g., successfully negotiated temptation situations) limits our ability to infer the extent to which particular precipitants are unique to smoking lapses (Shiffman, 2009). In addition, reporting of substance use may be influenced by social desirability bias, although smoking status was biochemically verified for all participants in the present studies.

Several measurement limitations exist in the present study. One issue is that different measures of nicotine dependence were employed across studies. However, these scales were all variants of the Fagerstrom Tolerance Questionnaire (Fagerstrom, 1978), providing common items to draw on for creating dependence scores. Further, the use of a median split

may not reflect high and low levels of nicotine dependence in the larger population of adolescent smokers. Importantly, the cigarette version of the Relapse Review employed in the present study and the consensus procedure utilized for scoring have not yet been evaluated for reliability or validity. Finally, original measurement categories were reduced for some variables in order to simplify presentation of results. As such, findings for these items need to be interpreted with caution. The nature and location of the studies may limit generalizability of these findings to adolescent smokers in general; however, inclusion of teens in clinical trials and conducting subgroup analyses for community and clinical youth may aide in mitigating this to some extent, since the primary population of interest is that of youth receiving treatment for smoking cessation.

This study describes the prevalence of emotional, cognitive, and situational factors experienced in lapse episodes of adolescent smokers. This is useful in understanding the modal lapse experience. The findings suggest that there is substantial heterogeneity in some lapse contexts (e.g., time of day, location) and almost total uniformity in other areas (urge/craving to smoke is experienced by almost everyone in the hours before a lapse). However, because nonsmoking temptation situations were not assessed, the present data cannot tell us the extent to which these factors are situational cues for smoking. For example, because the percent of adolescents experiencing depression when not lapsing was not assessed, the finding that only seven percent of subjects reported feeling depressed just before the lapse should not be interpreted to suggest that depression is not a risk factor (Gwaltney, et al., 2008). Further, the current data do not assess within-subject changes in situational precipitants (e.g., increases or decreases in depression), which are critical in identifying unique cues for smoking (e.g., (Shiffman & Waters, 2004).

5. Conclusions

Despite increased research attention to adolescent smoking relapse in recent years (Schuck, Otten, Engels, & Kleinjan, 2011; Van Zundert, Ferguson, Shiffman, & Engels, 2010; Van Zundert, Nijhof, & Engels, 2009) we are unaware of any published studies that describe circumstances surrounding adolescent lapse to cigarette smoking following a cessation attempt. As such, the present study provides the first adolescent-specific findings on smoking lapse, data that are essential for informing the adaptation of existing approaches to more appropriately reflect the unique phenomenological aspects of adolescent smoking and lapse. The current findings therefore set the stage for more detailed analyses of the lapse experience and provide some empirical evidence for the development of cessation interventions. The findings indicate that a broad range of factors appear to influence adolescent smoking lapse and commend the value of incorporating content relevant to managing social and affective cues, strategies for inhibiting the prepotent response to ask for a cigarette, addressing cognitions regarding the difficulty of not smoking (i.e., cessation expectancies) and combating perceptions of the ability to smoke occasionally. In particular, the finding that a vast majority of adolescents report experiencing urges and craving to smoke suggests that some type of craving reduction treatment may be important in this population, regardless of whether or not the craving is experienced as an episodic cue just before the lapse or over a more extended period of time. In addition, enhancing awareness of situational characteristics associated with lapse may be useful. Future work is needed on larger and more diverse adolescent samples that examine gender differences and employ more proximal assessment methods in order to confirm and extend the present findings.

Highlights

- adolescent smoking lapse characteristics and precipitants were assessed.

- modal lapse situation was in the evening while socializing with friends at home.
- Urges or cravings and social pressure were commonly endorsed.
- The most frequently reported proximal influence was desire for a cigarette.
- a broad range of factors appear to influence adolescent smoking lapse.

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Table 1

Demographics and smoking characteristics compared across study samples.

	Full (n=204)	Study 1 (substance use treatment; n=30)	Study 2 (psychiatric inpatient; n=67)	Study 3 (Emergency department; n=33)	Study 4 (School sample; n=74)	p
Demographics						
Age (M (SD))	15.99 (1.27)	16.49 (1.01)	15.43 (1.29)	16.09 (1.28)	16.24 (1.19)	.000
Gender (% male)	44	60	36	58	38	.036
Ethnicity (% White)	78	63	97	70	69	.000
Smoking Variables						
Age 1 st smoked (M (SD))	11.97 (2.44)	11.90 (2.18)	11.34 (2.18)	12.81 (2.45)	12.18 (2.65)	.030
Ever tried to quit (%)	84	83	75	97	87	.043
Daily smokers (%)	51	53	40	52	58	.202
Cigarettes per day (M (SD))	10.61 (7.54)	9.96 (8.51)	13.64 (8.20)	9.59 (6.79)	8.60 (5.93)	.001

Table 2

Lapse Situation Characteristics: Percent for full, clinical, and community samples.

Characteristic	Full (n=204)	Clinical (n=97)	Community (n=107)	p
Time of day				.144
Morning (6 a.m. - noon)	21%	16%	25%	
Afternoon (noon - 5 p.m.)	33%	38%	29%	
Evening (5 p.m. - 11 p.m.)	40%	42%	37%	
Night (11 p.m. - 6 a.m.)	7%	4%	8%	
*Number of People				.194
Alone	14%	10%	18%	
1-3	48%	46%	49%	
4 or more	38%	43%	34%	
Age of others in situation (with others only)				.932
Same	35%	36%	33%	
Older	41%	40%	43%	
Younger	4%	5%	3%	
Mixed	20%	20%	21%	
*Location (with others only)				.059
Vehicle	12%	9%	15%	
Home	30%	24%	36%	
Friend's/Party	17%	15%	20%	
School or work	10%	10%	9%	
Public (mall, restaurant, outdoors)	15%	20%	11%	
Other	16%	22%	9%	
*Primary activity (with others only)				.069
Drug and/or alcohol use	5%	2%	7%	
Socializing	58%	68%	49%	
Activity (playing, watching TV, music)	23%	18%	27%	
Other	14%	12%	17%	
*How got cigarettes (with others only)				.580
Offer	26%	25%	26%	
Got from others (asked, took)	59%	63%	55%	
Bought	3%	2%	5%	
Other	12%	9%	14%	
*Cigarettes present in situation (with others only)				.431
Yes	91%	93%	90%	
*Used alcohol/other drugs in situation				.091
Yes	15%	10%	19%	

* For these situation characteristics results were analyzed and presented for a reduced number of original categories (or continuous responses were categorized); categories with similar content were combined.

Table 3

Situational lapse precipitants: Percent for full, clinical, and community samples.

Precipitant	Full (n=204)	Clinical (n=97)	Community (n=107)	p
Negative Intrapersonal Emotions *				.406
Frustration	26%	24%	28%	
Depression	7%	8%	6%	
Anxiety	10%	14%	8%	
Boredom	11%	13%	9%	
Other	3%	1%	4%	
Negative Physiological	5%	7%	4%	.260
Other Intrapersonal *				.319
Enhance positive state	6%	5%	7%	
Test personal control	2%	0%	3%	
Urges/cravings	84%	84%	84%	
Other	2%	1%	2%	
Interpersonal Emotions *				.511
Frustration/anger	24%	21%	27%	
Criticized/let down	6%	6%	6%	
Anxious	2%	2%	1%	
Other	4%	2%	6%	
Social Pressure				.861
Direct (offered cigarette)	23%	24%	22%	
Indirect (others smoking, but no offer)	44%	44%	44%	

* For these precipitants results were analyzed and presented for a reduced number of original categories; categories with similar content were combined.

Table 4

Proximal lapse determinants: Percent for full, clinical, and community samples

Precipitant	Full (n=204)	Clinical (n=97)	Community (n=107)	p
Social	34%	24%	43%	.004
Conflicts/life stress	40%	28%	51%	.001
Negative Emotional	48%	46%	49%	.753
Passive emotional	28%	34%	23%	.092
Active Emotional	24%	37%	11%	<.001
Desire for cigarette	90%	84%	95%	.006
Non-problematic use	35%	54%	18%	<.001
Abstinence focused	52%	68%	37%	<.001

Table 5

Demographics and smoking characteristics compared for high and low nicotine dependent participants.

	Low Dependence (n= 110)	High Dependence (n=93)	p
Demographics			
Age (M (SD))	16.00 (1.35)	15.96 (1.19)	.845
Gender (% male)	62	51	.106
Ethnicity (% White)	69	87	.002
Smoking Variables			
Age 1 st smoked (M (SD))	12.06 (2.31)	11.80 (2.54)	.438
Ever tried to quit (%)	82	87	.278
Daily smokers (%)	49	52	.720
Cigarettes per day (M (SD))	8.24 (5.85)	13.38 (8.38)	.000

Table 6

Proximal lapse determinants by dependence level: Clinical Sample

Precipitant	Low Dependence (n=50)	High Dependence (n=47)	p
Social	26%	21%	.585
Conflicts/life stress	18%	38%	.026
Negative Emotional	36%	57%	.034
Passive emotional	34%	34%	.996
Active Emotional	38%	36%	.852
Desire for cigarette	78%	89%	.132
Non-problematic use	52%	55%	.743
Abstinence focused	52%	85%	<.001

Table 7

Proximal lapse determinants by dependence level: Community sample

Precipitant	Low Dependence (n=60)	High Dependence (n=46)	p
Social	38%	50%	.230
Conflicts/life stress	50%	52%	.824
Negative Emotional	48%	50%	.865
Passive emotional	20%	28%	.321
Active Emotional	8%	20%	.021
Desire for cigarette	97%	94%	.443
Non-problematic use	17%	20%	.700
Abstinence focused	28%	50%	.023