Testing Social Cognitive Theory as a theoretical framework to predict smoking relapse among daily smoking adolescents

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ABSTRACT

Predictors of adolescent smoking relapse are largely unknown, since studies either focus on relapse among adults, or address (long-term) smoking cessation but not relapse. In the present study, Social Cognitive Theory (SCT) was used as a theoretical framework to examine the first and second lapses, as well as mild and heavy relapse into smoking among 135 daily smoking adolescents who embarked on a serious quit attempt. Baseline predictors were pros of smoking, pros of quitting, self-efficacy, and intensity of smoking. Using an ecological momentary assessment (EMA) study design, participants were monitored three times a day during 4 weeks. A follow-up was administered 2 months after the monitoring period. Perceiving many pros of smoking, reporting a low self-efficacy to quit, and high levels of baseline smoking significantly predicted relapse within 3 weeks after quitting. The effects of pros of smoking and self-efficacy on relapse, however, appeared to be accounted for by differences in intensity of smoking. Besides that pros of quitting showed a marginal effect on abstinence at the 2-month follow-up, no long-term effects were detected.

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1. Introduction

Adolescents seem to undertake quit attempts frequently (Pallonen, Murray, Schmid, Firie, & Luepker, 1990; Presti, Ary, & Lichtenstein, 1992), but only few adolescents succeed in quitting (Stanton, 1995). It is estimated that 95% to 99% of all unaided quit attempts among adults end in relapses (Jarvis, 2003), most of which occur in the first few days and weeks of quitting (Doherty, Kinnunen, Milletello, & Garvey, 1995; Jarvis, 2003). Adolescents even seem to relapse as much as or even more often than adults (Mermelstein, 2003; Pallonen, Murray, Schmid et al., 1990; Presti, Ary, & Lichtenstein, 1992; Stanton, McLeland, Elwood, Ferry, & Silva, 1996). Predictors of adolescent smoking relapse are largely unknown, since studies on smoking relapse are conducted almost invariably among adults. In addition, most studies, both among adults and adolescents, examine predictors of long-term smoking cessation, which only establishes distal relationships between predictors and outcomes over months and years. The present study focuses on incidental lapses and relapse among daily smoking adolescents who achieved at least 24 h abstinence.

A wide variety of factors, such as physiological and biological as well as cognitive factors appear to determine whether individuals successfully quit smoking or not. The present study concentrates on the role of cognitive factors in adolescent smoking relapse. Social Cognitive Theory (SCT) explains how people acquire and maintain certain behavioral patterns, for example smoking. The cognitive factors outcome expectations, self-efficacy, and intentions are important determinants of behaviour according to SCT (Bandura, 1986). In the context of smoking, outcome expectations can be operationalized as pros and cons of smoking, and intentions as motivation or readiness to quit. Pros of smoking involve the perceptions of the advantages of smoking, and cons refer to the disadvantages of smoking. Prior research on the pros and cons of smoking also used measures of the pros of quitting next to the pros of smoking (De Vries & Backbier, 1994; Dijkstra, Bakker, & De Vries, 1997; Ven, Engels et al., 2007). As such, SCT offers a theoretical framework to examine smoking behaviour.

Several studies have demonstrated that adult smokers' perceptions of the pros and cons of smoking and quitting affect their quitting behaviour (De Vries & Backbier, 1994; Dijkstra, De Vries, & Bakker, 1996; Greening, 1997; Hansen, Collins, Johnson, & Graham, 1985; Prochaska, DiClemente, & Norcross, 1992; Rose, Chassin, Presson, & Sherman, 1996). Individuals who report to attribute relatively few advantages to smoking and many benefits to quitting are more likely to achieve smoking cessation. However, relatively little is known about the influence of the pros and cons on smoking relapse...
specifically. It is conceivable that adolescents who perceive smoking to be highly advantageous and quitting to have relatively few advantages are the ones who will relapse and revert to smoking after embarking on a quit attempt. Another predictor which seems to play an important role in smoking relapse is self-efficacy to resist smoking. Research has consistently shown that low self-efficacy is related to smoking relapse among adults (for an overview, see Gwaltney, Metrik, Kahler, & Shiffman, in press). Among adolescents, self-efficacy has not yet been tested in association with relapse. Lastly, motivation to quit has yet been found to be a precursor of smoking cessation among adolescents (Engels, Knibbe, De Vries, & Drop, 1998; Lichtenstein, Lando, & Notwehr, 1994; Osler & Prescott, 1998). Conclusively, there are some indications from both the literature on smoking cessation and from adult studies that components of the SCT can predict relapse. However, most studies that used the SCT to explain smoking cessation and relapse have focused on aspects of the SCT rather than capturing the model including outcome expectations, self-efficacy, and intentions as a whole. Moreover, to our knowledge, SCT has not yet been used to predict relapse among adolescents. In the present study, we examined whether SCT derived smoking-specific cognitions predicted adolescents’ lapses and relapse after a serious quit attempt.1

Besides the influence of adolescents’ smoking-specific cognitions, the effect of intensity of smoking on relapse was taken into account. Intensity of smoking refers to the number of cigarettes smoked per day. Previous research has shown mixed results regarding the relation between intensity of smoking and smoking relapse. Some adult studies have found that heavy smokers are at greater risk for relapse during a quit attempt compared to light smokers (Curry, Thompson, Sexton, & Ommen, 1989; Senore, Battista, Shapiro, Segnan, Ponti et al., 1998). In contrast, other studies showed that the number of cigarettes smoked per day did not predict whether persons would succeed or fail during their attempts to quit smoking (Fiore, Novotny, Pierce, Giovino, Hatziandreu, et al., 1990; Kenford, Fiore, Jorenby, Smith, Wetter et al., 1994). Nicotine dependence is in part determined by intensity of smoking (Pierce & Gilpin, 1996), and there have been several studies that explored nicotine dependence in relation to adolescent smoking cessation (Engels, Knibbe, De Vries et al., 1998; Horn, Fernandes, Dino, Massey, & Kalsekar, 2003), but not to relapse. Conclusively, the impact of baseline smoking on adolescent relapse has not yet been examined. Despite scarce evidence from previous research among adults and the contrasting findings above, we expected that a high intensity of smoking would predict the first lapses, as well as relapse into smoking within 3 weeks, and that high baseline levels of smoking would lower the odds that quitters would be abstinent at the 2-month follow-up.

The purpose of the present study was to provide prospective information on the effects of SCT-derived smoking-specific cognitions and intensity of smoking on relapse among adolescent daily smokers. A number of 135 daily smoking adolescents in the ages of 15 to 20 participated in an Ecological Momentary Assessment (EMA) study in which they embarked on a serious attempt to quit smoking. Participants answered daily questions about their quitting experiences three times a day over a period of 4 weeks (1 week pre-cessation, and 3 weeks post-cessation). We hypothesized that high scores on pros of smoking, low scores on pros of quitting, low self-efficacy to resist smoking, and intensive tobacco use at baseline would predict the following five outcome variables: A first lapse, a second lapse, mild and heavy relapse into smoking as observed during the 3 weeks after the quit attempt, and current smoking at the 2-month follow-up.

1 Since a strong intrinsic intention or motivation to quit smoking had been one of the primary criteria for participation, we expected extremely little variation on this variable and did not include this variable in the baseline questionnaire.

2. Methods

2.1. Participants

Participants were 135 daily smoking adolescents in the ages of 15 to 20 years, who were highly motivated to quit. Participants were recruited through advertisements and articles about the study that were published and displayed in newspapers, on websites, and in community centers. Being between 15 and 19 years of age, having a strong motivation to quit, and smoking at least one cigarette per day were the main selection criteria. Exclusion criteria were participation in a smoking cessation program, and use of anti-depressants. Two participants who had turned 20 in the month prior to the study were allowed to participate. The sample originally comprised 176 adolescents who were enrolled in the study. For the present analyses, we excluded 17 individuals who withdrew prior to the target quit day, 9 who had too many missing values to establish whether they had achieved 24 h abstinence or not, 1 participant who failed to reach 24 h abstinence at least once during the study, and 14 participants who had not successfully returned their baseline questionnaire. The final sample thus consisted of 135 adolescents. Of those 135 participants, 120 (88.%) completed the 2-month follow-up.

The final sample of 135 adolescents consisted of 86 girls (63.7%), and 49 boys. Ages were distributed as follows: 15 (2.2%), 16 (31.1%), 17 (29.6%), 18 (16.3%), 19 (17.8%), and two persons had just turned 20 (1.5%) (M = 17.2; SD = 1.2). Participants resided across all four regions of the Netherlands. All adolescents received regular education, and all levels of educational attainment were represented: Lower vocational training (14.6%), pre-university education (13.8%), and college (17.7%). Most respondents lived at home with their parents (89.5%), whereas 7.6% lived in student housing, with his or her grandparents (0.7%), or with a romantic partner (2.2%). The average number of years that participants had been smoking daily was 2.9 (SD = 1.6). At the time of enrollment in the study, smoking rate was distributed as follows: 1–5 cigarettes per day (11.9%), 6–10 cigarettes per day (34.3%), 11–20 cigarettes per day (47.0%), 21–30 cigarettes per day (3.7%), and 31 or more cigarettes per day (3.0%). Although use of nicotine replacement was allowed, only 1 participant reported to have used nicotine patches.

2.2. Procedure

Participants were asked to complete a baseline questionnaire 1 week prior to starting the ‘diary period’ during which they were monitored daily for a total of 4 weeks. During the first week of monitoring, participants were instructed to smoke ad lib. The eighth day was the assigned quit day for each participant. A quit attempt was considered as such when participants were abstinent for at least 24 consecutive hours, as was evidenced by 3 consecutive reports of non-smoking. Following the assigned quit day, subjects were monitored for an additional 3 weeks. On each day of monitoring, participants were asked to complete the same Internet-based questionnaire three times a day – in the morning (to be completed between 10 am and 12 pm), the afternoon (3 pm–5 pm), and evening (8 pm–10 pm). Each questionnaire was identical and contained questions on smoking behaviour since the previous questionnaire. The questionnaires took approximately 3 min to complete. Participants who failed to complete a questionnaire within the designated interval were sent a text message to remind them. If participants found the Internet to be inaccessible during a sampling interval, they were asked to complete a paper version of the questionnaire during the interval and to submit their report online as soon as they had access to Internet again. A follow-up was administered 2 months after the end of the diary period. Participants received 40 euros if they completed the full 4 weeks of the diary period, and 10 additional euros upon completion of the 2-month follow-up. All data were collected between October 2006 and March 2007.
2.3. Measures

2.3.1. Pros of smoking and pros of quitting

Pros of smoking involved the perceptions of the advantages of smoking, and pros of quitting involved the perceptions of the advantages of smoking cessation as constructed by De Vries and Backhier (1994). These measures have been validated in other studies (cf. Dijkstra, Bakker, De Vries, 1997). Response categories of both scales ranged from 1 (totally disagree) to 4 (totally agree). Example items of the 10 pros of smoking were: “Smoking helps to cope with stress”, and “Smoking helps to concentrate”. Cronbach’s alpha was .72. The scale for pros of quitting consisted of 13 items, with items such as “To quit smoking decreases the risk for lung cancer”, and “To quit smoking increases my health”. Cronbach’s alpha was .82.

2.3.2. Self-efficacy to resist smoking

Self-efficacy represented adolescents’ perceived ability to resist smoking in tempting situations and was measured using a scale that had been developed for adolescents specifically (Kremers, Mudde, & De Vries, 2001). To the question “When you have quit smoking, how easy or difficult would it be for you not to smoke in the following situations?”, respondents could answer on a 5-point Likert scale ranging from 1 (very easy) to 5 (very difficult). Exemplary situations of the 18 situations given were: “When you are watching television”, and “When you feel angry”. Alpha was .83.

2.3.3. Intensity of smoking

Intensity of smoking refers to the number of cigarettes adolescents smoked per day at baseline. Response choices were: 1 (less than one cigarette per day), 2 (1–5 cigarettes per day), 3 (6–10 cigarettes per day), 4 (11–20 cigarettes per day), 5 (21–30 cigarettes per day), and 6 (31 or more cigarettes per day).

2.3.4. Outcome variables

The following variables were the five outcomes of interest: First lapse, second lapse, ‘mild’ and ‘heavy’ relapse within 3 weeks after the quit attempt, and smoking status at the 2-month follow-up. Whether a first lapse had occurred was established by any report of smoking (even if only a puff) after having accomplished 24 h of abstinence. Similarly, the event of a second lapse was defined as any report of smoking after the first relapse. Relapse was defined in two ways: 1) smoking at least 1 cigarette per day for three consecutive days (‘mild relapse’), and 2) smoking at least 5 cigarettes per day for three consecutive days (‘heavy relapse’). Smoking status at the 2-month follow-up was measured through the question: “Have you maintained abstinence since the end of the diary period?” Response choices were: ‘1’ ‘Yes, I am still a non-smoker’, ‘2’ ‘No, I am smoking again, but I currently smoke less than when I entered the study’, and ‘3’ ‘No, I am smoking again at the same level as when I entered the study’. Scores were recoded and dichotomised into ‘abstinent’ (response choice 1), and ‘smoking’ (response choices 2–3). All outcome variables were dichotomous with score ‘1’ representing non-smoking, and ‘2’ indicating the occurrence of smoking (occurrence of first and second lapses, and relapse). All independent variables were measured through the baseline questionnaire.

2.4. Strategy for analyses

First we calculated the relative occurrence of the relapse variables, and computed correlations among independent variables. Next, we examined the predictive power of the SCT-derived cognitions and intensity of smoking on the various outcome variables by means of survival analyses, using a Cox proportional hazards regression model. Survival analysis is concerned with studying the time between the entry to a study and a subsequent event (such as death, or in the present case ‘relapse’). A Cox regression model provides an estimate of the hazard (or risk) of the event for individuals on the basis of their individual characteristics (such as cognitions) thereby taking into account when the event occurred. Since the follow-up was measured at a fixed time point (2 months after the end of the diary period), we used logistic regressions to test effects on abstinence at follow-up. Since the pros of smoking and self-efficacy were highly correlated and thus at risk to cause multicollinearity, we present both the univariate and the multivariate analyses. Lastly, sex and age did not significantly predict any of the outcome variables and were therefore not included in the model as possible confounding variables.

3. Results

3.1. Descriptive analyses

The majority of the participants experienced at least one lapse during monitoring (70.4%, n=95 of 135), and 58.5% (n=79 of 135) also reported a second lapse. ‘Mild’ relapse defined as ‘smoking at least 1 cigarette on three consecutive days’ occurred for 46 participants (34.1%, n=46 of 135). ‘Heavy’ relapse defined as ‘smoking at least 5 cigarettes on three consecutive days’ occurred for 27 participants (20.0%, n=27 of 135). At follow-up, 29.6% of the initial sample of 135 adolescents were still abstinent, and 59.3% were smoking again (11.1% of the subjects did not participate in the follow-up).

The mean scores and standard deviations for the independent variables were as follows: Pros of smoking (M=2.71, SD=.47), pros of quitting (M=3.45, SD=.44), self-efficacy (M=2.48, SD=.61), and intensity of smoking (M=3.53, SD=.87). Pearson correlations among the independent variables showed that the pros of quitting were not correlated with any of the other predictors. The pros of smoking were strongly negatively correlated with self-efficacy (r=−.54, p<.001), and also with intensity of smoking (r=−.20, p=.01), which indicates that those who perceived smoking to be advantageous were more likely to be heavy smokers and to have low self-efficacy to remain abstinent. Self-efficacy and intensity of smoking were positively correlated (r=−.21, p<.01), indicating that participants with higher levels of baseline smoking reported lower self-efficacy.

3.2. Survival analyses

The univariate analyses showed that neither one of the independent variables predicted time to first and second lapses, mild relapse, nor smoking at follow-up (Table 1). However, perceiving smoking as highly advantageous predicted time to heavy relapse (HR=2.87, CI=1.15–7.16, p<.01) – each one-point increase in the pros of smoking

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Univariate survival analyses</th>
</tr>
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<tr>
<td></td>
<td>1st lapse</td>
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<tr>
<td></td>
<td>HR</td>
</tr>
<tr>
<td>Pros of smoking</td>
<td>1.07</td>
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<tr>
<td>Pros of quitting</td>
<td>.77</td>
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<tr>
<td>Self-efficacy</td>
<td>1.03</td>
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<tr>
<td>Intensity of smoking</td>
<td>.96</td>
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</tbody>
</table>

Note: *p<0.05, **p<0.01. HR = hazard ratio; OR = odds ratio.
increased the risk of suffering heavy relapse by almost 3 times. Lower levels of self-efficacy (HR = .46, CI = .24–.89, p < .01) as well as high levels of baseline smoking (HR = 1.84, CI = 1.25–2.71, p < .01) were also predictive of heavy relapse. The multivariate analyses (Table 2) showed that the initially significant effects of pros of smoking and self-efficacy on heavy relapse diminished when intensity of smoking was accounted for.2 Of the cognitions, only the pros of quitting showed a trendwise effect on abstinence at follow-up, indicating that endorsing many pros of quitting provided a protective effect on prolonged abstinence.

4. Discussion

In the present study, smoking-specific cognitions derived from the Social Cognitive Theory (Bandura, 1986) were hypothesized to predict the outcomes of a serious quit attempt of daily smoking adolescents. The main findings show that a strong endorsement of the pros of smoking, low self-efficacy to quit, and baseline smoking status significantly predicted relapse within 3 weeks after quitting. The first and second lapses as well as abstinence 2 months later appeared to be largely unaffected by baseline smoking status and smoking-specific cognitions. The finding that pros of smoking and self-efficacy significantly predicted heavy relapse is in line with our own hypotheses as well as findings from prior research on adolescent smoking cessation (Hansen, Collins, Johnson et al., 1985) and adult relapse (Gwaltney, Metrik, Kahler et al., in press). More specifically, this means that individual differences in smoking-specific cognitions that adolescents set out on their quit attempts with in part determine successful cessation. It therefore might be fruitful to target smoking-specific cognitions before adolescents begin their quit attempt. However, it is possible that the effects of pros of smoking and self-efficacy on heavy relapse can be attributed to smoking status. We found that inclusion of baseline smoking status attenuated the effects of the cognitions to non-significance, which is in line with recent findings suggesting that smoking status and nicotine dependence are potentially dominant over cognitive strategies in predicting smoking cessation (Kleinjan, Van Den Eijnden, Van Leeuwe, Brug, Van de Ven, et al., 2007).

Furthermore, in contrast with our hypothesis, pros of quitting were not significantly related to any of the relapse variables, except for a marginal effect on abstinence at follow-up. It is possible that the perceived pros of quitting are more relevant in an early stage of cessation – such as the trajectory that precedes smoking cessation and in forming intentions to quit (e.g., Van Zundert, Van De Ven, Engels et al., 2007) – than in preventing relapse once abstinence is achieved. Perception of the pros of smoking, on the contrary, was associated with relapse, but not with abstinence at follow-up. This is in line with previous studies showing that pros of smoking are particularly related to the action stage of the stages of change and to relapse, and that cons of smoking are related to long-term abstinence (Dijkstra, Tromp, & Conijn, 2003; Hansen, Collins, Johnson et al., 1985; Pallonen, 1998).

Compared to the pre-action phases, the pros of quitting have been found to be endorsed to a lesser extent among adults during the actual action phase (Dijkstra, De Vries, & Bakker, 1996; Pallonen, 1998). Such a decline in acknowledging the benefits of cessation may be plausible in the light of the temptations and smoking cues that smokers who are attempting to quit encounter. It is possible that when quitters experience the negative effects of quitting (e.g., withdrawal symptoms), they are inclined to downplay the advantages of quitting. If such a change in perception indeed occurs, this would render baseline individual differences in the pros of quitting unable to explain the outcome of the attempt. Whether this postulate is valid needs to be tested by measuring the pros of smoking and quitting during the quit attempt.

Contrary to our hypotheses, pros of smoking, self-efficacy, and baseline smoking status did not predict abstinence at follow-up. In the case of self-efficacy this contradicts most studies among adults (e.g., Shiffman, Balabanis, Paty, Engberg, Gwaltney et al., 2000; Stuart, Borland, & McMurray, 1994). An explanation for this may be that self-efficacy changes in response to the experiences during the quit attempt. During a quit attempt, self-efficacy has been found to decrease in reaction to the event of a lapse, to a higher urge to smoke, and by negative affect (Gwaltney, Shiffman, & Sayette, 2005; Shiffman, Balabanis, Paty et al., 2000; Shiffman, Hickcox, Paty, Gny, Kassel et al., 1997). It is possible that self-efficacy changes in response to quitting experiences to such an extent that baseline self-efficacy becomes insignificant in predicting prolonged cessation. Studies among adults have demonstrated that self-efficacy is indeed a dynamic construct and that the day-to-day variations in self-efficacy play an important role in lapses and relapse (Shiffman, Balabanis, Paty et al., 2000; Stuart, Borland, & McMurray, 1994), but these results have hitherto not been replicated for adolescents. Future research is recommended to examine the dynamic effects of self-efficacy among adolescents to gain a more in-depth understanding of the interplay between smoking-specific cognitions and adolescent smoking cessation and relapse.

In the above, we have mainly discussed the results for heavy relapse and the 2-month follow-up. However, the null findings for the first and second lapse and mild relapse raise questions and are important to discuss as well. It is possible that the first few slips are primarily caused by momentary states such as negative affect, or the experience of withdrawal symptoms, rather than that they are a consequence of with which attitude towards smoking and quitting adolescents set out on their cessation trials. Research among adults has shown that dynamic effects of smoking-specific cognitions such as self-efficacy and withdrawal symptoms can account for the first few lapses (Gwaltney, Shiffman, Balabanis, & Paty, 2005; Plasecki, Jorenby, Smith, Fiore, & Baker, 2003; Shiffman, Balabanis, Paty et al., 2000). Most studies, however, do not distinguish the first lapse from a second lapse or full relapse, while the interval between a lapse and full relapse is distinctly different from the interval between quitting and the first lapse (Shiffman, Balabanis, Paty et al., 2000). Although experiencing a first lapse is very likely to instigate a second lapse, and to eventually lead to relapse (Plasecki, 2006), our results show that independent variables that predict relapse do not necessarily predict the first lapses. Especially since the first lapse is a powerful indicator for later relapse, it is important to gain a deeper understanding of which

### Table 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>1st lapse</th>
<th>2nd lapse</th>
<th>Mild relapse</th>
<th>Heavy relapse</th>
<th>Smoking at follow-up</th>
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<tbody>
<tr>
<td></td>
<td>HR</td>
<td>95% CI</td>
<td>HR</td>
<td>95% CI</td>
<td>HR</td>
</tr>
<tr>
<td>Pros of smoking</td>
<td>1.14</td>
<td>.70–1.63</td>
<td>1.22</td>
<td>.60–2.15</td>
<td>1.16</td>
</tr>
<tr>
<td>Pros of quitting</td>
<td>.77</td>
<td>.48–1.22</td>
<td>.90</td>
<td>.60–1.66</td>
<td>1.68</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>1.49</td>
<td>.74–1.43</td>
<td>1.00</td>
<td>.65–1.54</td>
<td>1.11</td>
</tr>
<tr>
<td>Intensity of smoking</td>
<td>.93</td>
<td>.76–1.22</td>
<td>.90</td>
<td>.76–1.30</td>
<td>1.33</td>
</tr>
</tbody>
</table>

Note. **p < .05, *p < .01. HR = hazard ratio; OR = odds ratio.
factors affect the first lapses among adolescents. In addition, it is interesting to notice that the results differ depending on which definition of relapse is used: ‘mild’ versus ‘heavy’ relapse. Since the literature on smoking relapse among adolescents is still relatively underdeveloped, it is important to acknowledge that percentages of relapse rates as well as effects of possible predictors greatly differ as a function of definition.

4.1 Limitations

Important strengths of the present study are that it is the first prospective study testing Social Cognitive Theory in relation to adolescent smoking relapse in a sample of daily smoking adolescents. In addition, daily reports of smoking have allowed for the first and second lapses and relapse to be distinguished from one another, and to take into account the time to the event. On the other hand, some aspects of this study may be considered as limitations, such as the relatively small sample size, the relative homogeneity of the sample, and the lack of biochemical verification of abstinence. To start with, one might posit that the sample size might cause lack of statistical power. Nonetheless, we did find some of the associations to be significant which would not have been possible if there had been a serious power problem. Second, to be able to have adolescents undertake a serious quit attempt, motivation to quit must be high. Accordingly, this was a selection criterion for participation. This high motivation to quit may have restricted the range of scores on the smoking-specific cognitions, as well as visible in the relatively small standard deviations, and may have tempered the associations between the cognitions and the outcome variables. Lastly, we did not use biochemical verification to ensure that participants had achieved 24 h abstinence. However, the fact that 27.5% of the participants did not show 24 h abstinence on the target quit day suggests that participants felt free enough to honestly report whether or not they had smoked. Moreover, several studies among adolescents have indicated that self-reports of smoking and quitting behaviour are valid and reliable (Dolcini, Adler, & Ginsberg, 1996; Stanton, McClelland, Elwood et al., 1996).

4.2 Recommendations

Both the perception of the pros of smoking and self-efficacy appear to be affected and overruled by the intensity of smoking when it comes to heavy relapse. However, with the lapse of time after the quit attempt, the pros of quitting become more relevant again. This suggests that cessation interventions for adolescent smokers should have a dynamic character, and should intervene on different aspects at different stages of the cessation process. With the effect of baseline smoking status being strong and overruling the effects of cognitions on relapse, one might advocate to primarily target nicotine dependence when adolescents are in the action phase of the quit attempt. Prior research shows that withdrawal symptoms seem to be successfully reduced by using nicotine patches in adolescents (Smith, House Jr, Croghan, Gauvin, Colligan et al., 1996), but the few studies on the effects of nicotine patch treatment on adolescent smoking cessation have revealed inconsistent findings. Hurt et al. (2000) found that use of nicotine patches did not improve cessation rates. In addition, Moolchann et al. (2005) showed that use of nicotine patches increased cessation rates, but the nicotine patch intervention was accompanied by cognitive-behavioural therapy. Our results suggest that an approach similar to the latter study would be fruitful, and that both nicotine dependence and cognitions should be targeted in cessation interventions and relapse prevention among adolescents. Lastly, given that our findings do not support the notion that Social Cognitive Theory nor baseline smoking status explain the first few lapses, future research is recommended to explore other possible predictors, such as withdrawal symptoms.

References


