The role of environmental smoking in smoking-related cognitions and susceptibility to smoking in never-smoking 9–12 year-old children

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Abstract

Environmental smoking has numerous adverse effects on child health, and children are frequently exposed to environmental smoking. In the present study, we investigated the role of environmental smoking (parental smoking, sibling smoking, peer smoking) in smoking-related cognitions (pros of smoking, perceived safety of casual smoking, cue-triggered wanting to smoke) and susceptibility to smoking among 9–12 year-old never-smoking children (N = 778). We collected cross-sectional survey data from children attending 15 Dutch primary schools. Using structural equation modelling, we assessed direct as well as indirect relationships among study variables. The results showed that children who were exposed to more smoking parents, siblings, and peers perceived more pros of smoking. Additionally, parental smoking was associated with higher perceived safety of casual smoking and more cue-triggered wanting to smoke. In turn, perceiving a higher safety of casual smoking and more cue-triggered wanting to smoke were associated with a higher susceptibility to smoking in children. No direct effects of environmental smoking on children’s susceptibility to smoking were found. However, parental smoking was associated with children’s susceptibility to smoking through children’s perceived safety of casual smoking and cue-triggered wanting to smoke. The present study indicates that pre-adolescents may already display favourable smoking-related cognitions and that these cognitions may be an early indicator of a child’s vulnerability to smoking. Environmental smoking, particularly parental smoking, is associated with more favourable smoking-related cognitions in never-smoking children. In the intergenerational transmission of smoking from parents to children, children’s risk perceptions of smoking and the experience of cue-triggered wanting to smoke may constitute mechanisms of action, which need to be investigated in longitudinal research.

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1. Introduction

Environmental smoking has various adverse effects on child health, such as childhood asthma, respiratory tract infections, decreased lung growth, behavioural problems, or neurocognitive decrements (Cook & Strachan, 1999; DiFranza, Aligne, & Weitzman, 2004). In North America and Europe, children are frequently exposed to environmental smoking. At least one third of children live in a household with a smoker (King et al., 2009; Schuster, Franke, & Pham, 2002), and approximately two-thirds of children are exposed to smoking in their social environment (USDHHS, 2006). In addition to the numerous detrimental effects on child health, environmental smoking increases the child’s risk for smoking initiation in the future (Becklake, Chezzo, & Ernst, 2005; Bernat, Erickson, Widome, Perry, & Forster, 2008; Leonardi-Bee, Jere, & Britton, 2011).

To prevent youth smoking, it is essential to understand factors that promote vulnerability to smoking among children and adolescents. Research indicates that the development of a cognitive susceptibility and intentions to smoke precede actual smoking initiation among youth. Several studies suggest that children may display susceptible cognitions already at a very young age. In a longitudinal study, smoking-related perceptions (i.e., social images about what smokers are like and subjective norms about smoking) of children in the elementary years have been shown to predict children’s intention and willingness to smoke which, in turn, predicted adolescent smoking behaviour at five-year follow-up (Andrews, Hampson, Barckley, Gerrard, & Gibbons, 2008; Hampson, Andrews, & Barckley, 2007). Among children and adolescents, an increasing number of studies shows that smoking-related cognitions (e.g., attitudes towards smoking, normative beliefs about smoking, risk and benefit perceptions, tobacco refusal self-efficacy) are predictive of smoking intentions and smoking behaviour (Andrews, Hampson, & Barckley, 2008; Bidstrup et al., 2009; Carvajal, Wiatrek, Evans, Knee, & Nash, 2000; Gerrard, Gibbons, Bethin, & Hessling, 1996; Otten, Engels, & Prinstein, 2009; Song et al., 2009). However, relatively little is known about the development of smoking-related cognitions. Previous studies have focused mainly on
adolescents to determine who is at risk for smoking initiation. Consequently, childhood factors that may predispose youth for smoking are largely unrecognized.

Several studies have linked smoking in the social environment to more favourable smoking-related cognitions in youth. For pre-adolescents, parental smoking has been found to be associated with more tolerant and more positive attitudes towards smoking (Brook, Mendelberg, Galil, Priel, & Bujanover, 1999; Porcellato, Dugdill, Springett, & Sanderson, 1999). Similarly, pre-adolescents with smoking family members displayed more favourable implicit attitudes towards smoking compared to pre-adolescents with non-smoking family members (Andrews, Hampson, Greenwald, Gordon, & Widdop, 2010). Parental smoking and peer smoking were associated with more normative perceptions of smoking in early adolescence (Otten et al., 2009). Finally, adolescents exposed to smokers in their social environment perceived more benefits of smoking compared to adolescents not exposed to environmental smoking (Prokhorov et al., 1995). Taken together, previous studies demonstrate that environmental smoking affects global smoking-related cognitions, such as attitudes towards smoking and normative perceptions in youth. However, little is known about more specific cognitions, particularly in children. Smokers may hold very specific beliefs about smoking, and smokers may communicate these beliefs, to their social environment consciously or unconsciously. According to social learning theory (Bandura, 1977), children learn within a social context through observing others’ behaviour, attitudes, and outcomes of behaviour. Adult and adolescent smokers have been shown to hold strong beliefs as well as cognitive distortions regarding smoking. For example, smokers usually believe that smoking has various instrumental benefits, such as stress relief, concentration enhancement, or appetite control (Chapman, Wong, & Smith, 1993; Halpern-Felsher, Biehl, Kropp, & Rubinstein, 2004). In addition, in comparison to non-smokers, smokers display an optimistic bias; they tend to underestimate the risks of smoking in general and the personal risks of smoking in particular (Arnett, 2000). Similarly, risk denial has been found to be quite widespread among smokers (Peretti-Watel et al., 2007). Smokers also display associations between smoking-related cues and urges to smoke (Carter & Tiffany, 1999), which can be explained by classical conditioning through repeated pairing across time. For example, seeing others smoke can elicit the desire to smoke and smoking behaviour in smokers. Much less is known about similar beliefs and associations among children. Possibly, children who are exposed to smokers in their social environment may adopt beliefs and associations from their social environment through observations and social learning.

The present study investigated three types of susceptible cognitions in children, the perceived pros of smoking, the perceived safety of casual smoking, and the experience of cue-triggered wanting to smoke. Pros of smoking and safety of casual smoking assess risk and benefit perceptions. Cue-triggered wanting to smoke assesses the desire or temptation to smoke in response to smoking-related cues. In a recent study, a substantial percentage of never-smoking children reported cue-triggered wanting to smoke, which was associated with the number of smokers in the child’s social environment (Schuck, Kleinjan, Otten, Engels, & DiFranza, submitted for publication). Previous studies suggest that these three types of cognitions reflect an increased vulnerability to smoking among youth (Carvajal et al., 2000; Schuck et al., submitted for publication; Song et al., 2009).

It is assumed that a susceptibility to smoking precedes intentions to smoke and smoking initiation. Research has shown that susceptibility to smoking among never-smokers (i.e., the lack of a firm commitment to refrain from smoking) strongly predicted smoking experimentation at four-year follow-up (Pierce, Choi, Gilpin, Farkas, & Merrit, 1996). In pre-adolescents, intentions to smoke are seldom reported. Therefore, susceptibility to smoking, as measured by the lack of a resolute intention to refrain from smoking, may constitute a relevant outcome, particularly in younger age groups.

To summarize, the present study investigated the role of environmental smoking (parental smoking, sibling smoking, peer smoking) in smoking-related cognitions (pros of smoking, perceived safety of casual smoking, cue-triggered wanting to smoke) and susceptibility to smoking among 9–12 year old never-smoking children. We hypothesized that environmental smoking is associated with susceptible cognitions in children. In particular, we expected smoking of parents to be most influential, as parental influences are thought to be more important in elementary years while peer influences become increasingly important during adolescent years (Vitaro, Wanner, Brendgen, Gosselin, & Gendreau, 2004). Moreover, we hypothesized that susceptible cognitions in children are associated with an increased susceptibility to smoking, and that environmental smoking affects children’s susceptibility through susceptible cognitions.

2. Methods

2.1. Participants and procedure

We used cross-sectional survey data collected in 15 Dutch primary schools. Primary schools were selected randomly from a larger pool of schools located in urban areas in the East of the Netherlands. Participating schools agreed to distribute short questionnaires during school hours to all students in Dutch grades 6–8 (US grades 4–6). Study participants were 880 children aged between 9 and 12 years. Parents received written information about the school’s participation in the study as well as information about the procedure and aim of the study. All parents were informed that participation in the study was voluntary, and they received a form with a return envelope, which they were asked to return if they wished to withdraw their child from study participation (‘passive consent’). Parents of three students withdrew their child from study participation. Data collection took place between March and September 2010. Questionnaires were filled in anonymously with an instructed teacher present in the classroom. Children were informed that participation was voluntary. For the present study, we selected all children who reported that they had never smoked, not even a single puff (N = 778).

2.2. Measures

2.2.1. Parental smoking

Parental smoking was assessed with two questions “Does your mother/father smoke?” Response options were: 1 (my mother/father has never smoked), 2 (my mother/father quit smoking), 3 (my mother/father smokes), 4 (I don’t have a mother/father), and 5 (I do not know). Scores for mothers and fathers were dichotomized (0 = not currently smoking, 1 = currently smoking) and summed, to indicate the number of smoking parents.

2.2.2. Sibling smoking

To assess sibling smoking, children were asked to report the names of all siblings and for each sibling indicate whether he/she smokes. Response options were: 0 (no, he/she doesn’t smoke) and 1 (yes, he/she smokes). Scores of all siblings were summed, to indicate the number of smoking siblings.

2.2.3. Peer smoking

To assess the number of smoking peers, children were asked to report the number of friends who smoke. Response options were: 0 (no body), 1 (1 friend), 2 (2 friends), 3 (3 friends), 4 (4 friends), and 5 (5 or more friends).

2.2.4. Perceived pros of smoking

To assess perceived pros of smoking, children were asked to indicate the degree to which they agree with ten statements. Response options ranged from 1 (totally disagree) to 4 (totally agree). Example
items are: “Smoking helps cope with stress” and “Smoking helps relax.” The measure has been validated previously in adolescents (Dijkstra & De Vries, 1997). A mean score was calculated. Internal consistency was good (Cronbach’s alpha = .85).

2.2.5. Perceived safety of casual smoking
To assess perceived safety of casual smoking, children were asked to indicate the degree to which they agree with three statements on a scale ranging from 1 (totally disagree) to 4 (totally agree). The following items were used: “There is no harm in smoking a cigarette once in a while”, “It is safe to smoke for only one or two years”, and “If you only smoke once in a while you won’t become addicted” (see Siegel, Alvaro, & Burgio, 2003). A mean score was calculated. Internal consistency was acceptable (Cronbach’s alpha = .63).

2.2.6. Cue-triggered wanting to smoke
To assess cue-triggered wanting to smoke, we used the cue-induced craving subscale of the Autonomy Over Smoking Scale (AUTOS; DiFranza, Wellman, Ursprung, & Sabiston, 2009). Examples of the four items are: “When I see other people smoking, I want a cigarette” and “When I smell cigarette smoke, I want a cigarette” Children were asked to select the response that best describes them. Response options ranged from 1 to 5 (never, sometimes, regularly, often, very often). Because the distribution was skewed towards lower response categories, answers were recoded into 0 (never) or 1 (sometimes, regularly, often, very often). A sum score of items endorsed was calculated ranging from 0 to 4. In smokers, both the number of symptoms endorsed in the AUTOS and symptom intensity have been shown to correlate with cigarette consumption and other measures of tobacco use (DiFranza et al., 2009).

2.2.7. Susceptibility to smoking
To assess susceptibility to smoking, children were asked to select the statement that best describes them. Response options were: 1 (I know for sure that I will never start smoking), 2 (I think that I will never start smoking), 3 (I think I will try smoking in the future), 4 (I think I will try smoking within five years), 5 (I think I will try smoking within one year), 6 (I think I will try smoking within six months), 7 (I think I will try smoking within one month), and 8 (I have already tried smoking). Due to a preponderance of scores at the scale minimum, the scores were dichotomized into 0 (I know for sure that I will never start smoking) and 1 (any other response), thereby indicating (the lack of) a resolute intention to refrain from smoking (Pierce et al., 1996).

2.3. Strategy for analyses
A path model was estimated in Mplus 5 (Muthén & Muthén, 2007) to evaluate the effects of environmental smoking (parental smoking, sibling smoking, peer smoking) on children’s susceptibility to smoking via children’s smoking-related cognitions (perceived pros of smoking, perceived safety of smoking, cue-triggered wanting to smoke). The chi-square value, degrees of freedom, and the p-value of the model were evaluated. Direct associations between variables were assessed based on standardized path coefficients and p-values. Indirect effects (i.e., mediation) were tested using a bootstrap method in Mplus (Shrout & Bolger, 2002).

Of the 778 never-smoking children, 36 children (4.6%) had missing responses on the outcome variable (susceptibility to smoking) and were not included in the analyses. Missing values on predictor variables were substituted in Mplus using full information maximum likelihood (FIML) estimation.

To examine gender differences in individual model paths, we compared the relative model fit between a model in which all parameters were allowed to vary freely across groups and a model in which the individual parameters were held equal across groups (i.e., nested model comparison). All parameters were tested separately (i.e., one parameter was freed at a time). A chi-square difference test was used to test relative model fit (Satorra & Bentler, 2001).

3. Results

3.1. Descriptive analyses

Descriptive statistics are provided for the sample of 742 never-smoking children. Univariate correlations between study variables are displayed in Table 1. The mean age of the sample was 10.7 (SD = 1.0) and 50.9% of the sample were girls. Overall, 167 children (22.5%) reported that one parent currently smokes, and 77 (10.4%) reported that both parents currently smoke. Forty-two children (5.7%) reported current smoking among at least one sibling, and 52 (7.0%) reported current smoking among at least one peer. Of the 742 never-smoking children, 305 children (41.3%) agreed with at least one item on the ‘pros of smoking’ scale, 255 (35.6%) agreed with at least one item on the ‘perceived safety of casual smoking’ scale, and 61 (8.4%) reported at least one item on cue-triggered wanting to smoke. Regarding intentions to smoke, 403 children (54.3%) reported ‘I know for sure that I will never start smoking’ (i.e., a resolute intention to refrain from smoking in the future). A total of 301 children (40.6%) reported ‘I think that I will never start smoking’ and 38 children (5.1%) reported ‘I think I will try smoking in the future’ (i.e., lack of a resolute intention to refrain from smoking in the future).

3.2. Direct and indirect associations between study variables

We used structural equation modelling (path analysis) to evaluate direct and indirect associations between study variables (Fig. 1). The model included direct effects between age, gender, parental smoking, sibling smoking, and peer smoking on one hand and susceptibility to smoking on the other hand as well as indirect effects between these variables through children’s smoking related cognitions (perceived pros of smoking, the perceived safety of casual smoking, cue-triggered wanting to smoke).

The model was fully saturated. Age was positively associated with perceived pros of smoking in children (beta = .12, SE = .02, p = .01). Boys perceived more pros of smoking (beta = .12, SE = .03, p = .001), perceived a higher safety of casual smoking (beta = .14, SE = .07, p < .001), and reported more symptoms of cue-triggered wanting to smoke (beta = .09, SE = .03, p = .02) compared to girls. Parental smoking, sibling smoking, and peer smoking were positively associated with perceived pros of smoking in children (beta = .13, SE = .03, p = .001; beta = .09, SE = .05, p = .03; and beta = .10, SE = .03, p = .02, respectively). Additionally, parental smoking was positively associated with perceived safety of casual smoking (beta = .12, SE = .05 p = .001) and reported symptoms of cue-triggered wanting to smoke (beta = .09, SE = .03, p = .04). In turn, perceiving a higher safety of casual smoking (beta = .17, SE = .02, p < .001) and reporting more symptoms of cue-triggered wanting to smoke (beta = .15, SE = .04, p < .001).

Table 1

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Note: * p < .05, ** p < .01; *** p < .001.
...yielding a significant nested model comparison ($\Delta \chi^2 (1) = 3.90, p = .05$), indicating a difference in the relative strength of this association between boys and girls (girls: $\beta = -.02, p = .73$; boys: $\beta = .16, p = .01$). Second, constraining the association between the perceived pros of smoking and the perceived safety of smoking to be equal across boys and girls yielded a significant nested model comparison ($\Delta \chi^2 (1) = 5.76, p = .02$), indicating a difference in the relative strength of this association between boys and girls (girls: $\beta = .22, p < .001$; boys: $\beta = .31, p < .001$). For all other paths, imposing the restriction of equal path coefficients across boys and girls did not result in a statistically significant nested model comparison, indicating no reliable differences between boys and girls in the magnitude of these path coefficients.

### 3.3. Gender differences across model parameters

In two instances, imposing the restriction of equal path loadings across boys and girls resulted in a statistically significant nested model comparison, indicating a decrease in model fit in the constrained model compared to the unconstrained model. First, constraining the association between peer smoking and the perceived pros of smoking to be equal across boys and girls yielded a significant nested model comparison ($\Delta \chi^2 (1) = 3.90, p = .05$), indicating a difference in the relative strength of this association between boys and girls (girls: $\beta = -.02, p = .73$; boys: $\beta = .16, p = .01$). Second, constraining the association between the perceived pros of smoking and the perceived safety of smoking to be equal across boys and girls yielded a significant nested model comparison ($\Delta \chi^2 (1) = 5.76, p = .02$), indicating a difference in the relative strength of this association between boys and girls (girls: $\beta = .22, p < .001$; boys: $\beta = .31, p < .001$). For all other paths, imposing the restriction of equal path coefficients across boys and girls did not result in a statistically significant nested model comparison, indicating no reliable differences between boys and girls in the magnitude of these path coefficients.

### 4. Discussion

The present study investigated the role of environmental smoking in smoking-related cognitions and susceptibility to smoking among 9–12 years-old never-smoking children. In the present sample, the prevalence of parental smoking was quite high (33%), which is consistent with findings in other Dutch samples (Otten, Engels, & van den Eijnden, 2005). The results showed a positive graded association between the numbers of smokers among parents, siblings, and peers and the perceived pros of smoking in children (i.e., children with more smoking parents, siblings, and peers perceived more pros of smoking). Separate analyses for boys and girls revealed that the association between peer smoking and the perceived pros of smoking was significant only for boys. Otherwise, only few gender differences were found, indicating that the results of the present study are generalizable to both boys and girls. In addition, children of smoking parents perceived casual smoking to be safer, and they reported more wanting to smoke in response to smoking-related cues compared to children of non-smoking parents. Sibling smoking and peer smoking were unrelated to the perceived safety of casual smoking and cue-triggered wanting to smoke in children. Previously, several studies have suggested that environmental smoking is related to susceptibility to smoking among children (Andrews et al., 2010; Brook et al., 1999; Otten et al., 2009; Porcellato et al., 1999; Prokhorov et al., 1995). However, most studies have examined general cognitions, such as attitudes and normative perceptions, and only few studies have compared the effect of smoking behaviour of parents, siblings, and peers on children’s cognition directly. As expected, parental smoking seems to influence children’s cognition the most, as it is associated with a wider variety of cognitions compared to sibling and peer smoking. Children in elementary years are likely to spend a lot of time with their parents. Moreover, parental smoking behaviour is probably more established and more overt compared to sibling and peer smoking.

Interestingly, children of smoking parents already display rather specific smoking-related cognitions. They perceive more benefits of smoking, less risks of smoking, and report a stronger desire or temptation to smoke in response to smoking-related cues. According to social learning theory (Bandura, 1986), children learn from their social context through observations and imitation. Smokers may communicate their beliefs and associations regarding smoking to their social
Children who are exposed to smokers in their social environment may adopt these cognitions either because they are overtly displayed or because of children's observations and inferences of behavior. Particularly, children may easily adopt benefit perceptions, as smokers often emphasize the instrumental benefits of smoking while children can observe the immediate effects of smoking directly (e.g., stress relief). Parental smoking also seems to affect children's risk perceptions of smoking. Smokers generally display an optimistic bias (i.e., they tend to underestimate the risks of smoking in general and the risks of smoking for themselves in particular). It has been suggested that optimistic biases develop in response to threatening information and serve to preserve psychological well-being. Possibly, perceiving smoking to be less harmful may serve a similar function in children of smoking parents (i.e., decreasing worries about the parent/smoker). Alternatively, pre-adolescents may view their parents as role models and health experts, and they may assume that smoking may not be as harmful, otherwise, their parents would not engage in it. Finally, parental smoking was associated with more cue-triggered wanting to smoke in children. However, while 'wanting' may reflect urges to smoke in smokers, it may reflect a desire or temptation to smoke in never-smoking children (Schuck et al., submitted for publication). In smokers, cigarette craving and smoking behaviour can be elicited by smoking-related cues (e.g., seeing someone smoke, smelling cigarette smoke, sight of ashtray). Theoretically, children may form similar associations following observations of repeated pairing of smoking cues and smoking behaviour in their environment.

In a recent study among kindergarten children, children of smoking parents were more likely to pretend to smoke a cigarette when they were asked to pretend to be grown-ups having dinner than were children of non-smoking parents (de Leeuw, Engels, & Scholte, 2010). Interestingly, the present findings suggest that children may not only form associations between smoking cues and smoking behaviour, but may also experience a desire to smoke in response to these cues.

In the present study, the perception of (casual) smoking as less harmful and the experience of more cue-triggered wanting to smoke were associated with an increased susceptibility to smoking in never-smoking children. Previously, several studies have suggested that favourable smoking-related cognitions (e.g., attitudes towards smoking, normative beliefs about smoking, risk and benefit perceptions, tobacco refusal self-efficacy) predict smoking intentions, smoking initiation, and smoking behaviour among youth (Andrews, Hampson, & Barckley, 2008; Andrews, Hampson, Barckley, & Gerrard, 2008; Bidstrup et al., 2009; Carvajal et al., 2000; Gerrard et al., 1996; Otten et al., 2009; Song et al., 2009). The present study suggests that in pre-adolescents, risk perceptions and cue-triggered desire or temptation to smoke are more important determinants of children's susceptibility than are benefit perceptions. Contrary to our expectations, the perceived pros of smoking were unrelated to susceptibility to smoking in pre-adolescents. Possibly, the perceived benefits of smoking are more important in adolescent rather than elementary years. Alternatively, the lack of resolute intention to refrain from smoking may have different determinants than smoking initiation or smoking behaviour. Possibly, the lack of a resolute intention to refrain from smoking is better explained by motivation (being less motivated to refrain from smoking if smoking is perceived as harmless) and inhibitory abilities (resisting the desire or temptations to smoke in situations where smoking-related cues are present) rather than cognitive elaboration (being tempted to smoke because smoking is perceived to have instrumental benefits). This explanation supports the idea that smoking initiation is a spontaneous and situated behaviour rather than planned behaviour.

The present study suggests that smoking-related cognitions may mediate the association between parental smoking and children's susceptibility to smoking (i.e., parental smoking affects children's susceptibility through children's cognitions). Parental smoking was associated with children's cognitions, which were, in turn, associated with child susceptibility. Statistically, the effect of parental smoking on children's susceptibility was fully mediated by these cognitions. However, it should be noted that due to the cross-sectional design of the present study, only statistical mediation could be inferred. To conclude that smoking-related cognitions constitute a mechanism of action in the association between parental smoking and child susceptibility to smoking a longitudinal design is required to establish a temporal order between study variables (Embry & Biglan, 2008). Temporal precedence needs to be addressed in future research.

Several limitations should be acknowledged in interpreting the results of the present study. First, smoking in the social environment was self-reported by children and has not been validated against other measures. However, previous research suggests that pre-adolescents are reliable reporters of smoking in their social environment (Barnett, O'Loughlin, Paradis, & Renaud, 1997). Moreover, the cross-sectional design of the study does not allow for making inferences regarding temporal precedence or causality between study variables. While it is intuitive to assume that environmental smoking affects children's cognitions rather than vice versa, it is also possible that children who display susceptible cognitions or a cognitive vulnerability to smoking are more likely to notice and report smoking behaviour in their social environment. Similarly, it cannot be concluded from the present study that smoking-related cognitions precede susceptibility to smoking in children. Possibly, smoking-related cognitions and susceptibility to smoking may simply reflect a common underlying construct (cognitive vulnerability to smoking). Moreover, it should be noted that the number of smokers in the environment may have a different effect on children than the amount of exposure to environmental smoking. While children may be generally aware that a parent is a smoker, the number of cigarettes that parents smoke in the presence of the child may vary. Future studies should distinguish between these measures to increase the understanding of the effects of environmental smoking on children. Finally, children's cognitions measured in the present study are of course not comprehensive and may even be as diverse as are cognitions of smokers. Future studies may further examine different types of smoking-related cognitions in pre-adolescents. Different methodologies, for example indirect tasks (e.g., computer tasks measuring reaction times to specific stimuli) or eye-tracking technology, may add to a more comprehensive understanding of cognitions, cognitive distortions, and cognitive biases in children.

In summary, the present study investigated the role of environmental smoking in smoking-related cognitions and susceptibility to smoking among 9–12 years-old never-smoking children. A substantial percentage of never-smoking children displayed susceptible smoking-related cognitions. Findings showed a positive association between the number of smokers in the child's social environment, particularly parent smokers, and smoking-related cognitions in children. In turn, smoking-related cognitions (i.e., perceived safety of casual smoking and cue-triggered desire to smoke) were associated with children's susceptibility to smoking. Whether susceptible cognitions constitute a mechanism of action in the intergenerational transmission of smoking from parents to children needs to be investigated in longitudinal research. Practical implications of this study include enhanced attention to preadolescence in smoking prevention. Knowledge regarding predisposing factors in childhood may help in the early identification of vulnerable groups and selective prevention of youth smoking.

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Contributors

KS is responsible for the data collection, data analysis, and report of study results. RD, RE, and MK are supervisors and grant applicators. All authors read and approved the final manuscript.
Conflict of Interest
All authors declare that they have no conflicts of interests.

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