Smoking-specific communication and children’s smoking onset: An extension of the theory of planned behaviour

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The aim of this study was to test whether maternal smoking-specific communication and parental smoking related to smoking cognitions (i.e. attitude, self-efficacy and social norm) derived from the Theory of Planned Behaviour in association with smoking onset during preadolescence. A total of 1478 pairs of mothers and children participated (mean age: 10.11; standard deviation = 0.78). Structural equation models in Mplus were used to examine whether smoking-specific communication influences children’s smoking cognitions, which in turn, affect smoking onset. A positive association was found between pro-smoking attitudes and smoking onset. Smoking-specific communication and parental smoking were related to smoking cognitions. Specifically, frequency of communication was negatively associated with pro-smoking attitudes, social norms of mother and best friend. Quality of communication related negatively to pro-smoking attitudes and positively to self-efficacy and norms of friends. Parental smoking was positively associated with pro-smoking attitudes and norms of mother and (best) friends. Additionally, more frequent communication and higher levels of parental smoking were associated with higher smoking onset. In conclusion, smoking-specific communication and parental smoking were associated with smoking cognitions and smoking onset. Already during preadolescence, parents contribute to shaping the smoking cognitions of their children, which may be predictive of smoking later in life.

Keywords: children; smoking onset; Theory of Planned Behaviour; smoking cognitions; smoking-specific communication; parental smoking

Introduction

Youngsters who first try smoking at the age of 12 are referred to as early initiators (Jackson & Dickinson, 2006). In 2010, the prevalence estimates indicated that 4% of the 10-year-old children in the Netherlands had already tried smoking. These estimates increased to 9% for 11-year-old children, 12% for 12-year-old children and up to 44% for 14-year-old children (Stivoro, 2010). These rates are similar to those in the UK (National Centre for Social Research, 2010) and the USA.
It is important to prevent children from smoking because early smoking is a strong predictor of developing a long-enduring smoking habit (e.g. Chassin, Clark, Pitts, & Sherman, 2000). Several studies indicated that nicotine dependence occurs after very little exposure to smoking and develops rapidly after onset (e.g. DiFranza et al., 2000). Specifically, early initiators are most likely to smoke as adults (Chassin et al., 2000) and less likely to try to quit smoking (Chassin, Presson, Sherman, & Edwards, 1990; Ershler, Leventhal, Fleming, & Glynn, 1989) and to be successful in quitting (Ershler et al., 1989). To prevent this, precursors of the pre- and first phases of smoking onset need to be examined more closely.

From previous research, we know that the process that ultimately leads to smoking begins with the development of smoking cognitions, such as attitudes and beliefs about smoking, years before the actual behaviour occurs (e.g. Leventhal & Cleary, 1980), and it runs through a series of developmental phases (Mayhew, Flay, & Mott, 2000). The first phase of smoking starts as soon as children recognise smoking as a discrete behaviour and internalise beliefs and norms regarding smoking behaviour. These fundamental psychological processes emerge in early childhood (Jackson, 1998). For instance, different studies have shown that young children from smoking families have more positive attitudes towards smoking compared to children from non-smoking families (Dalton et al., 2005; de Leeuw, Engels, & Scholte, 2010), which may be indicative of the underlying developmental process. Hardly any studies focused on the period just prior to the most important phase of smoking onset, a period during which smoking cognitions are developed. Since cognitions change over time, we expect that cognitions of children differ from those of adolescents (e.g. Hiemstra, Otten, de Leeuw, van Schayck, & Engels, 2011). The development of cognitions is contingent on the immediate social environment and media factors (such as smoking in movies; Sargent, 2005) and on the individual social and biological factors that children encounter once they hit puberty (Finkenauer, Engels, Meeus, & Oosterwegel, 2002). Parents and friends both play a different role during childhood and adolescence (e.g. Vitaro, Wanner, Brendgen, Gosselinb, & Gendreau, 2004). During childhood, parents are the most important role models (Schneider & Vanmastrigt, 1974). During adolescence, parents still affect the behaviour of their child while the influence of friends increases. For example, children from smoking families have more positive attitudes towards smoking compared to children from non-smoking ones (Dalton et al., 2005; de Leeuw, Engels, et al., 2010). During adolescence, peer attitudes influence children’s attitudes (Smet, Maes, De Clercq, Haryanti, & Djati Winarno, 1999). Therefore, children and adolescents are expected to differ in their expressions of cognitions. In this study, we will concentrate on cognitions of nine- to 11-year-old children. Specifically, we will focus on the associations between smoking cognitions, derived from the Theory of Planned Behaviour (TPB) (Azjen, 1991), and smoking onset.¹

The TPB is designed to predict and interpret human behaviour in specific situations. With respect to smoking, the TPB posits that smoking cognitions (i.e. attitudes, self-efficacy and social norms) predict the intention to start smoking. In turn, intention to start smoking predicts actual smoking onset. Expectations about possible consequences of smoking lead to positive or negative attitudes towards smoking, beliefs about the normative smoking beliefs of important others lead to social norms and beliefs about the presence of factors that may facilitate or prevent smoking lead to refusal self-efficacy of smoking. Several studies have found support
for the predictive value of the TPB with respect to adolescent smoking behaviour (e.g. Guo et al., 2007; Harakeh, Scholte, Vermulst, & Engels, 2004; Mercken, Candel, van Osch, & de Vries, 2011; Otten, Harakeh, Vermulst, van den Eijnden, & Engels, 2007; Petraitis, Flay, & Miller, 1995; Smith, Bean, Mitchell, Speizer, & Fries, 2007; Topa & Moriano, 2010; van de Ven, van den Eijnden, & Engels, 2006). However, very little is known about the effectiveness of cognitions in predicting the smoking behaviour in younger children. To our knowledge, previous studies have not investigated the effectiveness of TPB and smoking in 10-year-old children or younger. However, previous adolescent research showed a strong link between cognitions and smoking behaviour; therefore, we expected an association between cognitions and smoking behaviour also in children.

Given the idea that cognitions are formed by more distal factors, Petraitis et al. (1995) postulated that it is important to gain more insight into distal factors that precede these smoking cognitions. Distal effects are likely to operate through proximal cognitions. For instance, previous studies found support for the idea that distal parenting factors affect adolescent smoking indirectly through smoking-specific cognitions (i.e. Harakeh et al., 2004; Otten et al., 2007).

Recent studies have focused on parents’ anti-smoking socialisation (e.g. Chassin et al., 2005; Harakeh, Scholte, de Vries, & Engels, 2005; Jackson & Henriksen, 1997). One aspect of anti-smoking socialisation is the communication about smoking-related topics. Communication may affect children’s opinion about smoking and personal strengths to resist smoking, which in turn relate to smoking onset (Chassin, Presson, Todd, Rose, & Sherman, 1998). The effectiveness of discussing smoking topics seems to depend on the frequency and quality of the parent–child communication. Previous research found support for positive (e.g. Chassin et al., 1998; Clark, Scarisbrick-Hauser, Gautam, & Wirk, 1999; Jackson, 1997; Jackson & Henriksen, 1997) as well as negative (e.g. den Exter Blokland, Hale, Meeus, & Engels, 2006; Ennett, Bauman, Foshee, Pemberton, & Hicks, 2001; Harakeh et al., 2005) associations between frequency of communication and adolescent smoking. These contradictory findings for frequency of communication are likely to be a result of parents reacting to child smoking, as parents are likely to start talking about smoking more often if they find out that their child tried to smoke (de Leeuw, Scholte, Vermulst, & Engels, 2010; Hiemstra, Otten, & Engels, 2011). Higher quality of communication was associated with lower odds of adolescent smoking (e.g. Chassin et al., 2005; de Leeuw, Scholte, et al., 2010; Harakeh et al., 2005; Otten et al., 2007).

Frequency and quality of communication might be antecedents of the proximal factors of the TPB, thereby affecting adolescent smoking indirectly. Previous research found that higher frequency of communication was related to not only lower self-efficacy to resist smoking (Engels & Willemsen, 2004; Huver, Engels, & de Vries, 2006; Otten et al., 2007) and lower pro-smoking attitudes (Huver, Engels, Vermulst, & de Vries, 2007), but also higher pro-smoking attitudes (Huver et al., 2006; Otten et al., 2007) and lower perceived social norms of parents (Otten et al., 2007). Higher quality of communication was related to higher self-efficacy, lower pro-smoking attitudes and lower perceived social norms of friends (Otten et al., 2007).

Besides parenting, parental own smoking seems to be associated with adolescent smoking onset (e.g. Leonardi-Bee, Jere, & Britton, 2011). Parental smoking affects the likelihood that children will start smoking and, over time, develop regular
smoking habits (e.g. Gilman et al., 2009; Mayhew et al., 2000). This could be explained by children modelling parental behaviours (Bandura, 1977), norm setting of parents (e.g. von Bothmer, Mattsson, & Fridlund, 2002) and intergenerational genetic transmission (e.g. Brody et al., 2006). In addition to the direct effect of parental smoking on children’s smoking, parental smoking might influence children’s smoking indirectly through smoking cognitions. Otten et al. (2007) showed a positive relation between parental smoking and perceived social norms of parents, as perceived by adolescents. Moreover, Harakeh et al. (2004) found that adolescents with parents who smoke were more likely to develop pro-smoking attitudes.

This study

The aim of this study was to test whether distal smoking-specific maternal communication (i.e. frequency and quality of communication) and parental smoking is important in shaping children’s smoking cognitions, which in turn relate to smoking (Figure 1) in a sample of 1478 children and their mothers. We expected that the associations found in previous adolescent literature would also apply to pre-adolescents. Specifically, we expected that (1) pro-smoking cognitions (i.e. attitude, self-efficacy and social norm) relate to child’s smoking onset and (2) smoking-specific communication relates indirectly to smoking onset through smoking cognitions. For parental smoking, we expected that (3) parental smoking would relate to child’s smoking onset directly as well as indirectly via pro-smoking cognitions. We tested for differential effects between child and mother on the frequency and quality of communication. Previous research found differences between mother and child

![Figure 1. The TPB applied to child smoking behaviour and extended with smoking-specific parenting practices and corrected for data collection method (phone vs. questionnaire).](image-url)
report on anti-smoking socialisation (de Leeuw, Scholte, et al., 2010; Harakeh et al., 2005; Mahabee-Gittens, Ding, Gordon, & Huang, 2010). Mothers reported higher levels of both frequency and quality of communication, as compared to their children (Harakeh et al., 2005). Parents are more likely to overestimate their parenting skills to conform to the norms of being a good parent (de Leeuw, Scholte, et al., 2010). Hence, it is important to know how parenting practices are perceived by children themselves.

Methods

Procedure

Baseline data were used of a randomised controlled trial evaluating a Dutch home-based smoking prevention programme (adapted and developed from the US version, see Jackson & Dickinson, 2006) in the Netherlands (for more information, see Hiemstra et al., 2009). Baseline data were collected before randomisation. Families were recruited from primary schools, media and health professionals. Specifically, primary school boards were asked to distribute letters to all children aged nine to 11 years old and to request that children give this letter to their parents. Participation was possible by returning the recruitment letter or registering online via a secured webpage. The families had to fit the following criteria to participate: children had to be between nine and 11 years of age, participating adults had to be the mother or a female guardian, and both adult and child needed to be competent in reading and speaking Dutch. Only one child per household was eligible to participate. A total of 1478 mothers and children were selected. Each family will receive €10 for participation in all measurements and five traveller’s checks of €1000 are to be raffled among these families.

Baseline assessments (T1) took place between December 2008 and June 2009. Families were contacted by phone by trained interviewers (61.2%) or they received written questionnaires by mail (38.8%). Trained Master students from the Radboud University at Nijmegen administered the telephone interviews with the mothers and their children. Mothers were interviewed first to check the eligibility of the family. Children were interviewed several days later. Prior to the interview, we made sure that mothers and the children could speak freely in order to assure privacy. To protect children against parent who – against our instructions – listened to their child during the telephone interview, we used closed-ended questions. Questionnaires were sent via mail and returned in two separate enclosed envelopes, allowing children to return their own questionnaire without their mother reading their answers. Children that participated in phone interviews were somewhat different on some variables compared to children that received the questionnaires. Therefore, in the analysis, we have corrected for data collection method.

Sample characteristics

Most families were of Dutch origin (98.2%). Children’s mean age was 10.11 years (standard deviation (SD) = 0.78; range eight to 12 years) with 47.8% being boys. With regard to parents’ educational levels, 0.9% of the mothers and 1.3% of the fathers had attended primary school only; 20.5% of the mothers and 13.6% of the fathers finished secondary school; 41.2% of the mothers and 45.6% of the fathers
finished technical and vocational training; 28.8% of the mothers and 25.6% of the fathers finished college and 8.6% of the mothers and 13.9% of the fathers finished university.

**Measures**

*Child smoking*

Child smoking was assessed by asking them which stage of smoking applied to them (de Vries, Engels, Kremers, Wetzes, & Mudde, 2003; Harakeh et al., 2005) measured on a nine-point scale ranging from 1 = ‘Never smoked, not even a puff’ to 9 = ‘I smoked at least once a day’. To focus on experimenting with smoking among children, responses were recoded into 0 = ‘never smoked’ (i.e. not even a puff) and 1 = ‘smoked once or more’ (e.g. Harakeh et al., 2005; Jackson & Henriksen, 1997). Self-report data about child smoking are generally reliable (e.g. Henriksen & Jackson, 1999).

*Parental smoking*

To assess mother smoking, a similar procedure as for the children was used. One of the nine items was not suitable for parents to answer (i.e. ‘I try smoking once in a while’) and was therefore omitted. Mothers reported about father smoking using the same scale. Both parents were classified into two groups on basis of their lifetime smoking status: non-smoker or smoker. By combining responses on smoking status of both parents, we constructed three categories (1 = ‘both parents are non-smokers’, 2 = ‘one parent is a smoker’ and 3 = ‘both parents are smokers’ (e.g. Otten, Engels, & van den Eijnden, 2008).

**Attitude**

Positive and negative attitudes towards smoking were assessed with seven items based on Harakeh et al. (2004) measured on a three-point scale. Children were asked what they think about daily smoking using the text: ‘I think that daily smoking is...’. Children responded either with negative, positive or neutral attitudes. Negative attitudes were ‘unpleasant’, ‘harmful’, ‘useless’, ‘boring’, ‘dangerous’, ‘unhealthy’, and ‘bad’ and positive attitudes ‘pleasant’, ‘harmless’, ‘useful’, ‘exciting’, ‘not dangerous’, ‘healthy’ and ‘good’(Harakeh et al., 2004). This scale is frequently used in studies involving (early) adolescents (Ter Doest, Dijkstra, Gebhardt, & Vitale, 2009; van de Ven et al., 2006; van Zundert, Engels, & van den Eijnden, 2006). Because of skewed data, omega (McDonald, 1999) was calculated instead of the Cronbach’s alpha. Omega was 0.79, with a higher score indicating a pro-smoking attitude.

**Refusal self-efficacy**

Self-efficacy was measured with six items on a six-point scale ranging from 1 = ‘very difficult’ to 6 = ‘very easy’, e.g. ‘For me it is difficult/easy to stay a non-smoker’, ‘Imagine: When I am offered a cigarette, I find it difficult/easy to refuse’. These items are based on previous research of adolescents (de Vries, Backbier, Kok, & Dijkstra, 1995; de Vries, Dijkstra, & Kuhlman, 1988; Engels, Knibbe, de Vries, & Drop, 1998;
Engels, Knibbe, & Drop, 1999). We simplified them by asking children to imagine the presented smoking-related situations. Omega was 0.79, with a higher score indicating higher efficacy to refuse a cigarette.

**Social norm**

The perceived social norm with respect to smoking was measured by assessing children’s perceptions of the approval of mother and (best) friends’ smoking behaviour (de Vries et al., 1995; Harakeh et al., 2004; Otten et al., 2007) using three items, ‘Do you think your friends/your best friend/your mother would approve when you smoke (or would smoke)’. The responses were measured on a four-point scale ranging from 1 = ‘definitely not’ to 4 = ‘definitely’. Social norms were measured in young children previously (Andrews, Hampson, & Barckley, 2008; Hampson, Andrews, & Barckley, 2007).

**Frequency of smoking-specific communication reported by child and mother**

Frequency of communication was assessed by averaging the scores of seven items referring to how often in the past 12 months parents and their child talked about smoking-related issues (e.g. ‘During the last 12 months, how many times did you/your mother talk to you about how to resist peer pressure to use tobacco?’) measured on a three-point scale ranging from 1 = ‘never’ to 3 = ‘often’ (Ennett et al., 2001; see for an adapted Dutch version Harakeh et al. (2005)). Omega was 0.86 (child report about mother) and 0.81 (mother report about child), with higher number indicating a more frequent communication.

**Quality of smoking-specific communication reported by child and mother**

Quality of communication was assessed with six items. The items of this scale reflect a constructive and respectful way of communicating about smoking-related issues (e.g. ‘Me/My mother and my child/I are able to talk easily about our opinions concerning smoking’). Mothers and children were asked to report on a three-point scale which answer applied for them, with responses ranging from 1 = ‘not true’ to 3 = ‘true’ (Harakeh et al., 2005). Omega was 0.78 for children reporting about their mother and 0.88 for mothers reporting about their child, with higher numbers indicating a better quality of communication.

**Statistical analyses**

Descriptive statistics were calculated to provide information about the distribution of smoking in the sample. To examine whether frequency and quality of communication (reported by mother and child) were indirectly related to child smoking through smoking cognitions, structural equation models (SEM) were tested with Mplus (Muthén & Muthén, 1998–2004), as depicted in Figure 1. Mplus allows the use of both continuous and categorical variables as independent and dependent variables. In our model, we had a mixture of both types of variables. The smoking onset variable was categorical (binary) while the other variables were continuous. As a special case of SEM, path analysis with a categorical dependent variable was used (Muthén & Muthén, 1998–2004). With Mplus, the correlation matrix of these
variables and parameters in the model was estimated according to the weighted least square method with adjusted mean and variance chi-squared statistics estimator. Two separate models for communication reported by the child and mother were analysed and these models were corrected for data-collection method (phone versus questionnaire). The fit of both models was assessed using the following fit indices: $\chi^2$, comparative fit index (CFI) (with a cut-off value of 0.95) and root mean square error of approximation (RMSEA) (with a cut-off value of 0.06) (Hu & Bentler, 1999; Kaplan, 2000).

**Results**

**Descriptive statistics**

Of the 1478 children, 1398 (94.6%) children reported that they had never tried a cigarette while 80 (5.4%) children had tried smoking. Regarding parental smoking, 906 (62.2%) children had two non-smoking parents, 362 (25.0%) had one parent who smoked and 179 (12.4%) had two parents who smoked. Children of smoking parents were more likely to try smoking compared to children of non-smoking parents ($p < 0.001$). Specifically, 3.0% of children in families with two non-smoking parents tried smoking once or more, 7.5% of children from families with one smoking parent and 11.7% of children in families where both parents tried smoking.

Means and SDs among model variables can be found in Table 1. The results revealed average levels of frequency of communication (i.e. between 1.6 and 1.8 on a three-point scale) and high quality of communication (i.e. between 2.6 and 2.8 on a three-point scale) for both mother and child report. Children reported greater frequency of communication compared to the reports of their mothers ($t(1400) = -16.22$, $p < 0.001$), but mothers scored significantly higher on quality of communication compared to their children ($t(1454) = 13.68$, $p < 0.001$). Pro-smoking attitudes were low (1.1 on a three-point scale), and self-efficacy was high (4.7 on a six-point scale). Social norms of mother (1.3 on a four-point scale) were lower compared to social norms of (best) friends (1.7–1.8 on a four-point scale).

**Correlations**

Pearson correlations (Table 1) presented that smoking onset was positively associated with the frequency of communication reported by the mother, parental smoking, pro-smoking attitudes, social norms of friends and best friend and negatively to quality of communication reported by the child.

Frequency of communication reported by the child was positively associated with frequency of communication reported by the mother, quality of communication reported by the child, parental smoking, self-efficacy and negatively with pro-smoking attitudes, norms of both mother and best friend. Frequency of communication reported by the mother was positively related to quality of communication reported by the child and mother, parental smoking and smoking onset.

Quality of communication reported by the child was positively related to quality of communication reported by the mother and self-efficacy and negatively related to parental smoking, pro-smoking attitudes and social norms of both mother and best
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<th></th>
<th>Mean (SD)</th>
<th>Range</th>
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<th>2</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<th>9</th>
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<th>11</th>
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<tbody>
<tr>
<td>1</td>
<td>Frequency of communication (c)</td>
<td>1.77a (0.45)</td>
<td>1–3</td>
<td>–</td>
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<td>2</td>
<td>Frequency of communication (m)</td>
<td>1.64a (0.36)</td>
<td>1–3</td>
<td>35***</td>
<td>–</td>
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<td>3</td>
<td>Quality of communication (c)</td>
<td>2.66b (0.34)</td>
<td>1–3</td>
<td>0.25***</td>
<td>0.08**</td>
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<td>4</td>
<td>Quality of communication (m)</td>
<td>2.81b (0.31)</td>
<td>1–3</td>
<td>0.02</td>
<td>0.10***</td>
<td>0.22***</td>
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<tr>
<td>5</td>
<td>Parental smoking</td>
<td>0.49c (0.71)</td>
<td>0–2</td>
<td>0.09***</td>
<td>0.13***</td>
<td>−0.11***</td>
<td>−0.28***</td>
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<td>6</td>
<td>Pro-smoking attitude</td>
<td>1.10 (0.15)</td>
<td>1–3</td>
<td>−0.13***</td>
<td>−0.01</td>
<td>−0.17***</td>
<td>−0.01</td>
<td>0.08**</td>
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<tr>
<td>7</td>
<td>Self-efficacy</td>
<td>4.74 (0.97)</td>
<td>1–6</td>
<td>0.07**</td>
<td>0.02</td>
<td>0.17***</td>
<td>0.03</td>
<td>−0.04</td>
<td>−0.29***</td>
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<td>8</td>
<td>Norm mother</td>
<td>1.26 (0.52)</td>
<td>1–4</td>
<td>−0.15***</td>
<td>−0.04</td>
<td>−0.07***</td>
<td>−0.01</td>
<td>0.12***</td>
<td>0.21***</td>
<td>−0.16***</td>
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<td>9</td>
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<td>1.81 (0.72)</td>
<td>1–4</td>
<td>−0.05</td>
<td>0.03</td>
<td>−0.03</td>
<td>0.04</td>
<td>0.07**</td>
<td>0.24***</td>
<td>−0.15***</td>
<td>0.36***</td>
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<tr>
<td>10</td>
<td>Norm best friends</td>
<td>1.67 (0.74)</td>
<td>1–4</td>
<td>−0.11***</td>
<td>0.02</td>
<td>−0.09***</td>
<td>0.02</td>
<td>0.07**</td>
<td>0.29***</td>
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<td>0.43***</td>
<td>0.70***</td>
<td>–</td>
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<td>11</td>
<td>Smoking onset</td>
<td>0.05b (0.23)</td>
<td>0–1</td>
<td>0.04</td>
<td>0.11***</td>
<td>−0.06*</td>
<td>−0.01</td>
<td>0.14***</td>
<td>0.10***</td>
<td>−0.05</td>
<td>0.04</td>
<td>0.10***</td>
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</table>

Notes: c = child and m = mother. Means with similar superscripts (a or b) are significantly different (p < 0.01). Paired t-tests were used. Children’s reports about the mother on smoking-specific parenting were compared with the mothers’ reports. 0 = both parents never smokers to 2 = both parents current smokers and 0 = non-smoker and 1 = smoker. ***p < 0.001, **p < 0.01, *p < 0.05.
Quality of communication reported by the mother was negatively associated with parental smoking. Parental smoking was positively associated with frequency of communication reported by the child and mother, pro-smoking attitudes, social norms of mother, friends and best friend and smoking onset and negatively related to quality of communication reported by child and mother.

**Model with communication reported by child**

The model depicted in Figure 1 shows a good fit to the data ($\chi^2 (45, n = 1478) = 2065.55$, $p = 0.00$, $CFI = 1.00$ and $RMSEA = 0.00$). Figure 2 shows the model for child smoking with all significant paths. No significant associations between self-efficacy, social norm and child smoking were found. Pro-smoking attitudes were marginally positively related to child smoking ($p < 0.06$). A high frequency of communication was negatively related to pro-smoking attitudes and social norms of mother and best friend. Higher quality of communication was negatively associated with pro-smoking attitudes and positively with self-efficacy and marginally negatively associated with norms of best friend. Parental smoking was positively related to pro-smoking attitudes and social norms of mother, friends and best friend. Parental smoking was positively related to child smoking and frequency of communication was marginally positively related to child smoking.

**Model with communication reported by mother**

The model fit was satisfactory ($\chi^2 (45, n = 1478) = 1902.82$, $CFI = 1.00$ and $RMSEA = 0.00$). Figure 3 shows the model for child smoking with all significant paths. In general, the most paths in this model were similar to those found in the
child-reported model. Pro-smoking attitudes were positively related to child smoking, but no associations between self-efficacy, social norms and child smoking were found.

Higher frequency of communication was negatively related to social norms of mother and a high quality of communication was positively related to social norms of friends. Parental smoking was positively related to pro-smoking attitudes and social norms of mother, friends and best friend. Frequency of communication and parental smoking were positively related to child’s onset to smoke. Children who often talked with their parents about smoking and children who have parents who smoke were more likely to engage in smoking.

Discussion
This study aimed to test whether maternal smoking-specific communication (i.e. frequency and quality of communication) and parental smoking function as antecedents of smoking cognitions (i.e. attitude, self-efficacy and social norm) of the TPB (Ajzen, 1991) and smoking in a large sample of nine- to 11-year-olds. In this preadolescent sample, we found that pro-smoking attitudes were associated with higher smoking onset. In addition, we found that distal factors, such as frequency and quality of communication and parental smoking, were related to the smoking cognitions derived from the TPB. More frequent communication about smoking was related to lower pro-smoking attitudes and social norms. Higher quality of communication was related to lower pro-smoking attitudes and higher self-efficacy and social norms. Parental smoking was related to higher pro-smoking attitudes and social norms. Moreover, parental smoking and higher frequency of communication were related directly to more child smoking.
Regarding the proximal factors in the conceptual model, we only found an association between pro-smoking attitudes and smoking onset. Previous studies showed that smoking onset was related to not only positive smoking attitudes, but also self-efficacy and social norms (e.g. de Vries et al., 1988; Engels et al., 1999; Hanson, 1997; Harakeh et al., 2004; Otten et al., 2007). However, these studies concentrated on samples consisting of mid- and late adolescents. In our cross-sectional study, with younger children, we only found a small association between pro-smoking attitudes and smoking. It is likely that for the small group that did report some experience with smoking (i.e. 5.4%), the effects of parental smoking, frequency of communication and pro-smoking attitudes cancelled out the effects between social norms of friends and best friend and smoking onset. This idea was supported by the significant bivariate correlations between social norms of friends and best friend and smoking onset. Hence, it might be that the effects of social norms of friends and best friend were too small to remain significant in the multivariate regression analysis. Another explanation for the limited associations could be that at this age, smoking initiation is more unreasoned or unplanned; therefore, the predictability of adolescent smoking using explicit cognitive concepts may be limited (Kremers, Mudde, & de Vries, 2004).

In this research, we tested the influence of smoking cognitions on smoking onset. Other factors that might directly relate to smoking onset that were not included in the conceptual model may be genetic influences (e.g. children of smokers are more likely to be exposed to smoking, have easier access to cigarettes and are therefore more familiar with smoking) (Munafo & Johnstone, 2008), problem behaviour (e.g. ADHD) (e.g. Milberger, Biederman, Faraone, Chen, & Jones, 1997), personality (high extraversion and low on conscientiousness, agreeableness and emotional stability) (Harakeh, Scholte, de Vries, & Engels, 2006; Otten et al., 2008) and implicit cognitions (automatic instead of reflective) (de Leeuw, Engels, et al., 2010; Pieters, van der Vorst, Engels, & Wiers, 2010). Further research is needed to examine the role of these and related factors in early smoking initiation.

Regarding the direct effects of more distal factors in the model, parental smoking was directly associated with higher likelihood of smoking onset (Leonardi-Bee et al., 2011) and indirectly via pro-smoking attitudes. In addition, more frequent levels of communication were associated with higher smoking onset (see also Chassin et al., 1998; Clark et al., 1999; Jackson, 1997; Jackson & Henriksen, 1997), which might reflect the way parents react to their child’s early smoking behaviour (Hiemstra, Otten, & Engels, 2011; de Leeuw, Scholte, et al., 2010). No association was found between quality of communication and smoking onset. One explanation may be that parents do not yet talk about smoking in a more conversational manner at this age. Specifically, the content of conversations about smoking may be limited to warning their children about the detrimental health effects of smoking instead of discussing strategies for resisting smoking, for instance. During adolescence, the process of communication might change, that is, the frequency of communication might increase and the content of the communication about smoking might better fit the developmental stage of the child (i.e. quality of communication). More research is necessary to get better insight into parent and child communication about smoking. Therefore, observational research should be performed (Wakschlag et al., 2011). Family discussion should be observed to gather more information about how and what parents say about smoking as well as about who takes initiative in discussing smoking-related issues.
Since we concentrated on a young group of preadolescent children, we were also interested in cognitions as a proxy for actual smoking behaviour. Specifically, we looked at the extent to which distal factors preceded the more proximal cognitions. Parental smoking was associated with higher pro-smoking attitudes (see also Harakeh et al., 2004), pro-smoking norms of mothers (see also Otten et al., 2007) and (best) friends. An explanation for the association between parental smoking and social norms of mothers could be that children do not expect their parents to disapprove behaviour that is congruent with their own (Jackson & Dickinson, 2003). With respect to friends’ norms, parental smoking might affect the extent to which children perceive smoking as a normative behaviour. In turn, this may affect the way children think about how others perceive their own smoking behaviour (Otten, Engels, & Prinstein, 2009).

Frequent communication reported by children was associated with lower pro-smoking attitudes and lower social norms of mother and best friend. More frequent communication, as reported by mothers, was associated with lower social norms of mothers, which has also been reported in other studies (Huver et al., 2006, 2007; Otten et al., 2007). Higher quality of communication reported by children was associated with lower pro-smoking attitudes and higher self-efficacy, which was also found by Otten et al. (2007). Higher quality of communication reported by mothers was associated with higher pro-social norms of friends. The minor differences in findings between mothers and children may support the assumption that children’s perceptions of smoking-specific communication differ from the perceptions of their parents (de Leeuw, Scholte, et al., 2010; Harakeh et al., 2005; Mahabee-Gittens et al., 2010), which could be supported by low bivariate correlations between mother and child regarding frequency and quality of communication.

This study is innovative in three ways. First, whereas most studies concentrated on adolescence, the phase in which most children start smoking, our study focused on preadolescence, which allows us to catch a glimpse of the process that takes place prior to the onset of smoking. Second, we used a large sample size of 1478 children, which allowed us to test the conceptual model derived from the TPB. Finally, we used both mother and child reports about smoking-specific communication.

However, some limitations of this study should be acknowledged. First, this study was a cross-sectional one. Smoking develops through various stages, and empirical support indicates the existence of different risk factors at different smoking stages (Mayhew et al., 2000). Longitudinal designs give more insight into the development of smoking and associated risk factors in children and allow testing for potential bidirectional relationships between smoking-specific parenting and cognitions. Second, children reported about their own smoking cognitions and smoking behaviour, which introduces the possibility of under- or over-reporting because of recall bias or social desirability. However, previous research has shown that self-report data on smoking are generally reliable when confidentiality is assured (e.g. Dolcini, Adler, & Ginsberg, 1996). Moreover, the reliability of preadolescent children’s self-reports does not differ from adolescents’ reports (Henriksen & Jackson, 1999). Third, concerning the assessment of smoking cognitions, it is possible that the children reported smoking attitudes that were more negative compared to their actual attitudes, as the children were aware of the social desirability of the existing societal norms. It is possible to overcome this using implicit measure of attitudes (de Leeuw, Engels, et al., 2010) and comparing implicit with explicit attitudes (Pieters et al., 2010). For self-efficacy, the results should be interpreted with
caution. Although self-efficacy develops through observation (Bandura, 1992), children of this age may be too young to encounter situations in which they need to use potential smoking refusal skills. Therefore, it could be difficult to imagine different situations presented in the self-efficacy questions. Therefore, in future studies with pre-adolescents, we recommend measuring, in addition to self-efficacy skills, also self-regulation as a precursor of self-efficacy (Bandura, 1991) to measure the effect of the environment on the behaviour of the child.

Finally, our study did not assess fathers’ parenting behaviours; therefore, it cannot provide any information on mother–father differences in communication or the combined effect of communication from both parents. Future research might also consider the influence of peers on smoking onset. As most studies on peer influence focus on pro-smoking socialisation, it would be interesting to learn more about the extent to which peer communication may have a positive (anti-smoking) effect on children’s attitudes and behaviours towards tobacco use. Besides communication about smoking, other forms of anti-smoking socialisation, such as house rules, also relate to cognitions (Huver et al., 2007). In future studies, it would be interesting to test the associations of various aspects of anti-smoking socialisation with smoking cognitions of the TPB.

In sum, the current findings suggest that during preadolescence, smoking-specific communication of parents and parents’ own smoking behaviour contribute to the formation of smoking cognitions prior to smoking onset. At this young age, only pro-smoking attitudes was associated with smoking onset. However, several studies have shown that also self-efficacy and social norm are associated with smoking onset later in life (Harakeh et al., 2004; Otten et al., 2007). Present findings suggest that cognitions that increase the likelihood of smoking onset in adolescence may already take place years before actual smoking onset. Therefore, prevention programmes, such as Smoke-free Kids (Hiemstra et al., 2009; Jackson & Dickinson, 2006), aimed at families with children in primary school are important in stimulating communication about smoking.

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Note

1. Intention to smoke was not included in the model because intention to smoke was very skewed, with only few children with an intention to smoke (i.e. 2.2% had intention to start smoking vs. 97.8% had no intention).

References


