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Influence and selection processes in friendships and adolescent smoking behaviour: the role of parental smoking

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Abstract

Concerning the role of parental smoking on development of adolescent smoking, most studies have exclusively focused on the direct effects of parents' smoking on youths' smoking. However, parental smoking may also play an indirect role by affecting youths' susceptibility to peer influences and by affecting friendship selection. Data were from a three-wave short-term longitudinal study of 1595 adolescents. Findings showed high similarities in smoking between reciprocal friends. Additionally, friend's smoking and parents' smoking were moderately related to adolescent smoking onset, but parents' smoking did not moderate the prospective association between best friend's smoking and adolescent smoking. Finally, parental smoking seemed to affect the selection of new friends: In particular, adolescents with smoking parents were most likely to become affiliated with smoking friends. There was no evidence that parental smoking affected termination of friendships.

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Introduction

Smoking is an important and preventable cause of premature death throughout the world (USDHHS, 1994). Since the middle of the 20th century, tobacco has contributed to more than 60 million deaths in developed countries. The estimated annual mortality due to tobacco use is 540,000 in the European Union, 461,000 in the USA, and 457,000 in the former USSR (Peto,

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Boreham, Thun, & Heath, 1994). It is essential to prevent people from taking up smoking as early in life as possible. Therefore, longitudinal research is required to examine the precursors of smoking onset in adolescence. Insight into these precursors can be used in smoking prevention programs. In this paper, we will examine the roles of best friends and parents in smoking onset. More specifically, we examine whether parental smoking affects adolescent smoking directly, but also whether it affects adolescent smoking indirectly by (a) influencing individual susceptibility to peer influences and (b) affecting selective affiliation with smoking friends.

Friends are assumed to be of major importance for the development of cigarette smoking in young people (Oetting & Beauvais, 1986; Petraitis, Flay, & Miller, 1995). Throughout adolescence, youngsters experience feelings of uncertainty about their self-image, and consider themselves more or less dependent on the opinions and judgements of friends (Engels, Knibbe, Drop, & De Haan, 1997). Meeting the expectations of one's group is crucial for preventing loss of friends, becoming a loner, and eventually losing one's identity (Gordon, 1986). Therefore, associating with friends will be less complicated when one's own behaviours are congruent with others'. Studies carried out in the 1970s focusing on determinants of substance use among young people, show that adolescents tend to be similar to their friends in their behaviours and attitudes (Cohen, 1977; Kandel, 1978). This homogeneity of health related behaviour in peer groups could be caused by two processes: Influence and selection. Influence refers to an individual group member's behaviour or opinions being affected by other members. Selection can be divided into two conceptually different mechanisms. First, adolescents might acquire new friends with similar characteristics, attitudes, and behaviours. Second, they might avoid contacts with new friends, or even break off friendships, because of differences in opinions and behaviours (i.e. deselection of friends). Only in studies employing longitudinal designs in which changes in smoking and changes in friendships are traced can accurate conclusions be drawn about (a) the relative contribution of selection processes and (b) the relative effects of friends' smoking on individuals' smoking.

In the past decades, several longitudinal studies have analysed influence and selection processes in adolescent health behaviour (Billy & Udry, 1985; Fisher & Bauman, 1988; Aseltine, 1995; Engels, Knibbe, Drop, & De Haan, 1997; Urberg, Degirmencioglu, & Pilgrim, 1997; Norton, Lindrooth, & Ennett, 1998; Engels, Knibbe, & Drop, 1999b). A prospective study by De Vries, Engels, Kremers, Wetzels, and Mudde (2003) among 15,705 adolescents in six European countries showed only small effects of best friend's smoking and the peer group's smoking on smoking onset. These findings are comparable with longitudinal studies of youngsters in the US (Ennett & Bauman, 1994; Urberg et al., 1997) and the Netherlands (Engels, Knibbe, Drop, & De Haan, 1997; Engels et al., 1999b). Further, Wang et al. (1999) showed that although both peer influence and selection occurred, selection might play a greater role in affecting homogeneity of smoking within peer groups (see for comparable findings, Ennett & Bauman, 1994; Engels et al., 1997). Thus, several studies have shown that selection processes are largely responsible for homogeneity of smoking in friendships (see review by Bauman & Ennett, 1996).

The empirical evidence that influence and selection processes both operate in friendships raises the question of what role parents play in these processes. Up to now, most studies have focused on the direct effects of parental smoking on adolescent smoking initiation, showing that when parents are current smokers their off-spring are more likely to take up smoking (e.g. Goddard, 1990; Conrad, Flay, & Hill, 1992; Petraitis et al., 1995; Friestad, 1998; Engels et al., 1999b; Engels, Knibbe, Drop, De Vries, & Van Breukelen, 1999a). Other studies have demonstrated a

dose-response relation between parental and adolescent smoking: The more intensively parents smoke, the more intensively their offspring smoke (Pederson, Koval, McGrady, & Tyas, 1998). In addition, recent research shows that parents' smoking histories are related to adolescents' smoking. When parents quit smoking, children are less likely to take up smoking, and the earlier in the children's lives the parents quit smoking, the less likely the children are to start smoking (Den Exter Blokland, Engels, Hale, Meeus, & Willemsen, 2003; Farkas et al., 1999). In sum, parental current smoking status and their history of smoking affect the likelihood that adolescents start to smoke.

Nonetheless, less attention has been paid to the role parental smoking specifically plays in the influence and selection processes in children's friendships (see Dishion & Nelson, 2002). Parents' roles may actually be underestimated if the ways parents' smoking affects children's functioning in peer relationships is neglected (see also Parke & Ladd, 1992). Although this has seldom been considered for smoking, in other areas of problem behaviour it has been argued that (a) high parental monitoring prevents adolescents from affiliating with deviant peers (e.g. Brown, Mounts, Lamborn, & Steinberg, 1993; Bogenschneider, et al., 1998), and (b) parents' negative responses to friendships may affect the continuation of those friendships (Hansen, Graham, Sobell, Shelton, Flay, & Anderson Johnson, 1987). Despite these thoughts and findings about parents' opportunities to indirectly affect their child's involvement in problem behaviour by affecting their functioning in friendships, no systematic research has been conducted in the field of smoking. In the current study, we will examine whether parental smoking status is related to youngsters' tendencies to adopt their friends' smoking habits and whether adolescents are affected by their parents' smoking in the selection of new friends.

Before we discuss the main hypotheses in this study it is important to address a few necessary conditions that should be met in order to test our hypotheses accurately. The first is that instead of relying on adolescents' reports of their friends' behaviours, one should interview the friends, themselves (see Bauman & Ennett, 1996). This is because smokers tend to exaggerate the prevalence of smoking in society, and especially among their friends (Sherman, Presson, Chassin, Corty, & Olshavsky, 1983; Marks & Miller, 1987). Further, information should be gathered regarding the status of friendships. One might expect that especially in reciprocal friendships, friends affect each other's behavioural patterns because they both acknowledge the status of the friendship (see for exception Aloise-Young, Graham, & Hansen, 1994). The second necessary condition is that only periods in adolescence should be studied in which substantial changes in friendships and smoking occur. The transition from primary to secondary school is especially fitting because many changes in friendships take place during this transition (see also Poulin, 2002). In the Netherlands, most children switch schools. Many have to go to other cities to continue their education. In addition, a rapid increase in experimentation with smoking is observed in this period (see Stivoro, 2002). The third condition is that short intervals between the waves should be employed in longitudinal studies on peer influences and adolescent behaviour. The magnitude of the impact of best friend smoking on smoking initiation depends on the time interval between measurement of best friend smoking and adolescent smoking onset: the longer the interval, the more difficult it becomes to predict smoking onset by friend's smoking accurately (Engels et al., 1999b). This might be explained by the fact that when prolonged intervals are used in longitudinal research, too many changes occur in the constellation of friendships which lead to low predictability. This might actually lead to an underestimation of the impact of friends in

long-term longitudinal studies. So, it is preferable to employ a short-term prospective design in which people are examined frequently in periods in life where substantial changes in friendships occur. The fourth condition is that the effects of behaviour of best friends instead of peer group members or peers in general should be studied. Using social network data on adolescent smoking, Urberg et al. (1997) compared the relative impact of best friends and other peer group members and clearly demonstrated that especially best friends affect smoking onset. This argues for a focus on best friends in our analyses.

In the current study, we examine whether parental smoking behaviour affects peer influence as well as selection processes. Data from a three-wave short-term longitudinal study among early adolescents, in which they are followed during the first year of secondary education, were used. We had the following hypotheses. First, concerning influence processes, we expect that best friend's and parental smoking is directly associated with smoking onset in adolescents. Second, we expect that when parents smoke youngsters are more likely to adopt smoking of their best friend. Concerning selection processes, we assume that when parents smoke youngsters will be more likely to select a smoker in a new friendship. In addition, we expect that, in particular, smoking adolescents with smoking parents are most likely to select a smoking new friend.

Methods

Respondents and procedure

The data for this study were collected from a large scale, three-wave longitudinal study of young adolescents. Ten Dutch middle schools participated in this study and all the students at these schools in the first and second grade were invited to take part. In the Netherlands, youngsters start their educational career at the age of 4. Then they are enrolled in primary education for about 8 years, and at the age of 12 (but this may vary between 11 and 14) they will continue their education at a secondary school. The parents of the respondents were informed of the objectives of this study and were given the opportunity to withdraw their child from the study.

The first measurement was conducted in the fall of 2000, T2 was conducted on the spring of 2001 (6 months after T1), and the third wave in the fall of 2001 (approximately 12 months after T1). Testing procedures were identical for all three waves. Questionnaires were administered among students during regular school hours in the presence of a teacher. The forms took about 45 min to complete. In total, we started the project with a sample of 1969 adolescents and 1595 (81%) students participated in all three measurements.

All respondents were informed that all information would be kept strictly confidential and used for research purposes only. To increase the students' motivation to participate, all students were entered into a lottery (the prizes were Compact Disk [CD] gift certificates) and winners were announced after the measurements.

A total of 794 boys (49.6%) and 801 girls provided data. The age of the adolescents varied from 10 to 14 years (T1: $M = 12.3$, $SD = 0.51$). At T1, 89.2% of the respondents lived with both their parents and 9% lived in a single parent home (8.1% with their mother and 0.9% with their father). A total of 1.8% lived in other arrangements (e.g. other family members, foster home).

The attrition at a wave 1 was only due to absence at the day of measurement. None of the parents did not provide permission to include their child in our study, and none of the kids explicitly refused to participate. Sample attrition over the waves is primarily due to (a) moving out of students to a different city and therefore a different school, (b) students who did not pass the exams at the first grade and had to follow all courses in this year all over again, and (c) school drop out.

Measures

Smoking. A widely employed method to assess smoking was used (see Kremers, Mudde, & De Vries, 2001). Respondents were asked to fill in an item, which, on a 7-point scale, described what type of (non)smoker they are. Responses ranged from 1: “I have never smoked, not even one puff” to 7: “I smoke at least once a day”. In the Netherlands, the vast majority of the teenagers smoke manufactured or hand rolled cigarettes. Chewing tobacco, or smoking cigars or pipe is very uncommon (Stivoro, 2002). Because of the skewness of the answers in this age category (i.e. there are hardly any daily smokers), the scores were dichotomized into 1 ‘never-smoker’ and 2 ‘ever smoker’. It should be stressed that the self-reported smoking was not validated by biological indicators. However, self-reports have been shown to be reliable and in good agreement with biological indicators when measurements are conducted under optimized measurement conditions, ensuring anonymity (Dolcini, Adler, & Ginsberg, 1996). Moreover, experimental and weekly smoking would have been difficult to detect anyway by biological verification measures. We optimized measurement conditions by assuring respondents that their responses would be treated strictly confidentially.

Best friend. An adaptation of the format of Ennett and Bauman (1994) to assess peer relations within school settings was employed. Respondents were asked to write down the first name and first letter of the family name of their best friends (with a maximum of five). In contrast with Ennett and Bauman (1994) respondents were not restricted to friends at school. Furthermore, respondents had to indicate if the friends were students at the same school they went to. Because all respondents were given a unique number, it was possible to replace the names of the friends that were in the same school by their respondent number. We only focused on friendships at school because friends outside the school context were not included in the sample. The first friend in the list that could be matched with a number was considered the best friend. The reciprocity in friendship was established by a preliminary version of the software ‘MAKEDYAD’ (Thissen-Pennings & Bendermacher, 2002a). Friendship was considered to be reciprocal when the respondent’s friend also named the respondent in his or her list of friends.

Parental smoking. Adolescents were asked whether their mothers and fathers currently smoked, with two response categories consisting of 1 = ‘no’ and 2 = ‘yes’. We recorded the response to 1 ‘both parents do not smoke’, 2 ‘one parent smokes’ and 3 ‘both parents smoke’. We employed adolescent reports on their parental smoking, which has been found to correlate highly with parents’ self-reports. In a sample of 3165 adolescent-father couples and 3497 adolescent-mother couples, Vink, Willemsen, Engels, and Boomsma (2003) showed that 97% of the answers from father and child, and 98% of the answers from mother and child were in agreement.

Statistical analyses

First, cross tabulations were conducted to examine similarities in smoking in friendships cross-sectionally. Second, we conducted prospective logistic regression analyses to examine the effects of best friend smoking at T1 on adolescent smoking onset at T2 and T3. Furthermore, we examined whether parental smoking added to the prediction of adolescent smoking at T2 and T3 taken friend's smoking into account. After that, we tested the moderating effect of parental smoking on the associations between best friend smoking and adolescent smoking by including interaction terms. Gender, age and educational level were included in these analyses as control variables.

Third, we tested whether adolescent smoking at T1 plays a role in selecting new friends at T2 and T3 by logistic regression analyses. In addition, we tested whether parental smoking has a direct effect on this selection process (i.e. smoking of new friends at T2 and T3). We also tested whether parental smoking is indirectly related to peer selection processes by examining the moderating effect of parental smoking on the association between adolescent smoking at T1 and smoking status of new friends at T2 and T3.

Results

Descriptive analyses

Concerning friendships, it appeared that at T1, 253 (16%) adolescents reported to have no friend at school at all, 193 (12%) reported to have a non-reciprocal best friend at school and 1149 (72%) had a reciprocal best friend at school. At T2, 255 (16%) had no friend at school, 212 (13%) not a reciprocal friend, and 1128 (71%) a reciprocal friend. At T3, these figures were, respectively, 215 (14%), 196 (12%) and 1184 (74%). At the first wave, 75% of the respondents reported to be a non-smoker. This percentage decreased to 69% at T2 and 60% at T3. A total of 144 (12%) adolescents started to smoke between T1 and T2 and 270 (23%) between T1 and T3.

Associations between best friend and adolescent smoking (Table 1)

Concerning the cross-sectional associations between best friend and adolescent smoking status, it appeared that there was strong homogeneity in smoking status at the three waves. At T1, among reciprocal friends, if the adolescent had a non-smoking friend the probability of being a smoker emerged as being 18% while when s/he had a smoking friend the probability was 44% ($\chi^2(1, n = 1149) = 84.73, p < 0.001$). This association became stronger with age. At T2, the probability of being a smoker was 20% having a non-smoking friend and 52% having a smoking friend ($\chi^2(1, n = 1128) = 120.39, p < 0.001$). At T3, the probability of being a smoker was 26% having a non-smoking friend and 60% having a smoking friend ($\chi^2(1, n = 1172) = 133.46, p < 0.001$).

Effects of friend's smoking on smoking onset

Logistic regression analyses were conducted to examine the effects of best friend smoking on individual smoking onset at T2 and T3. In these analyses, we controlled for the effects of age,

Table 1
Cross-sectional associations between adolescent and best friend smoking status (in row percentages)

	Adolescent smoking status					
	Wave 1		Wave 2		Wave 3	
	Smoker	Non-smoker	Smoker	Non-smoker	Smoker	Non-smoker
<i>Best friend</i>						
Non-smoker	18	82	20	80	26	74
Smoker	44	56	52	48	60	40

Note. Figures are presented in percentages.

gender, and educational level. In these analyses, we selected the non-smoking respondent at a specific wave (T1 or T2) and examined whether smoking initiation of the target adolescent could be predicted by best friend smoking status (these analyses are not in Tables). Between T1 and T2, best friend smoking status was not related to smoking initiation (OR = 1.39, $p > 0.10$). Between T2 and T3, having a smoking best friend increased the likelihood of smoking onset (OR = 1.74; 95% CI = 1.14–2.65; $p < 0.01$). Similar analyses were conducted for adolescents with a stable reciprocal friendship between the waves (T1–T2: $n = 684$; T2–T3: $n = 588$). It appeared that between T1 and T2, best friend's smoking status did not predict smoking initiation at T2, and between T2 and T3, an effect was observed (OR = 2.75; 95% CI = 1.39–5.45; $p < 0.01$). Thus, no substantial differences were displayed between stable and non-stable friendships in effects of best friend smoking on adolescent smoking onset. In general, best friends smoking appeared to contribute to smoking onset at T3 but not at T2 (see Table 1).

Effects of parental and friend's smoking on smoking onset

Table 2 depicts the findings of logistic regression analyses in which best friend's and parental smoking are included as predictor variables. In these analyses we again controlled for age, gender, and educational level which are included in step 1 of the logistic regression analyses. Clearly, parental smoking status predicts smoking initiation, even when best friend smoking status is entered into the equation. This implies that when parents smoked themselves their offspring was more likely to start smoking him or herself. Furthermore, we checked whether best friend smoking is more strongly associated with smoking onset when adolescents have smoking parents as compared to non-smoking parents. This was done by including an interaction term (best friend smoking \times parental smoking) in the third step of the equation after including age, gender and educational level in the first step and the main effects of best friend smoking and parental smoking in the second step. No interaction effects were found. Because these interaction terms were not significant, we did not include them in the Table. So, parental smoking and best friend smoking both affected smoking onset at T3, but only parental smoking affected smoking onset at T2.

Deselection processes in friendships

Since selective association exclusively concerned adolescents with a best new friend at T2 or T3, we investigated whether differences in smoking status between an adolescent and his or her friends

Table 2

Logistic regression analyses predicting adolescent smoking onset by best friend and parental smoking status: influence processes

	T1–T2		T2–T3	
	OR	95% CI	OR	95% CI
Gender	0.91	0.60–1.39	1.32	0.88–1.97
Education	1.00	0.77–1.30	0.90	0.70–1.15
Age	1.02	0.66–1.59	0.88	0.57–1.35
<i>Best friend Smoking</i>				
Non-smoker	1		1	
Smoker	1.50	0.90–2.49	1.73**	1.12–2.67
<i>Parental smoking status</i>				
No parents smoke	1		1	
One smokes	1.71*	1.05–2.79	1.76*	1.12–2.76
Both smoke	2.03*	1.11–3.71	1.86*	1.02–3.37

Note. In both analyses, nonsmokers at a preceding wave (T1 or T2) were included. For best friend smoking status is being a non-smoker the reference category. For parental smoking status is having two non-smoking parents the reference category.

* $p < 0.05$. ** $p < 0.01$.

at T1 (and T2) was related to the likelihood of changing friends between the waves. This was not the case in the present study. Chi-square analyses showed far from significant relationships between stability of the friendship and correspondence in smoking status between friends at T2 and T3 ($p > 0.10$) (not depicted in Tables). Furthermore, we explored whether parental smoking status affects the likelihood of adolescents changing friendships due to differences in smoking between them and their friends. This was not the case. So, we find no support for the existence of deselection processes with respect to smoking.

Selective peer affiliation

Table 3 shows the impact of adolescent own smoking status and parental smoking status on selective peer affiliation. Selective peer affiliation was measured by means of the smoking status of the new friend at a following wave (T2 or T3) (see Ennett & Bauman, 1994; Engels et al., 1997). Thus, these analyses were only conducted for those adolescents who reported to have a new friend at a following wave. First, findings showed that adolescent own smoking status at T1 was a strong predictor of best friend smoking status at T2. A similar pattern was found for the prediction of best friend smoking at T3.

Parental smoking appeared to be directly related to this selection processes, because after controlling for adolescent smoking, an effect was seen for parental smoking on best friend smoking status for both new friends at T2 and T3. No interaction effect was found between adolescent and parental smoking on peer affiliation. Because these interaction terms were not significant we did not include them in this Table. Thus, both parental and adolescent smoking predicted selective peer affiliation.

Table 3

Logistic regression analyses predicting peer smoking in new friendships by adolescent and parental smoking: selection processes

	T1–T2		T2–T3	
	OR	95% CI	OR	95% CI
Gender	0.68*	0.47–0.98	1.32	0.96–1.84
Education	0.85	0.68–1.07	0.87	0.71–1.05
Age	1.18	0.80–1.74	1.03	0.74–1.43
<i>Adolescent smoking status</i>				
Non-smoker	1		1	
Smoker	1.99***	1.32–3.01	2.18***	1.55–3.07
<i>Parental smoking status</i>				
No parents Smoke	1		1	
One Smokes	1.83**	1.20–2.80	1.35	0.94–1.94
Both Smoke	2.52***	1.53–4.14	1.60*	1.00–2.58

Note. These analyses were only conducted for those adolescents who reported to have a new reciprocal best friend at T2 or T3.

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Discussion

The present study examines the role of parental smoking with respect to influence and selection processes in friendships of adolescents. Our study clearly showed that (a) the effects of parental and best friend smoking on smoking onset are quite similar in magnitude, (b) parental smoking did not affect adolescents' susceptibility to peer influences, and (c) parental and adolescent smoking status affect selective affiliation with smoking friends.

First, it is important to mention that cross-sectional analyses at the three waves showed that respondents and their reciprocal friend are quite similar in smoking status. Findings about friend's influence on smoking onset are not straightforward. No effect of best friend smoking was found between wave one and two and a small positive effect between wave two and three. There are two possible reasons for these differences. First, it is possible that in the beginning of secondary education, friendships at school are relatively unstable and rather coincidental. During the first year, classmates get to know each other and the friends they mention at the end of that first year are more likely to be friends that are significant for them. Second, the increase in smoking onset is more substantial at the later waves, which might constitute a statistical reason for this stronger effect of best friend smoking. Our findings coincide with other studies showing small to moderate effects of friend and peer group smoking on youngsters' smoking initiation (e.g. Aloise-Young et al., 1994; Ennett & Bauman, 1994; Engels et al., 1997, 1999a, b; Urberg et al., 1997; De Vries et al., 2003). Still, because we employed only limited intervals between the waves, we might expect stronger effects of reciprocal friends on smoking onset. In addition, it is good to bear in mind that we focus on early adolescence, a period in which only a small percentage of adolescents smoke on a regular basis or are addicted to nicotine. It would, therefore, be interesting

to try to replicate these findings in a study of late adolescents, in which we predict smoking onset, regular smoking, and nicotine dependence.

Selection processes can only be detected if youngsters report transformations in their social relationships. Our results show that even with six-month intervals between waves, adolescents' friendships change. In addition, strong support was found for selective association. In general, adolescents choose peers with similar smoking habits. This implies that to some extent an adolescent "decides" to take up smoking and then chooses like-minded friends (Kandel, 1978; Bauman & Ennett, 1996). Wang et al. (1999) suggested that, while teaching adolescents to resist peer pressure may be necessary, it may be more important to identify factors that influence adolescents' choices of friends who smoke. Concerning breaking off friendships, differences in smoking did not seem to motivate youths to terminate existing friendships, which is in line with previous studies (Ennett & Bauman, 1994; Engels et al., 1997).

Despite the fact that our study has substantial strengths, with its short-term longitudinal design, large number of subjects, information on reciprocity of friendships by including friends' reports, and inclusion of friend's own smoking and not adolescent perceptions, our study has some limitations. First, one might argue about which strategy to use to establish reciprocal friends. We started by having the target adolescent list up to 5 friends. If the first friend's list did not include the target adolescent, we checked the target adolescent's second friend. Longitudinally, it is possible that a specific friendship dyad at T1, is not a friendship any more at T2 although they mention each other at T2. Namely, if the target adolescent put this particular friend at a second place at T2 and the first mentioned friend appears to be reciprocated, this second mutual friendship at T2 will not be taken into analyses. In this way, we will underestimate the stability of friendships. The only way to handle this issue is not to focus exclusively on dyads but on multiple dyads and groups. In addition, in some cases, the reciprocal friendship consists of two adolescents who mentioned each other as fifth best friend whereas others mentioned each other as their first best friends. These differences might affect stability in friendships, but perhaps also individual differences in susceptibility to peer influences. Future research is needed to explore the extent to which these analytic strategies affect the main findings reported in this paper.

Second, some researchers argue that in unreciprocated friendships, youths are more strongly inclined to adapt to a friend's norms and behaviours because they have a intrinsic needs to make the friendship mutual. Adaptation might be one of the ways to achieve this (Bot, Engels, Knibbe & Meeus, 2003; see also Aloise-Young et al., 1994; Kiesner, Cadinu, Poulin, & Bucci, 2002). Whereas mutual friends who have long lasting relationships might be more open to variation in behaviours between friends. Third, we concentrated exclusively on reciprocal friends at school. Although between 71% and 74% of the sample had a reciprocal friend at school, it might be possible that friends outside the school context are more likely to affect adolescent smoking onset. This might be due to (a) the fact that in some cases friends outside school are older and therefore more likely to be involved in problem behaviour and (b) friends meet each other in more risk prone situations, such as a bar or pub, youth centre or on the street. In previous analyses on the same data set, we examined whether the association between perceived smoking of friends and adolescent smoking onset depends on the context of the friendship (inside or outside school) (Engels, Scholte & Meeus, 2002). However, we found no differences in effects of smoking friends in school or outside school on the individual odds of starting to smoke. Still, in order to pay full attention to the complexity of friendships in adolescence, we consider it important that future

research should focus on the relevance of friends and peers in different contexts. Finally, one of the limitations of the current study is that analyses were performed for the total sample. Variables might vary in their impact on smoking onset for different categories, such as gender (Flay et al., 1994), ethnic background (Warheit et al., 1995), or educational level (Chassin, Presson, Sherman, Carty, & Olshavsky, 1984). We did not perform the analyses for subpopulations. However, if prevention programs are directed toward certain categories, specific information on the determinants of onset in these categories might be more helpful than general information about the general population.

Although we found substantial evidence for the direct effect of parental smoking on adolescent smoking onset (see also reviews by Conrad et al., 1992; Petraitis et al., 1995), we did not find any impact of parental smoking on adolescents' susceptibility to peer influences. It should be noted that the same problems with causality that exist in the associations between friends and adolescent smoking do not apply here. It is unlikely that children affect parental smoking or that selection effects occur. We expected that in particular adolescents with smoking parents would be prone to adopt smoking habits of their friends. Furthermore, we found that when parents smoke, adolescents are more likely to select a smoking best friend when they report changes in their reciprocal friendships. This underlines the assumption that parental control on adolescent smoking functions directly and indirectly through adolescents' selection of specific friends (see Brown et al., 1993; Engels et al., 1999a). Still, a more complete picture of the role parents play in adolescent smoking onset would be obtained if other measures of parental behaviours would be taken into account. For instance, in a longitudinal study, Chassin, Presson, Todd, Rose, and Sherman (1998) showed that parents who control their children's behaviour, by actively seeking information about the whereabouts of their children and by being strict about what children can and cannot do, may be successful in prohibiting their children from taking up smoking. In addition, Harakeh, Scholte, Engels, De Vries, and Vermulst (2002) demonstrated that a manipulative type of control, so-called parental psychological control, consisting of coercive discipline and suppressing individuality, is related to an increased likelihood of starting to smoke. It is possible that, comparable with findings of studies on other types of problem behaviours (see Bogenschneider, Wu, Raffaelli, & Tsay, 1998; Brown et al., 1993; Vitaro, Brendgren, & Trembley, 2000) high levels of parental control affect the odds of youths becoming affiliated with deviant peers.

Recent empirical studies on adolescent smoking have examined the role in adolescent smoking of parenting practices aimed at controlling adolescent smoking (Henriksen & Jackson, 1998; Engels & Willemsen, 2000; Ennett, Bauman, Foshee, Pemberton, & Hicks, 2001). Jackson and Henriksen (1997) demonstrated that when parents have certain anti-smoking strategies, such as establishing non-smoking rules, warnings about smoking risks, and punishment if they were to find out that their child smokes, their children are less likely to smoke. Moreover, Simons-Morton et al. (1999) reported that high parental monitoring, that is, parents' keeping watch, might prevent adolescent from taking up smoking. Their findings showed that when adolescents thought that their parents would not find out that they smoked, they were four times more likely to smoke than when they thought that their parents would find out immediately. Future studies are needed to examine whether anti-smoking socialization efforts prevent adolescents from adopting friends' behaviour or from selecting smoking friends as well as directly preventing them from smoking.

We tend to assume that associations between parental smoking and adolescent or friends' smoking are due to modelling (Bandura, 1977, 1986), by parents setting an example and consciously or unconsciously reinforcing certain behaviours related to smoking. Nonetheless, similarities in smoking in families might be partly explained by inheritance as is shown in twin studies (e.g. Boomsma, Koopmans, Van Doornen, & Orlebeke, 1994). Our design does not permit conclusions regarding the environmental and genetic variance attributed to this similarity. However, a recent analysis on longitudinal data of a Dutch twin study depicted small but significant modelling effects of parental smoking on adolescent smoking onset (Vink et al., 2003). To make it more complex, we stress that the effects of parental smoking onset on adolescent smoking and peer relations cannot explain differences in smoking between siblings. Up until now, to our knowledge only one prospective study has concentrated on the role of parental behaviours in differences and similarities in smoking in non-twin siblings (Rose et al., 1999). Recently, Darling and Cumsille (2003) pointed to the need for longitudinal research in which parents and siblings are followed through time in order to obtain more insight into how parents precisely affect smoking onset and selective peer affiliation between and within families.

In sum, the present study clearly showed that parental smoking status not only affects adolescent smoking onset directly but also affects it indirectly by affecting adolescents' peer relationships. Although we found no indication for a higher vulnerability of adolescents to adopt smoking of friends when they have smoking parents, we found substantial evidence for the effect of parental smoking of selective peer affiliation. Future research is required that takes a closer look at the different strategies parents may have to affect their child behaviours; not only attention to the smoking of parents, but also on their general parenting practices as well as anti-smoking socialization efforts.

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