UTRECHT UNIVERSITY

# Parental and peer influences on adolescent cigarette smoking

## Final Thesis

**Lianne van Andel (3285294)**

**Bachelor Thesis ASW**

**Supervisor: Zeena Harakeh**

**02-07-2010**

**Abstract** – The effects of peer smoking (imitation and peer pressure) and parental smoking and their interaction effects on adolescent smoking were investigated through an experimental study among 59 students of intermediate technical and vocational-training. The experiment had a 2 (confederate smoking three times during the session, or not smoking) x 2 (confederate offering three cigarettes during the session, or not offering any cigarettes) factorial design. Adolescent smoking was observed through television monitoring during the session, in which was kept track of the times the participant lighted up and putted out a cigarette. Parental smoking was measured through the reports of the subjects in the questionnaire they filled out after the session. Subjects were more positively affected by confederate smoking than by confederate offering cigarettes. However, both of them had a significant positive effect, which presumes that imitation and peer pressure processes are influential. Paternal smoking affected adolescent smoking negatively. Though, this effect was smaller than the peer influence effects. No significant maternal smoking and the interaction effects were found. Thus, adolescents have a bias to imitate their peer's smoking behavior and are (somewhat less) susceptible for peer pressure. From these results, intervention programs may shift their main focus from peer pressure to imitation, yet keeping peer pressure in mind too.

Smoking is one of the major death causes in the world. Since the mid twentieth century more than 60 million people have died worldwide due to tobacco use (Engels, Den Exter Blokland, Kemp & Scholte, 2004). In 2000, 49.7% of the deaths among Dutch adults over 20 was caused by smoking (Stivoro, 2001). Adolescence is clearly a sensitive period in the initiation of smoking, since most smokers start their tobacco use during this period and continue to being regular smokers into adulthood. In 2009, 21% of the Dutch youth, between 10-19 years old, smoked at least one cigarette a month and 14% smoked a cigarette daily (Stivoro, 2009). Since smoking can have disastrous effects on health, it is important to prevent and reduce this behavior as soon as possible, in particular in adolescents, which is why prevention programs on smoking among adolescents are designed.

A lot of research has been conducted in the field of risk factors for smoking initiation and continuation among adolescents. Previous research on smoking implied that the nearest environment of an adolescent is one of the most important factors in the initiation process, especially parents and best friends (Bothmer, Mattsson & Fridlund, 2002). During adolescence there is an increase of the amount of time spend with friends and a decrease of time spend with parents (Darling & Cumsille, 2003). Parental influence remains strong in adolescent's decision making, and especially in areas involving adolescent's values and long-term goals, like career choice (Bauman, Carver & Gleiter, 2001). However, since the time spend with peers increases, peer influence, which is the mechanism in which adolescents become more similar to their peers by interacting with them, is crucial during adolescence and especially in day to day activities (Darling & Cumsille, 2003). That is why this investigation will focus on the extent to which the nearest environment, including peers and parents, influences adolescent's smoking behavior.

*Peers*

During adolescence a lot of things change for youngsters, like a new school and bodily changes. In this period many adolescents experience feelings of insecurity about their image and thereby feel dependent on the judgements of their peers. For group members it is essential to feel a sense of psychological connection with each other, which is why behaviors and norms that facilitate and maintain such bonds, and similarities between group members are extremely important (Lakin, Jefferis, Cheng & Chartrand, 2003).

This tendency to be(come) similar to each other is the reason why peer influence is widely being assumed to be one of the major causes to predict current use of cigarettes in adolescents (Urberg, Shyu & Liang, 1990). For example, empirical evidence shows that non-smokers who affiliate with smokers have an increased risk of becoming a tobacco user compared to youth without smoking friends (Kobus, 2003). Peer-influence can be divided into two types. The first type, implicit influence, will first be discussed and subsequently the second type, explicit influence, will be discussed.

One way of implicit influence is imitation. According to the *social learning theory* (Bandura, 1977), someone can take up a particular behavior, like cigarette smoking, by observing and imitating a model. This process of observational learning of a particular behavior is conscious, through intentionally imitating a model's behavior. On the other hand, Chartrand & Bargh (1999) have shown that imitation can also be unconscious, by revealing a link between perceiving another's behavior and behaving similarly oneself. This is called the *perception-behavior link*, which accounts for unintentional modeling of a peer's behavior. Although it is hardly possible to examine whether an observed imitation is intentional or unintentional, there is support for the assumption that imitation processes are present. The results of an experiment of Kniskern, Biglan, Lichtenstein, Ary and Bavry (1983) about the influence of smoking models showed that adolescent smokers are influenced by smoking peers; the presence of a smoking peer significantly increased the cigarette frequency during a session. However, there was not a significant difference in influence between the conditions in which a same-sex or opposite-sex model was observed, which suggests the sex of a smoking model is not influential. Antonuccio and Lichtenstein (1980) also showed an overall imitation-effect. They also compared heavy and light smokers, but did not find significant differences between them. Thus, both of these experiments showed that people have a tendency to imitate a model's smoking behavior.

In contrary to these implicit peer influence processes, there is also explicit peer influence, whereby the adolescent experiences direct pressure to smoke from his/her peers. Direct

pressures can contain the verbal offer of a cigarette and/or encouraging the adolescent to smoke (Mercken, Candel, Willems & De Vries, 2009). Most intervention programs assume that peer pressure is of major importance for smoking initiation processes (Urberg et al., 1990), and thus focus on teaching adolescents to resist peer pressure (Urberg et al., 1990; Urberg, Degirmencioglu & Pilgrim, 1997). Though, not much is known about this type of peer influence and there have not been done experimental studies in this vein yet. That is why, in contrary to previous studies on peer pressure, this research will have an experimental design. This is preferred over longitudinal and cross-sectional survey studies, because, first of all, experiments enable us to determine whether there are true causal links between peer and adolescent smoking. A second advantage of experimental studies is that factors, like potential imitation processes and peer pressure, can be manipulated.

Friedman, Lichtenstein and Biglan (1985) investigated onset situations of the first smoking experiences or experiences with pressure to smoke. They used a method of structured, open-ended interviews among 157 high school students, to elicit detailed information about adolescent's first three smoking experiences. The results showed that 30% of the 157 adolescents experienced pressure to smoke, which are 47 adolescents. Three types of pressure felt were reported: modelling, wanting to be part of the group and prevent oneself from being teased if smoking was refused. Even though only 30% of the 157 high school students experienced pressure, in 63% (99 cases) of the instances a cigarette was offered directly to the subject, which reflects the tendency of peers to promote initial smoking. Thus, Friedman and colleagues (1985) showed that peers encourage adolescent smoking, by offering cigarettes.

So, from previous research it can be concluded that current smoking adolescents imitate smoking peers. Subsequently, explicit peer influence is clearly present in smoking onset situations. However, it is not clear yet how this peer pressure operates when adolescents are daily smokers already, although it is expected that peer pressure will also affect daily smoking adolescents. Furthermore, it is still uncertain what the relative effects of implicit and explicit peer influences are. In conclusion, if the assumptions about peer pressure to be of main influence in adolescent smoking turn out to be flawed, then so are the intervention programs, since not any of these programs focus on imitation.

*Parents*

It has been shown that adolescents are at higher risk to start or continue smoking and smoke more cigarettes when one or both parents are smokers (De Leeuw, Scholte, Harakeh, Van

Leeuwe & Engels, 2008; Mercken et al., 2009). However, there are inconsistent findings on the level of direct influence of parental smoking on their child's smoking behavior. Whereas some studies found evidence that parental smoking does not appear to directly affect their child's smoking behavior, other studies suggest that it does. A review of Avenevoli & Merikangas (2003) showed that 'the effect of parental smoking on adolescent smoking is often eliminated completely when other variables are included in models'. Furthermore, they stated that there are inconsistent findings concerning the fact that adolescents with two smoking parents would be at higher risk to become smokers than adolescents with one smoking parent. Boomsma, Koopmans, Van Doornen & Orlebeke (1994) showed that the correlations between currently smoking parents and adolescent smoking were not systematically higher than correlations between ever smoking parents and adolescent smoking. In contrast, Den Exter Blokland (2006) demonstrated that adolescents living in households where both parents were never smokers were the least likely to be smokers, and that the probability to become a smoker is the biggest for adolescents living in a household in which one parent is a current smoker and the other is either a former or a current smoker. Moreover, there might not only be differences in influence among parental smoking statuses, but also between maternal and paternal smoking. Scragg, Reeder, Wong, Glover & Nosa (2008) used the data of a national survey among year 10 students, to state that adolescent smoking prevalence was highest in those with two smoking parents, followed by adolescents with their mother only smoking, then adolescents with only a father who smokes and lowest in adolescents with both parents being non-smokers. These results are in accordance to a study of Kandel and Wu (1995), who showed that adolescents are more likely to have ever smoked or are current smokers if their mothers are currently smoking at least one package of cigarettes a day, then if their fathers have ever smoked, whatever his current smoking status is. So, in general it seems that parental smoking promotes adolescent smoking. Furthermore, it appears that the influence of mothers is stronger than the influence of fathers.

*Interaction effects of parental and peer smoking on adolescents*

If both peer influences and parental smoking affect adolescent's smoking behavior, the question arises about what their relative influence on adolescent smoking is. Peer smoking is considered to be of major impact on adolescent smoking, with research providing a lot of evidence that peer smoking is tied more strongly to adolescent smoking than does parental smoking. For example, Avenevoli and Merikangas (2003) discussed that parental smoking influences are very small in magnitude, especially when compared to other risk factors, such

as peer smoking. In contrast however, Bricker, Peterson, Andersen, Leroux, Rajan & Sarason (2006) and De Vries, Candel, Engels and Mercken (2006) showed that the influence of parental smoking and peer smoking was of comparable importance on adolescent smoking. Thus, it is not entirely clear yet what the relative influences of both peer smoking and parental smoking are on adolescent smoking.

However, it has been shown that there are some cumulative effects of being at higher risk to become a daily smoker when both parents and two or more close friends are smokers (Bricker et al., 2006). In this longitudinal survey study the amount of smoking parents and the amount of smoking friends was measured in the 5$^{th}$ grade. Consequently, children's smoking behavior was measured in 12$^{th}$ grade. The results showed first of all, that children with non-smoking parents were the least likely to be daily smokers and the ones with two smoking parents were the most likely to be daily smokers. Furthermore, having smoking friends increased this likelihood. So, it was obviously clear that close friends' smoking effects are cumulative on the effect of parental smoking on adolescent smoking (Bricker et al., 2006).

Though, since adolescents with smoking parents have been exposed and are used to tobacco use for a long time, and so implicitly learned everything to be competent in smoking, it might be expected that they are more susceptible to peer smoking influences than adolescents with non-smoking parents (Darling & Cumsille, 2003). Yet, this assumption has rarely been considered in past studies. To our best of knowledge only one study included this potential moderating effect of parental smoking on adolescent's susceptibility for peer smoking influences, with no separation of imitation and peer pressure. Engels et al. (2004) showed that even though there is evidence that parental smoking has a direct effect on the smoking initiation of their children, they could not find any support on the assumption that parental smoking behavior would influence the susceptibility of adolescents to their friends' smoking behavior. Thus, with the focus on smoking initiation, there might not be an increase of susceptibility on peer smoking by an adolescent when one or both parents are daily smokers. And since it is expected that adolescents will not become more susceptible once they are daily smokers, it is not probable that daily smoking adolescents with current smoking parents will be more susceptible to peer influences than daily smoking adolescents with non smoking parents.

*Current study*

The purpose of this study was to examine to what extent implicit (imitation) and explicit (peer pressure) peer influence affects adolescents' smoking behavior. Subsequently, the focus was

on parental smoking as a potential moderator on this processes of peer influence. Thus, whether the amount of parental smoking affects the susceptibility of an adolescent to peer smoking influences. Is an adolescent with non-smoking parents less susceptible for imitation and peer pressure to smoke than an adolescent with regular smoking parents? This brings us to the main question to be answered in the experimental study that will be conducted: '*To what extent does parental smoking moderate the effects of implicit (imitation) and explicit (peer pressure) peer influence on adolescent smoking?'*. To be able to answer this question, five questions are discussed;

1) To what extent does imitation affect adolescent's smoking behavior?
2) To what extent does peer pressure affect adolescent's smoking behavior?
3) To what extent does parental smoking affect adolescent's smoking behavior?
4) To what extent does parental smoking moderate the effect of imitation on adolescent smoking?
5) To what extent does parental smoking moderate the effect of peer pressure on adolescent smoking?

The hypotheses are that (1) an adolescent will smoke more, once his/her peer smokes. Subsequently, (2) the adolescent will smoke more, once peer pressure is involved. Another assumption is that (3) adolescents will smoke more often, once his/her parents smoke, and (3.1) maternal smoking will be more positively related to adolescent smoking than does paternal smoking. The final hypotheses are that (4) an adolescent will not be more susceptible to imitation, once his/her parents smoke and (5) an adolescent will not be more susceptible to peer pressure, once his/her parents smoke.

There have not been previous experimental studies concerning both imitation and peer pressure in one design yet. This results in no current knowledge about the relative influences of both of these processes on adolescent smoking. Furthermore, there are inconsistent findings regarding parental smoking influences and the potential interaction effects of parental smoking with imitation and peer pressure have not been investigated separately. So, with this research some shortcomings in the current knowledge about adolescent smoking will be filled.

## Methods

*Design*

In this experiment both imitation (through confederate's smoking) and direct pressure (by offering cigarettes by confederate) will be manipulated in one design, without the subject's awareness. A 2 (confederate smoking three times during the session, or not smoking) x 2 (confederate offering three cigarettes during the session, or not offering any cigarettes) factorial design is applied. Thus, the design consists of 4 conditions: 1) confederate does not smoke and does not offer cigarettes to the adolescent, 2) confederate smokes, but does not offer cigarettes to the adolescent, 3) confederate does not smoke, but does offer cigarettes to the adolescent and 4) confederate does smoke and offers cigarettes to the adolescent. In the conditions in which the confederate smokes and/or offers a cigarette to the participant, s/he is informed to light up and/or offer a cigarette (1) right after s/he found the package, which is just before the start of the music task, (2) ten minutes later, during the third music fragment and (3) again ten minutes later, during the fifth music fragment.

*Procedure*

The participants are recruited during classes and lunch-breaks at their intermediate technical and vocational-training schools in Utrecht, Nijmegen, Arnhem and 's Hertogenbosch, in which permission was given by the managing director. The teenagers are told that they can participate in a research about musical tastes, which will take up for about an hour and that they will receive 8 euro's after finishing the session. The students who are interested in participating fill out a screening list with questions on life style and their backgrounds. Consequently, the daily smoking adolescents within the age group (16-25) will be selected and called to make an appointment for participating. By all means, they were not aware of the fact that they were selected based upon their smoking behavior.

During a session, the participant will face a confederate of which s/he thinks is a participant too. These confederates are students, in the age of 18-25, from colleges and Universities. They are recruited through flyers and posters and had a training prior to the experiment. In this training, they are told how to offer the participant a cigarette (they have to offer verbally with the package opened to the participant and if they are in a condition in which they have to smoke themselves too, they first have to take a cigarette themselves, before offering to the adolescent). They are also instructed to interact in a warm and social

manner with the participant and to agree with the participant in their discussion about musical tastes.

For this experiment approval was given by the ethical commission of Utrecht University (The Netherlands). This experiment is performed in the period of April 2009 to January 2010. All sessions were run by a researcher from Utrecht University and took place in a camper, so that all settings are the same and no other factors than the confederate influencing the adolescent's smoking behavior. This camper was divided into two rooms, a session room in which the experiment took place, and a observation room in which the researcher observed the session. It was located near the intermediate technical and vocational-training schools, this was to reduce the chance of not showing up of the participants. The confederate and participants always sat at the same seats during all sessions. At start of each session both the confederate and the participant first filled out an informed consent form. Second, they got an arousal meter, which was explained to be measuring their stress-levels during different music styles. This was mainly used to make the cover story more credible. Third, they got a breath test, which was told to measure their alcoholic values, but which in fact measures the CO-level in their blood. Fourth, the questionnaire about the music fragments was being explained. At last, the confederate found a cigarette package, underneath a pillow, containing 8 cigarettes and a lighter. The investigator told them that that package was probably forgotten by another participant, asked if both of them smoke and told them that they could smoke cigarettes, eat (nuts are provided on the table) and drink inside the camper. In the conditions in which peer pressure or smoking is involved the confederate offers/smokes a cigarette immediately after finding the cigarette package. Continuously, the participant and confederate were offered non-alcoholic drinks (orange juice, ice tea, apple juice and water). Then the actual 30-minute session started. During this session six music fragments of one minute were played, followed by four minutes of discussion time in which the participant and confederate discussed about whether they know and liked the fragment and discussed ten questions about the music fragments. For example, they had to discuss of what genre the music fragment was. The confederate only smokes and offers cigarettes during this 30-minute session. When the session is completed, the adolescent will receive his/her earned 8 euro's, signs a form to confirm s/he received his/her money and leaves.

*Participants*

The inclusion criteria for the participants of this experiment ($N$ = 59) are that they are daily smoking adolescents in the age of 16-25 years (min.=16; max.=23; M = 18.15; SD = 1.54) ,

who are students of intermediate technical and vocational-training. 40.7% of the participants were male, which accounts for 24 participants. This means that 59.3% of the participants were girls (35 participants).

From a total amount of 62 experimental sessions, only 59 were found to be legitimate. The sessions that are not included in the analysis failed on the including criteria; those three participants were not daily smokers (anymore). At the end of each session the participants could declare their ideas about the purposes of the investigation, from which can be stated that none of them was aware of the actual purpose.

*Instruments*

Carbon-monoxide level: The breath test which is given to the participants is in fact a Micro$^{+}$ Smokerlyzer, which measures the participant's Carbon-monoxide (CO) level participant's blood in parts per million (Sinefuma, n.d.). By doing this, it is possible to see whether the participant has smoked a lot prior to the session. Carbon-monoxide is a harmful gas that is released in combustion processes, including cigarette smoking. It attaches to hemoglobine in the blood, which obstructs the uptake and transport of oxygen through the body. So, the amount of CO in a participant's blood shows his/her smoking habits; the higher the CO-level, the more s/he smokes on a daily basis.

Adolescent smoking is measured by participant's smoking behavior during the session. This behavior is observed via a television in the observation room in the camper, which is connected to three camera's in the session room of the camper. This television thus gave a clear view of both confederate's and participant's smoking behavior. In this way the investigator could enter the times of offering a cigarette by the confederate, amount of smoked cigarettes and starting and ending times of a cigarette in SPSS. After completing the session, the researcher checked the total amount of smoked cigarettes by counting the cigarettes in the ashtray, which was always in agreement with the observed amount.

Parental smoking is measured through the participant's report in a general questionnaire s/he fills out after the experiment, since parental smoking behavior is being assumed to affect adolescent smoking. Since current knowledge indicate that maternal and paternal smoking affect adolescent's smoking differently, parental smoking has been split up in maternal and paternal smoking. In the questionnaire the adolescents report on both maternal and paternal smoking, with options non-smoker, former smoker, current smoker or 'have not'. Paternal and maternal smoking will be recoded into non-smoker (the options non-smoker and former

smoker) and current smoker. If the particular parent is not present in the family, s/he will not be used in the analysis.

*Data analysis*

The data will be analyzed with SPSS 17.0. First the descriptive statistics will be considered. A look will be taken at the particular amounts of smoking per condition. Then the actual data analysis will be done. In this experiment several independent variables are included: (1) confederate's smoking behavior (smoking three cigarettes or not smoking), (2) peer pressure (offering three cigarettes or not offering) and (3) parental smoking behavior (non-smoker or current smoker). The dependent variable is adolescent's smoking behavior during the session. To get reliable conclusions, there will be controlled for the potential covariates: gender (0=male; 1=female) and Carbon-monoxide level in participant's blood.

For the examination of the data a linear regression analysis will be used, in which the effects of confederate smoking, peer pressure and parental smoking will be linked to adolescent smoking separately. Prior to this analysis, a correlation check between paternal and maternal smoking has been done, to make sure multicollinearity was absent. Even though the correlation turned out to be significant ($p$=.04), both variables did not correlate above r=.60 (r=.29), so there is no multicollinearity. This means that both variables can be included in the same model of analysis, without distorting the results.

Consequently, the interaction terms confederate smoking * father's smoking, confederate smoking * mother's smoking, peer pressure * father's smoking and peer pressure * mother's smoking will be tested and included in the analysis.

## Results

*Descriptives*

From a total of 59 participants, 15 were included in condition 1 (no peer pressure, no smoking by confederate) of which no-one reported having felt pressure to smoke during the session, 16 in condition 2 (no peer pressure, three times smoking by confederate), of which 2 reported having felt pressure to smoke, 15 in condition 3 (peer pressure, no smoking by confederate), of which 3 reported having felt pressure to smoke and 13 in condition 4 (peer pressure and three times smoking by confederate), of which 1 reported having felt pressure to smoke.

Throughout the experiment, there has not been one participant who did not smoke. In the sessions in which no peer pressure and no imitation was involved, 16.9% (N=10) of the total

of participants smoked 1 cigarette, 8.5% (N=5) smoked 2 cigarettes and 0% smoked 3 cigarettes. In the condition of no peer pressure and three times smoking by the confederate 0% smoked 1 cigarette, 8.5% smoked 2 cigarettes and 18.6% (N=11) smoked 3 cigarettes. In the condition in which peer pressure was present, but no smoking by the confederate, 5.1% (N=3) smoked 1 cigarette, 15.3% (N=9) smoked 2 cigarettes and 5.1% smoked 3 cigarettes. And in the condition in which both peer pressure and smoking by the confederate was present 0% smoked 1 cigarette, 3.4% (N=2) smoked 2 and 18.6% smoked 3 cigarettes. This results in a mean of cigarettes smoked per participant of 2.20 (min.=1; max=3; SD=.78) in the session. The values of Carbon-monoxide in participant's breath varied between 0.00 and 34.00 (M=9.34; SD=5.59) before the session.

*Peer and parental influence analyses*

For the actual data-analysis, first an univariate regression analysis has been conducted to answer the first three questions. These were respectively (1) to what extent does imitation affect adolescent's smoking behavior?, (2) to what extent does peer pressure affect adolescent's smoking behavior? and (3) to what extent does parental smoking affect adolescent's smoking behavior? Participant's gender and CO-level have also been included, to have a look at their independent effects on participant's smoking. The results are shown below.

**Table 1. Univariate Regression Analysis of Gender, CO-level, Cigarettes Smoked by Confederate, Cigarettes offered by Confederate, Paternal Smoking and Maternal Smoking on Participant's Smoking Behavior**

| *Variable* | *B* | *Std. Error* | *Beta* |
|---|---|---|---|
| Gender | -.06 | .21 | -.04 |
| CO-level | .02 | .02 | .11 |
| Cigarettes smoked by confederate | 1.09 | .15 | .70*** |
| Cigarettes offered by confederate | .36 | .20 | .23 |
| Paternal smoking behavior | -.36 | .22 | -.23 |
| Maternal smoking behavior | -.17 | .22 | -.07 |

Note: N=59, except for the analysis with paternal smoking (N=53), and maternal smoking (N=57); * $p < .05$; ** $p < .01$; *** $p < .001$

Both gender and CO-level turned out to be non-significant covariates. Imitation was measured by 'cigarettes smoked by confederate', which turned out to significantly affect participant's smoking in a positive way. So, participants confronted with a heavy smoking model were likely to smoke more cigarettes than participants confronted with a non-smoking model. Peer pressure was measured by 'cigarettes offered by confederate' and turned out to have just no significant effect on participant's smoking. The third research question was measured by both paternal smoking behavior and maternal smoking behavior. Both of these variables turned out to have no significant effect on participant's smoking.

Subsequently, a multivariate regression analysis was done, including the potential covariates: gender and CO-level and the independent variables: cigarettes smoked by confederate, cigarettes offered by confederate, paternal smoking behavior and maternal smoking behavior all in one model. In this model 61.5% of participant's smoking behavior during the experiment was explained by the variables 'cigarettes smoked by confederate', 'cigarettes offered by confederate' and 'paternal smoking behavior'. The results are stated below.

**Table 2. Multivariate Regression Analysis of Gender, CO-level, Cigarettes Smoked by Confederate, Cigarettes Offered by Confederate, Paternal Smoking and Maternal Smoking on Participant's Smoking Behavior (*N*=52)**

| *Variable* | *B* | *Std. Error* | *Beta* |
|---|---|---|---|
| Gender | -.06 | .16 | -.04 |
| CO-level | -.02 | .02 | -.12 |
| Cigarettes smoked by confederate | 1.19 | .16 | .74*** |
| Cigarettes offered by confederate | .44 | .16 | .28** |
| Paternal smoking behavior | -.37 | .16 | -.23* |
| Maternal smoking behavior | -.07 | .16 | .04 |

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

By putting these variables together in one model, some effects obviously change. Both covariates (gender and CO-level) remain insignificant and the effect imitation, measured by cigarettes smoked by confederate, remains significant. So, participants confronted with a heavy smoking model are likely to smoke more cigarettes than participants who are confronted with a non-smoking model. Subsequently, the effect of the amount of cigarettes offered by confederate became significant, with a positive effect. This means that participants

facing a cigarettes offering model are likely to smoke more cigarettes than participants who face a model who do not offer cigarettes to them. For the third question, the effects of paternal smoking behavior change in such amount that they become significant too. This however, is a negative effect which implies that participants with a current smoking father are likely to smoke less cigarettes than participants with a non-smoking father. Furthermore, maternal smoking remains to have no significant effect on participant smoking.

The fourth research question was: to what extent does parental smoking moderate the effect of peer smoking on adolescent smoking? The results showed that both father's smoking behavior in combination with confederate smoking (B=-.28; Std. Error=.31; Beta=-.29; *p*=.38) and mother's smoking behavior in combination with confederate smoking (B=-.05; Std. Error=.34; Beta=-.05; *p*=.88) were not of significant influence on adolescent's smoking during the experiment. Research question number five was: to what extent does parental smoking moderate the effect of peer pressure on adolescent smoking? These results also showed non-significant effects on adolescent's smoking for father's smoking behavior in combination with peer pressure (B=-.14; Std. Error=.32; Beta=-.14; *p*=.67) and for mother's smoking behavior in combination with peer pressure (B=-.42; Std. Error=.33; Beta=-.43; *p*=.21).

## Discussion

In the present study an experimental design was used to investigate the effects of imitation, peer pressure and parental smoking on adolescent's smoking behavior.

As hypothesized a strong positive significant effect of a heavy smoking model on adolescent smoking, imitation, was found, which means that the more peers smoke, the more an adolescent will smoke. This is in accordance with previous experimental research on this topic (Antonuccio & Lichtenstein, 1980; Kniskern et al., 1983). Since the amount of smoking by the confederate was manipulated, these results can be interpreted as a causal relationship of peer smoking on adolescent smoking. This is once more an endorsement of Bandura's *Social Learning Theory* (1977) and/or the *perception-behavior link* that Chartrand and Bargh (1999) have shown. Though, since this experiment was conducted with students of intermediate technical and vocational-training only, one might suggest that these imitation-effects could differ among higher educated students. However, earlier experiments focusing on imitation were done among higher educated individuals (Antonuccio & Lichtenstein, 1980; Miller,

Frederiksen & Hosford, 1979) and they too found significant imitation effects of smoking behavior.

The second hypothesis was that an adolescent will smoke more, once peer pressure is involved. There are two types of peer pressure. First there is coercive pressure, in which an adolescent is forced to smoke, or s/he will experience negative consequences if s/he does not smoke. These consequences can include being bullied, teased and rejected from the desired group. However, the vast majority of children does not report feeling coerced to smoke (Michell & West, 1996). The second type is normal pressure in which a cigarette is offered, without negative consequences if the adolescent does not smoke. Since some adolescents already feel pressure when a cigarette is offered (Stanton & McGee, 1996), coercive pressure was not taken into account in the current research.

In the presented univariate analysis of the present research, peer pressure was nearly significant, even though the effect was quite strong (Nijdam, 2003). However, in the multivariate analysis the effect became stronger and turned out to be significantly positive after all. In real life situations adolescents are always exposed to a combination of peer smoking, peer pressure and parental smoking, of which the multivariate analysis gives a better representation. This means that, even though the effect of imitation is stronger, the effects of peer pressure are definitely not to be underestimated and the second hypothesis is confirmed too.

There has hardly been any previous research on the topic of peer pressure, and the investigations that are available all focus on smoking initiation processes. Furthermore, in contrast to imitation, to the best of our knowledge, no previous experimental studies examined the effects of peer pressure on adolescent smoking and especially not with a focus on daily smoking adolescents. However, there are some longitudinal and survey studies on this topic. For example, Friedman et al. (1985) found in their survey study that peer pressure to smoke is present in much smoking initiation-processes. However, these results are in contrast to a survey study of Urberg et al. (1990). They focused on the effects of perceived friend smoking and perceived peer pressure, and divided this pressure into normative pressure to smoke or not to smoke and direct pressure to smoke or not to smoke. Their results showed that only direct pressure not to smoke cigarettes was significantly affecting adolescent's smoking. Nevertheless, both of these studies had adolescents self reporting on the pressures felt, concerning their smoking behavior. There are some possible explanations for the contrast between these findings and the current found results. First of all, the term peer pressure is a rather vague one. As already mentioned before, not everyone experiences peer pressure in the

same way. As is shown in the descriptive statistics, from a total amount of 28 participants who were in a condition in which peer pressure was present, only 3 of them reported having felt pressure to smoke. Furthermore, there were also 2 participants who already felt being pressured to smoke when the confederate smoked, even though they did not get cigarettes offered. Another explanation for the inconsistent findings about peer pressure might be that adolescents are reluctant to report feeling pressured. Adolescents are concerned with acquiring independence and so it may be socially desirable for them to report that they were not perceiving pressure (Michell & West, 1996; Urberg et al., 1990). In both of these explanations, the current study gives an improvement. Given that peer pressure is defined by offering cigarettes, so it could not be misinterpreted, and is manipulated throughout the different conditions, and since data is provided through observation of adolescents actual smoking, it is quite plausible to conclude that direct peer pressure positively affects adolescent's smoking behavior. However, it could be questioned whether this peer pressure process would affect higher educated students differently. Since there are no earlier experimental studies on this topic, not much can be said about that. However, it has been shown that the risk to being a smoker is higher for students with a low level of education, compared to students of a higher level of education (Richer & Lampert, 2008; Richter & Leppin, 2007). Since imitation processes seem to have the same effects in both low and high educated students, there is a chance that this higher risk to being a smoker for lower educated students could be due to a higher susceptibility to peer pressure. So, the potential differences in susceptibility to peer pressure to smoke among lower and higher educated adolescents is something that can be investigated in future research. Yet, a basis is laid with regard to experimental research on the topic of peer pressure.

What did become clear though, is that the processes of imitation are much more influential on adolescent smoking than is peer pressure. This is a quite striking result, since all intervention programs thus far only focused on teaching adolescents how to resist peer pressure, because it was assumed that peer pressure was of major importance on adolescent smoking (Urberg et al., 1990; 1997). However, both of these processes influence adolescents in such a way that they become more similar to each other, by taking up the same (smoking) behavior. Another process that contributes to similarities between adolescents is selection. Adolescents tend to select and connect with peers who are similar to themselves. These similarities can present themselves on different characteristics, like similarity in self-esteem, introversion/extraversion, socio-economic status and behaviors (Byrne & Griffitt, 1973), such as tobacco use. With respect to smoking behavior, selection occurs when adolescents select

peers with similar smoking behavior as themselves to interact with (Mercken et al., 2009). So, it seems plausible to interpret this as an adolescent becoming a smoker and thereafter selecting new, smoking friends. Nevertheless, it could also be interpreted as adolescent's wanting to be rewarded with reciprocity of desired friends and start smoking to become an accepted member of a social peer group. In that case, the cause of adolescent smoking can be ascribed to peer influence. This ambiguity shows that it remains hard to take and measure influence and selection apart. In the current study, selection was not included and peer influences turned out to be of significant importance when it comes to tobacco use. However, with a focus on real life situations and the attempt to reduce (adolescent) smoking by the intervention programs, future research may want to investigate what the relative influences of both selection processes and peer influences are on adolescent smoking. Though, for now it is important to be aware of the fact that from the types of peer influence on adolescent smoking, especially imitation is of major importance. Prevention should thus start with teaching adolescents how to resist the bias to imitate peers more importantly than how to resist peer pressure.

Subsequently, the focus has been on the effects of parental smoking on adolescent smoking. The hypothesis was that an adolescent will smoke more once his/her parents smoke. Furthermore, since previous studies suggest that there are differences between the effects of paternal and maternal smoking, this hypothesis can be supplemented with the hypothesis that 'maternal smoking will be more positively related to adolescent smoking than does paternal smoking'. However, the presented results contrast both of these hypotheses. In the univariate analysis, both paternal and maternal smoking turned out to have no significant influence on adolescent smoking. This is in accordance with the review of Avenevoli & Merikangas (2003). From their meta-analysis they concluded that there are inconsistent findings when it comes to the effects of parental smoking on adolescent smoking, including no significant findings when other variables are included in the model of analysis. When all independent variables of the current study were included in the multivariate analysis, only paternal smoking significantly affected adolescent smoking. This is a notable result, since previous evidence unanimously show a stronger effect of maternal smoking compared to paternal smoking (Avenevoli & Merikangas, 2003; Kandel & Wu, 1995; Scragg et al., 2008). However, what is more striking is the fact that the only paternal effect found significant, is negatively related with adolescent smoking, which indicates that the more cigarettes a father smokes, the less the adolescent will smoke. For control, a look has been taken to the distribution of fathers over the four conditions, which turned out to be equally distributed.

This means that it has not been the case that all participants with smoking fathers were in the condition in which the confederate did not smoke. Then, what could be a possible explanation, is that a lot of the participants possibly came from broken families. Nowadays, 34.1% of the married couples break up (Centraal Bureau voor de Statistiek, 2007). 80% of the children of broken families live with their mother after the break up and 25% of them do not have any contact with their fathers (Centraal Bureau voor de Statistiek, 2001). So, it could be that the subjects did know their mother's smoking behavior, but that they guessed about their father's smoking behavior. Since the options of choice about their parental smoking were non-smoker, former smoker, current smoker or have not, they might have interpreted the option 'have not' as mother/father being deceased. This might have resulted in adolescents picking one of the other options about their paternal smoking, and nothing can be said about how they would have made up their choices.

Furthermore, no evidence was found for the hypotheses that parental smoking moderates the effect of both imitation and peer pressure on adolescent smoking. These results are in agreement with Engels et al. (2004), who also did not find moderating effects of parental smoking on adolescent's susceptibility to peer influences. This indicates that adolescents with smoking parents are not more susceptible for both imitation of their peers and peer pressure to smoke. However, in this study, adolescents were faced with strangers instead of their close friends with who they interact with on a daily basis. So, in this case there is a certain distance between the social environments of the participant and confederate, which is less the case with adolescents and close friends. When adolescents are faced with close friends, it could be possible these processes work differently than when faced with a stranger. Growing up in a family where parents are observed smoking, provides the opportunity for children to learn the behaviors towards smoking, such as how to light a cigarette, how to inhale, what to do with ashes and when it is appropriate to smoke. In this manner a child sees and learns how to smoke, and even if they do not smoke themselves (yet), smoking becomes part of the range of behaviors that a child is capable of performing (Darling & Cumsille, 2003). With the focus on imitation, it could be possible that the unconscious urge to imitate a close friend is higher than with a stranger, since they feel the need for affiliation with them (Lakin et al., 2003). Furthermore, since they are implicitly competent in smoking, they might be more easily light up a cigarette if a friend does. When it comes to peer pressure, it could be possible that a close friend knows about the smoking behavior of the adolescent's parents. If they are smokers, this could be used in persuade the adolescent to light up a cigarette. Both these imitation and peer pressure processes could so work differently in cases where an adolescent is faced with a

close friend instead of a stranger. Future research might thus examine the effects of imitation and peer pressure from close friends on adolescent smoking and, furthermore, include parental smoking too.

*Limitations*

This research had one important limitation, which was the measuring of parental smoking. First of all, adolescents were asked about their parent's smoking behavior. Though, this can cause inconsistencies between perceived and actual congruencies between adolescent's and parent's smoking behavior, since adolescents have a bias to project their own smoking behavior on their environment, in a way that a peer's reported smoking behavior reflects the adolescent's own smoking behavior (Urberg et al., 1990). Furthermore, the selectable options were not totally clear. With no question asked about whether the parents were still together and the option 'have not', which could have been interpreted as 'is deceased', some adolescents might have taken a guess on their paternal or maternal smoking. This results in having no chance to give a reasonable explanation for the fact that the current found results are in contrast with previous studies. Future research thus might include parental smoking by self-reports of the parents and an instrument which excludes other potential explanations for the results found.

Another limitation that was present in this study, is the fact that imitation and peer pressure processes were conducted in same sex dyads, while in real life situations adolescents connect with each other mixed gender groups. This makes it not possible to generalize the found results to groups of adolescents. Of course, in these groups dyads exist too. But even though Kniskern et al. (1983) found no differences between same sex and opposite sex dyads on imitation, it is not clear if there would not be differences in the effects of peer pressure either. Furthermore, in interaction with other group members, these dyads might not only be influenced by each other, but also by the other members of the group. So, for intervention programs to have a 'real life fit', future research might have to focus on imitation and peer pressure processes in friendship groups.

*Implications*

It can be concluded that the current existing intervention programs are partly based upon the wrong assumptions about adolescent smoking. Particularly imitation processes are highly influential on adolescent smoking, and so it is not all on peer pressure to blame. However, peer pressure does affect adolescent smoking too. Since current intervention programs are

only teaching adolescents how to resist peer pressure, they should thus broaden their focus in the field of peer influences. Their main focus could then be on making adolescents aware of the fact that there is a chance that they are unconsciously influenced by smoking peers and start imitating them. This information might be especially useful for adolescents who try to stop smoking. Once they are aware of the bias to imitate peers, they can choose to not interact with smoking peers and/or keep themselves from imitating. Furthermore, to reduce the amount of smoking models for adolescents, the smoking-policy could, next to smoking restrictions in public places, start to forbid smoking at schools, since that is a place where a lot of smoking youngsters meet and connect with each other.

However, this research has focused on daily smoking adolescents. Intervention programs aim to prevent smoking instead of 'curing' current smokers. In smoking initiation situations the processes of imitation and peer pressure may differ from daily smoking situations. That is why further experimental research is necessary, to be sure that implications that may come from the current results also apply for smoking initiation situations.

## References


Antonuccio, D. O. & Lichtenstein, E. (1980). Peer modeling influences on smoking behavior of heavy and light smokers. *Addictive Behaviors, 5,* 299-306.

Avenevoli, S., & Merikangas, K. R. (2003). Familial influences on adolescent smoking. *Addiction, 98,* 1-20.

Bandura, A. (1977). *Social Learning Theory.* Englewood Cliffs, NJ: Prentice Hall.

Bauman, K. E., Carver, K. & Gleiter, K. (2001). Trends in parent and friend influence during adolescence: The case of adolescent cigarette smoking. *Addictive Behaviors, 26,* 349-361.

Bothmer, M. I. K. von, Mattsson, B. & Fridlund, B. (2002). Influences on adolescent smoking behaviour: Siblings' smoking and norms in the social environment do matter. *Health and Social Care in the Community, 10,* 213-220.

Boomsma, D. I., Koopmans, J. R., Van Doornen, L. J. P. & Orlebeke, J. F. (1994). Genetic and social influences on starting to smoke: A study of Dutch adolescent twins and their parents. *Addiction, 89,* 219-226.

Bricker, J. B., Peterson Jr., A. V., Andersen, M. R., Leroux, B. G., Rajan, K. B. & Sarason, I. G. (2006). Close friends', parents', and older siblings' smoking: Reevaluating their influence on children's smoking. *Nicotine & Tobacco, 8,* 217-226.

Byrne, D. & Griffitt, W. (1973). Interpersonal attraction. *Annual Review of Pyschology, 24,* 317-336.

Centraal Bureau voor de Statistiek (2001). *Een op de zes kinderen maakt echtscheiding mee.* Retrieverd 28 June, 2010 from http://www.cbs.nl/NR/rdonlyres/9295D279-139D-4DAD-AB42-A18740BF8C50/0/pb01n022.pdf

Centraal Bureau voor de Statistiek (2010). *Huwelijksontbindingen; door echtscheiding en door overlijden.* Retrieved 28 June, 2010 from http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=37425ned&D1=a&D2=0,10,20,30,40,50,(l-1)-l&HD=100628-1608&HDR=G1&STB=T

Chartrand, T. L. & Bargh, A. B. (1999). The chameleon effect: The perception-behavior link and social interaction. *Journal of Personality and Social Psychology, 76,* 893-910.

Darling, N. & Cumsille, P. (2003). Theory, measurement, and methods in the study of family influences on adolescent smoking. *Addiction, 98,* 21-36.

De Leeuw, R. N. H., Scholte, R. H. J., Harakeh, Z., Leeuwe, J. F. J. van & Engels, R. C. M. E. (2008). Parental smoking-specific communication, adolescents' smoking behavior and friendship selection. *Youth Adolescence, 37,* 1229-1241.

De Vries, H., Candel, M., Engels, R. & Mercken, L. (2006). Challenges to the peer influence paradigm: results for 12-13 year olds from six European countries from the European Smoking Prevention Framework Approach study. *Tobacco Control, 15,* 83-89.

Den Exter Blokland, A. W. (2006). *Adolescent smoking and parenting: Associations between smoking related parental behaviors and adolescent smoking.* Retrieved December 16, 2009 from http://igitur-archive.library.uu.nl.proxy.library.uu.nl/ dissertations/2006-1212-201505/full.pdf

Engels, R. C. M. E., Den Exter Blokland, E., Kemp, R. D., & Scholte, R. H. J. (2004). Invloed en selectieprocessen in vriendschappen en rookgedrag van adolescenten: Waarom ouders moeten stoppen met roken! *Pedagogiek, 24,* 83-97.

Friedman, L. S., Lichtenstein, E. & Biglan, A. (1985). Smoking onset among teens: An empirical analysis of initial situations. *Addictive Behaviors, 10,* 1-13.

Kandel, D. B. & Wu, P. (1995). The contributions of mothers and fathers to the intergenerarional transmission of cigarette smoking in adolescence. *Journal of Research on Adolescence, 5,* 225-252.

Kniskern, J., Biglan, A., Lichtenstein, E., Ary, D & Bavry, J. (1983). Peer modeling effects in the smoking behavior of teenagers. *Addictive Behaviors, 8,* 129-132.

Kobus, K. (2003). Peers and adolescent smoking. *Addiction, 98,* 37-55.

Lakin, J. L., Jefferis, V. E., Cheng, C. M. & Chartrand, T. L. (2003). The chameleon effect as social glue: Evidence for the evolutionary significance of nonconcious mimicry. *Journal of Nonverbal Behavior, 27,* 145-161.

Mercken, L., Candel, M., Willems, P. & De Vries, H. (2009). Social influence and selection effects in the context of smoking behavior: Changes during early and mid adolescence. *Health Psychology, 28,* 73-82.

Michell, L. & West, P. (1996). Peer pressure to smoke: The meaning depends on the method. *Health Education Research, 11,* 39-49.

Miller, P. M., Frederiksen, L. W. & Hosford, R. L. (1979). Social interaction and smoking topography in heavy and light smokers. *Addictive Behaviors, 4,* 147-153.

Nijdam, A. D. (2003). *Statistiek in onderzoek: 1 Beschrijvende technieken.* Groningen: Wolters Noordhoff.

Richter, M. & Lampert, T. (2008). Embodied inequalities: the role of multiple measures of socioeconomic position for adolescent health behaviour. *Zeitschrift fur soziologie der erziehung und sozialisation, 28,*174-190.

Richter, M. & Leppin, A. (1997). Socioeconomic inequalities in health. Trends in socio

economic differences in tobacco smoking among German schoolchildren. *European Journal of Public Health, 17*, 565-571

Scragg, R., Reeder, A. I., Wong, G., Glover, M. & Nosa, V. (2008). Attachment to parents, parental tobacco smoking and smoking among year 10 students in the 2005 New Zealand national survey. *Australian and New Zealand Journal of Public Health, 32*, 348-353.

Sinefuma (n.d.). *Veelgestelde vragen.* Retrieved February 27th, 2010 from http://www.sinefuma.com/index.php?lang=nl

Stanton, W. R. & McGee, R. (1996). Adolescents' promotion of nonsmoking and smoking. *Addictive Behaviors, 21,* 47-56.

Stivoro (2001). *Stivoro Jaarverslag 2001*. Retrieved January 23rd, 2010 from http://www.stivoro.nl/Upload/sterftedoorroken_2000.pdf

Stivoro (2009). *Roken Jeugd Monitor*. Retrieved January 23rd, 2010 from http://customers.tns-nipo.com/stivoro/jongeren_start.asp

Urberg, K. A., Degirmencioglu, S. M. & Pilgrim, C. (1997). Close friend and group influence on adolescent smoking and alcohol use. *Developmental Psychology, 33*, 834-844.

Urberg, K. A., Shyu, S. J. & Liang, J. (1990) Peer influence in adolescent cigarette smoking. *Addictive Behaviors*, 15, 247–255.