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Tobacco marketing and susceptibility to smoking: Cross-sectional survey of Polish children

Marketing wyrobów tytoniowych i podatność na palenie: przekrojowe badanie dotyczące polskich dzieci

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None declared.

Susceptibility to smoking has been identified as predictor of smoking onset in adolescence. Aim of the study was to investigate whether receptivity to tobacco marketing, for which a link to adolescent smoking already could be shown in the past, was also associated with susceptibility to smoking. A cross-sectional survey of 1,478 Polish students who reported having never smoked was conducted. Mean age was 10.1 years and about 53.3% were female. Overall, 84 (5.7%) students were classified as susceptible to smoking, and 33 (2.3%) were considered as receptive to tobacco marketing, operationalised by asking students to name a brand of their favourite cigarette advertisement. Crude logistic regression analyses as well as logistic regression analyses adjusting for socio-demographic characteristics, personality characteristics, factors of social influence and smoking-related cognitions revealed a positive association between receptivity to tobacco marketing and susceptibility to smoking (adjusted odds ratio=3.49 [95% confidence interval: 1.28-9.46], p=0.014). In conclusion, this study revealed that receptivity to tobacco marketing increases susceptibility to smoking. Results provide support for the almost comprehensive ban of tobacco marketing as existing in Poland and recommend its further expansion towards a total ban including e.g. ban of promotion at point of sale.

Podatność na palenie zostało zidentyfikowane jako czynnik ryzyka wystąpienia palenia w okresie dojrzewania.

Celem pracy było wykazanie, że otwartość na marketing wyrobów tytoniowych, którego powiązanie z paleniem w okresie dojrzewania wcześniej zostało zobrazowane, była także powiązana z podatnością na palenie.

Przeprowadzono przekrojowe badanie dotyczące 1478 polskich dzieci, które zadeklarowały, że nigdy nie paliły. Średnia wieku wynosiła 10,1 roku, a 53,3% stanowiły dziewczęta.

W sumie, 84 (5,7%) dzieci zostało zakwalifikowanych jako podatne na palenie, a 33 (2,3%) zostały zakwalifikowane jako podatne na marketing wyrobów tytoniowych na podstawie pytania o markę wyrobu w ulubionej reklamie papierosów. Analiza prostej regresji logistycznej, jak również regresji logistycznej po uwzględnieniu cech społeczno-demograficznych, cechy osobowości, czynników wpływu społecznego i okoliczności związanych z paleniem papierosów wykazały pozytywny związek pomiędzy otwartością na marketing wyrobów tytoniowych a podatnością na palenie (skorygowany iloraz szans=3,49 [95% przedział ufności: 1,28-9,46], p=0,014). Badanie wykazało, że otwartość na marketing wyrobów tytoniowych zwiększa podatność dzieci na palenie tytoniu. Wyniki stanowią potwierdzenie słuszności zakazu reklamowania wyrobów tytoniowych jaki obowiązuje w Polsce i mogą stanowić argument we wprowadzeniu zakazu promocji wyrobów tytoniowych również w miejscu sprzedaży.

Introduction

The detrimental impact of smoking on health such as the development of cardiovascular and lung diseases and several types of cancer is well-known [3,10]. Tobacco usually is one of the first psychotropic substances adolescents experiment with. It could be shown that even infrequent smoking of cigarettes in adolescence raises the risk to maintain the behaviour into adulthood [1]. Therefore, prevention of smoking onset in adolescence is a major goal to reduce smoking-related harm.

One promising strategy to prevent smoking initiation among adolescents is to decrease their susceptibility to smoking. Cognitive susceptibility to smoking, defined as lack of firm commitment not to smoke cigarettes in the future or when offered by friends, has been proven as predictor for

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smoking onset in adolescence [8,13,17]. Besides others, Huang and colleagues [7] could show that adolescents being identified as susceptible to smoking were two to three times more likely to initiate smoking within an observed period of two years than their non-susceptible peers. What is of more practical importance, there is also evidence that susceptibility to smoking might be responsive to interventions. Findings of Meschack and colleagues [12] indicated effectiveness of media campaigns and community-based programs in reducing susceptibility to smoking among sixth grade students. However, to develop interventions effective in targeting susceptibility to smoking it would be helpful to improve understanding of factors which influence susceptibility. Results of studies addressing this issue indicate that besides socioeconomic factors such as gender and ethnicity especially factors of social influence such as peer smoking are associated with increased susceptibility to smoking [5,19].

Another factor of social influence which might be related with susceptibility to smoking is tobacco marketing. One well-validated measure of tobacco marketing is receptivity to it. Receptivity to tobacco marketing indicates the extent of adolescent's exposure, attention and cognitive or affective response to tobacco marketing messages and is operationalised, among other things, by asking adolescents if they could name the brand of their favourite cigarette advertisement [2,11]. However, whereas receptivity to tobacco marketing could be linked to adolescent smoking in a variety of cross-sectional and longitudinal studies [4,14,15], it's association with susceptibility to smoking has hardly been investigated.

Since 1995, Poland, where the present study was conducted, has banned tobacco marketing almost completely from all types of communication channels ranging from television, radio and internet over print media such as magazines and newspapers to outdoor advertising on billboards (see http://www.tobaccocontrollaws.org). However, ban of tobacco marketing does not include international broadcast media, international newspapers and magazines and websites hosted on foreign servers. Tobacco advertising at point of sale, through internet product sales and product packaging as well as sponsorship of events is still allowed.

Aim of the study is to investigate the extent of receptivity to tobacco marketing and its link to cognitive susceptibility to smoking among never smokers in a sample of Polish children. Results of the study could provide useful information for the development of preventive means to decrease susceptibility to smoking and risk of smoking onset in adolescence.

Methods

Design

In October/November 2007, a cross-sectional survey of fourth-grade students of public primary schools in the Polish region Wielkopolska was conducted. Data was gathered from anonymous written surveys. The study was a cooperative collaboration between the Poznan University of Medical Sciences, Poland, and the Institute for Therapy and Health Research (IFT-Nord), Germany. Ethical approval for the study was provided by the Bioethical Committee at the University of Medical Sciences in Poznan. Analysis of the present study based solely on the subgroup of students reporting never having smoked in their lifetime.

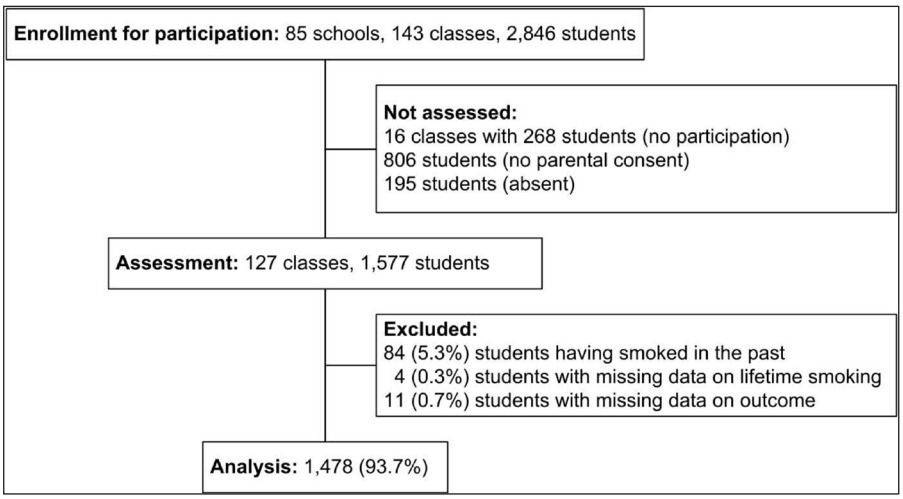

Figure 1
Participation flowchart.
Schemat uczestnictwa.

Sample recruitment and description

At the beginning of the school year 2007/08 all public primary schools in the Polish region Wielkopolska listed in the database of the Educational Authority were invited to participate in the study. For this purpose a letter explaining the content and design of the study was sent to the headmasters. All schools which decided to participate were included in the study.

A total of 85 schools with 143 classes and 2,846 students agreed to take part in the study of which 127 classes with 1,577 students took part in the survey (see Figure 1). Out of these, N=84 (5.3%) students were excluded due to reporting having smoked in the past, N=4 (0.3%) because of missing information on prior smoking experience and N=11 (0.7%) due to missing data on the outcome resulting in an analysis sample of N=1,478 (93.7%) students. Students were about 10.1 years old (SD = 0.35) and about 53.3% (n=788) were female.

Measures

All data was collected through self-completed anonymous questionnaires by students. Primary outcome of the study was susceptibility to smoking [13]. Students were asked if they are thinking about trying cigarettes soon with the response categories "Yes" and "No", and if they would try a cigarette offered by a friend with the response categories "Definitely yes", "Probably yes", "Probably no" and "Definitely no". All students answering the question "Are you thinking about trying cigarettes soon?" with "Yes" or the question "If one of your friends offered you a cigarette, would you try it?" with "Definitely yes", "Probably yes" or "Probably no" were categorised as susceptible to smoking [13]. The independent variable, receptivity to tobacco marketing, was operationalised by the question "What is the name of the cigarette brand from your favourite cigarette advertising? (If you don't have favourite cigarette advertising, write down the word "none".)" Students providing a tobacco brand to this question were considered receptive to tobacco marketing. Besides age and gender, analysis was adjusted for the following covariates: sensation seeking/rebelliousness [6], smoking by parents, siblings, peers and teachers, perceived prevalence of peer and adult smoking, attitude towards smoking and smoking-related knowledge. The assessment and modelling of the covariates are described in more detail in Table I.

Assessment Procedure

Data was assessed in class by trained staff of the Poznan University of Medical Sciences. Students were surveyed anonymously, i. e. no personal data was collected. Only students with written parental permission (active consent) took part in the survey. Participation in the survey was voluntary.

Analysis

Association between receptivity to tobacco marketing and susceptibility to smoking was examined stepwise by using logistic regressions. First, the crude association between both variables was tested. In a second step, to determine whether association between receptivity to tobacco marketing and susceptibility to smoking remained of statistical importance after controlling for other factors potentially related to the outcome, analysis was repeated with all covariates entered into the regression model. As measure of strength of the association, odds ratios (ORs) together with 95% confidence intervals (95% CI) were reported.

To reduce bias due to the rarity of the investigated outcome, i. e. being susceptible to smoking, in all analyses penalised likelihood, also called Firth method, was chosen as estimation method [9]. Additionally, to test whether results were biased due to the unequal distribution of students considered as receptive to tobacco marketing or not, a sensitivity analysis was conducted, that is, the adjusted analyses were repeated five times with equalised numbers of students in both conditions. For each of these analyses,

Table I
Covariates and their assessment.
Zmienne i ich ocena.

Variable	Survey question	Response categories
Age (dichotomised < 11 years vs. ≥ 11)	How old are you?	_ _ years old
Gender (girls coded 0, boys coded 1)	Are you a boy or a girl?	boy/girl
Sensation seeking/ rebelliousness (16 item index, range 1-4) Cronbach's alpha=.78	I get into trouble at school. I argue a lot with other kids. I do things my parents don't want me to do. I do what the teachers tell me to do. I sometimes take things that don't belong to me. I argue with my teachers. I like to break the rules. I like to do scary things. I get bored being with the same friends all the time. I like to do dangerous things. I often think there is nothing to do. I like to listen to loud music. I try to resist rules and regulations. I like it when I can contradict others. When I am told not to do something, I want to do it even more. I become frustrated when I am not allowed to make my own decisions.	Not like that Sort of like that A lot like that Just like that
Parent smoking (yes if either parent smokes; no (coded 0) vs. yes (coded 1))	Does your mother smoke? Does your father smoke?	Yes/no/I don't know (coded no)
Sibling smoking (no (coded 0) vs. yes (coded 1))	Does at least one of your brothers and sisters smoke?	Yes/no/I don't know (coded no)/I don't have any brothers or sisters (coded no)
Friends smoking (dichotomised: none (coded 0) vs. at least some (coded 1)	How many of your friends smoke?	None/some/most/all
Teachers smoking (dichotomised: none (coded 0) vs. at least some (coded 1)	How many teachers from your school smoke?	None/some/most/all
Perceived prevalence of peer smoking (dichotomised: definitely/probably yes (coded 1) vs. probably/definitely no (coded 0)	Do you think that most adolescents smoke?	Definitely yes Probably yes Probably no Definitely no
Perceived prevalence of adult smoking (dichotomised: definitely/probably yes (coded 1) vs. probably/definitely no (coded 0)	Do you think that most adults smoke?	Definitely yes Probably yes Probably no Definitely no
Attitude towards smoking (5 item index, range 1-4) Cronbach's alpha=.89	I think I would have a great fun. I think smoking would help me handle my problems or stress. I think smoking would help me being slim. I think smoking would be relaxing. I think I would be cool if I smoke.	I fully agree I agree I don't agree I don't agree at all
Smoking-related knowledge (6 items, percentage of correct answers)	Nicotine is the substance in cigarettes that makes one get addicted. Cigarette smoke contains more than 70 substances that can cause cancer. In Poland about 65 out of 100 teenagers are smokers. Second-hand smoking does not lead to diseases like lung cancer or heart attacks. Tobacco industry adds substances to tobacco like ammonia so that the smokers become addicted more quickly.	Right/Wrong/I don't know (coded wrong)

a subsample of 200 students not having a favourite cigarette advertisement was randomly drawn to be compared with the students having a favourite cigarette advertisement regarding susceptibility to smoking. All analyses were performed with Stata [16]. Logistic regressions were conducted using the Stata command "firthlogit".

Results

A total of 84 (5.7%) students could be classified as susceptible to smoking. Among them, 10.7% (N=9) reported having a favourite cigarette advertisement compared to 1.7% (N=24) within the group of their nonsusceptible peers. Overall, 33 (2.3%) students named a cigarette brand from their favourite cigarette advertisement.

A positive association between receptivity to tobacco marketing and susceptibility to smoking could be found (see Table II). The association proved to be significant in the unadjusted regression model (OR=7.04 [95% CI: 3.21-15.42], p<0.001) as well as in the regression model adjusted for socio-demographic characteristics, personality characteristics, factors of social influence and smoking-related cognitions (OR=3.49 [95% CI: 1.28-9.46], p=0.014). Students who were considered as receptive to tobacco marketing had a greater likelihood of also being susceptible to smoking than students not being receptive to tobacco marketing.

In four (80%) of the five repetitions no differences in the results on the association between receptivity to tobacco marketing and susceptibility to smoking could be found with odds ratios varying from OR=4.41 ([95% CI: 1.04-18.59], p=0.043) to OR=8.89 ([95% CI: 2.15-36.62], p=0.002). In only one analysis the association got insignificant (OR=2.96 [95% CI: 0.91-9.51], p=0.069).

Discussion

Aim of this study was to investigate the extent to which never smokers are receptive to tobacco marketing and whether receptivity to tobacco marketing was associated

Table II

Association between having a favourite advertisement and susceptibility to smoking – Results of unadjusted and adjusted analyses.

Związek pomiędzy posiadaniem ulubionej reklamy i podatnością na palenie – wyrównane i niewyrównane wyniki analiz.

	Unadjusted OR	95% CI	Adjusted OR	95% CI
Independent variable				
Receptivity to tobacco marketing	**7.04**	**3.21-15.42**	**3.49**	**1.28-9.46**
Covariates				
Age			1.72	0.90-3.27
Gender			1.05	0.62-1.76
Sensation seeking/ rebelliousness			**2.66**	**1.51-4.67**
Parent smoking			1.24	0.73-2.10
Sibling smoking			0.70	0.30-1.59
Friends smoking			1.49	0.83-2.66
Teachers smoking			0.79	0.47-1.32
Perceived prevalence of peer smoking			1.91	0.97-3.77
Perceived prevalence of adult smoking			0.80	0.34-1.87
Attitude towards smoking			**0.46**	**0.30-0.69**
Smoking-related knowledge			1.16	0.69-1.92

Note. OR odds ratio, CI Confidence interval, adjusted association is adjusted for all variables given in the table, significant results are in bold print.

with cognitive susceptibility to smoking, an identified risk factor for smoking onset in adolescence, within a sample of Polish students.

Considering the young age of the sample and the restrictive bans on tobacco marketing in Poland, it is not surprising that only a minority of students (2.3%) named a brand of their favourite cigarette advertisement. As a comparison: Pierce and colleagues [14] reported a proportion of 56.5% of nonsusceptible never smokers having a favourite cigarette advertising. However, results of that study based on a survey of somewhat older US-American adolescents already conducted in 1993, in a time when tobacco marketing did not experience much restriction. In a more recent study in Germany, 16.8% of the surveyed adolescents (never and ever smokers combined) reported the brand for a favourite cigarette advertisement [15]. Besides the older age of the sample and the combined consideration of adolescents already having smoked in their lifetime or not, especially differences in existing regulations of tobacco marketing between Germany and Poland may be responsible for the found deviation in proportions of students having a favourite cigarette advertisement. In contrast to Poland, advertising on billboards and in cinemas is still allowed in Germany. Therefore, results of the present study provide evidence for the usefulness of comprehensive bans on tobacco marketing to protect children and adolescents against it's influences.

Analyses of this study revealed a significant association between receptivity to tobacco marketing and cognitive susceptibility to smoking among never smokers. Students having a favourite cigarette advertisement seem to be more susceptible to smoking than their unreceptive peers. Even after adjusting for other potential factors of influence on susceptibility to smoking as sibling and friends smoking [19], the association remained significant.

One of the most important limitations of this study which should be noted is the cross-sectional design. Cross-sectional data do not provide information on the temporal sequence of events, that is, no statement can be made whether higher receptivity to tobacco marketing precedes higher susceptibility to smoking or if students being susceptible to smoking pay more attention to tobacco marketing and, therefore, respond to it to a higher extent. Further limitations of the study are the rarity of the investigated outcome and the unequal distribution of students having a favourite cigarette advertising or not. To take into account the first, analyses were adapted by choosing an estimation method not suffering from small-sample bias. Concerning the unequal distribution of students having a favourite cigarette advertising or not, adjusted analyses were repeated five times with more equalised numbers of students in both conditions. In four of the five repetitions, the association between receptivity to tobacco marketing and susceptibility to smoking was significant. Results of the sensitivity analysis made it appear unlikely that the findings of this study were biased due to the unequal distribution of students considered as receptive of tobacco marketing or not.

In summary, this study provides evidence of an association between receptivity to tobacco marketing and susceptibility to smoking among never smokers. Though further research is needed to confirm the found association, findings of this study highlight the importance of tobacco marketing and the influence of its messages to be addressed in preventive efforts targeting at the reduction of susceptibility.

Poland has ratified the WHO Framework Convention on Tobacco Control (FCTC) in 2006. One of the key recommendations of the WHO FCTC to prevent smoking-related harm is a comprehensive ban of all tobacco advertising, promotion and sponsorship [20]. Poland had started to ban tobacco marketing from almost all communication channels already prior to 2006 (see http://www.tobaccocontrollaws.org). The effectiveness of these efforts is reflected by the small proportion of students having a favourite cigarette advertisement found in this study. The proportion appears substantially smaller than the one found in previous US-American studies, when WHO FCTC guidelines have not been established yet, and recent studies conducted in Germany, which also has ratified the WHO FCTC but where tobacco marketing is still permitted via a variety of communication channels. However, due to the found association between having a favourite cigarette advertisement and being susceptible to smoking, results also plead for strengthening and expanding the existing regulations on tobacco marketing in Poland. One further possibility would be the introduction of a ban on promoting tobacco products at point of sale, which is also demanded by the FCTC [20]. The adverse effects of tobacco marketing at point of sale on youth are well documented [18].

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