

The average age of smoking onset in Germany – trends and correlates

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Summary

Objectives: Germany is rated among the countries with the highest prevalence of tobacco use in Europe. This paper analyzes whether the age of smoking onset has decreased in recent years.

Methods: Multivariable event data analyses were performed on the basis of the representative national cross-sectional study “Drug Affinity among Young People in the Federal Republic of Germany 2004”. The survey involved a total net sample of 3032 individuals aged 12 to 25.

Results: Socioeconomic groups starting to smoke at significantly earlier age include those from the economically deprived areas in eastern Germany, low educational achievers and subjects in households with adult smokers.

Conclusions: The average age of smoking onset has decreased further in the 1978–1992 birth cohorts.

Key words: Adolescence – Average age of starting to smoke – Cigarette smoking – Cohort analysis – Initiation – Onset age.

To prevent children and adolescents from ever smoking is a public health task of utmost priority¹. Although the age of smoking onset is a key parameter for an individual – often life-long – smoking biography, investigation of this variable has been marginal to date in Germany and other countries². In Germany only two analyses of the initiation of smoking have been conducted^{2,3,4}. Up to now no such analysis exists for the post-1980 age cohorts in Germany.

The objective of this study is therefore to describe the initiation process of smoking in German adolescents and to identify the impacting social factors.

Methods and population studied

Sample design

The database for this paper was a representative cross-sectional survey entitled “Drug Affinity of Young People in the Federal Republic of Germany 2004”. The survey was conducted in 2004 on behalf of Federal Centre for Health Education, Cologne, and involved a total net sample of 3 032 individuals aged 12 to 25 with an address in Germany⁵. Randomized samples of computer-generated telephone numbers were combined with a random selection of individuals in the chosen households. The survey consisted of computer-assisted telephone interviews (CATI). Representative weighting of sample size was applied. An extensive report of the sampling and interviewing methods is given in Federal Centre for Health Education BzGA⁵. This dataset was provided to the authors by the Federal Centre for Health Education as part of a cooperative project.

Operationalization of dependent variables

Documentation of current cigarette smoking status: All respondents were asked whether they would rate themselves as “habitual smokers”, “occasional smokers” or “non-smokers”. A self rating as “habitual smoker” and “occasional smoker” was defined as current smoking.

Documentation of current tobacco consumption: The current amount of tobacco consumed (unit: cigarettes per day) was derived from replies to the question “How many cigarettes do you smoke per day, on average?” and calculated as the median due to non normal distribution of the values.

Documentation of “ever smoked” and onset age: Respondents were also asked how old they were when they had their first smoke (discrete in whole years). The interval-scaled onset age was adjusted on the basis of the formula “onset age_{continuous} = onset age_{discrete} +0.5”.

Operationalization of independent variables

Age at the time of the survey was calculated as an interval-scaled variable from the difference between the interview date and the date of birth. To differentiate between age effects and cohort effects, three five-year cohorts were generated additionally. The size of the location of residence was classified as cities and large cities (place of residence $\geq 100\,000$ inhabitants) versus midsize and small centers (places of residence $< 100\,000$ inhabitants) based on the official community size categories for Germany. Persons with a current address in the western federal states (the former West Germany) were compared with persons with an address in the eastern federal states (the former East Germany). The respondents’ educational status was defined – on the basis of the three typical German qualifications after 9, 10 and 13 years of schooling (“Hauptschulabschluss”, “Mittlere Reife”, “Allgemeine Hochschulreife”), respectively – as “low”, “average” and “high” educational level. In the case of young people still attending school, the intended level of education was used for analysis. All other study subjects were defined as their highest level of education achieved. With regard to parental educational level, a high level of education was assumed for parents who had achieved graduation enabling them to enter a university, which involves 13 years of schooling in Germany. Full datasets were available from $n = 2\,332$ respondents, including $n = 826$ from the cohorts 1978–1982, $n = 889$ from the cohorts 1983–1987, and $n = 617$ from the cohorts 1988–1992.

Statistical analyses

An appropriate analysis of the smoking onset process should describe whether the investigated cohort actually starts smoking at all and if so, describe the age of onset. Event data analysis is the statistical tool of choice to address both these issues within one mathematical model. It is also a suitable method for decent differentiation and description of cohort influences. Therefore, the continuous onset age is used as “non-censored survival time” in subjects who ever smoked whereas the age at the time of interview is used as “censored survival time” in subjects who never smoked. The statistical models chosen for nonparametric representation of the survivor function were the life table method and Cox’s semiparametric proportional hazards model, which additionally offers the inclusion of covariables⁶. Transition to the “ever smoked” state is modeled

on the basis of a baseline hazard rate $\lambda_0(t)$ and covariables are taken up in log linear form $\exp(x'\beta)$ in the model

$$\lambda(t | x) = \lambda_0(t) \exp(x'\beta)$$

The coefficients are then converted into percent effects⁶ using the formula

$$\zeta_{\Delta x_i} = (\exp(\beta_i)^{\Delta x_i} - 1) \cdot 100\%$$

The defined level of significance was $p < 0.05$. All analyses were performed using SPSS for Windows, Version 14.0 (SPSS Inc. Chicago, IL, 60606, USA).

Results

Twenty five percent of the boys and sixteen percent of the girls aged 12 said to have ever smoked cigarettes. In the German 12–25 age group 35.9% of all male and 35.1% of all female adolescents are “current smokers”.

Analysis of the total population investigated reveals that young people normally smoke their first cigarette between the ages of 12 and 16: the mean survival time is commonly used to describe this phenomenon. It is the age at which 50% of all people have had their first smoking experience. The figure is 15.4 years of age for boys and 15.2 for girls.

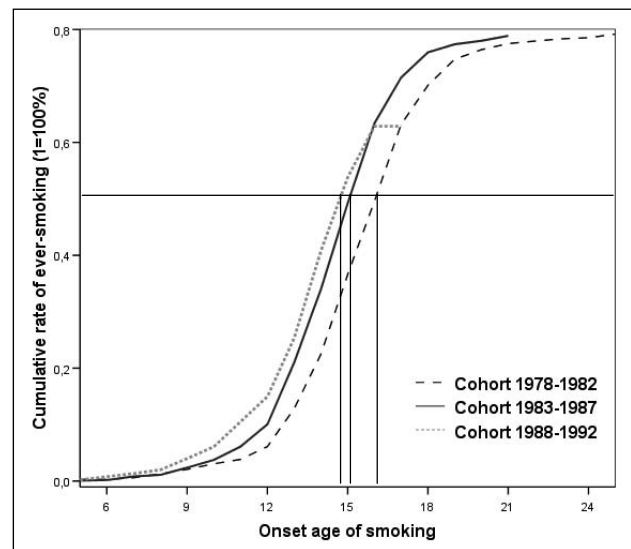


Figure Cumulative rate of smoking onset age in Germany by birth cohorts

Note: Life table analysis. The vertical lines mark the age at which 50% of a cohort first smoked. Test for gender differences by Wilcoxon-Gehan: 1978–1982 vs. 1983–1987: 37.0, $df = 1$, $p < 0.001$; 1983–1987 vs. 1988–1992: 7.7, $df = 1$, $p = 0.006$; 1978–1982 vs. 1988–1992: 62.8, $df = 1$, $p < 0.001$.

A cohort-specific analysis is required to investigate whether the onset process has changed in recent years. Since more in-depth analysis showed no significant difference, both genders are shown jointly in the Figure.

It is obvious that the onset age has continuously declined over the years. Compared to 50 % of those born between 1978 and 1982 have had their first smoke by the age of 16.0, the corresponding cohorts figure as 15.1 for the 1983–1987 and 14.7 for the youngest cohorts (1988–1992). The differences between the three cohorts are significant in every case.

The table presents an analysis of potential factors influencing onset age. The proportional hazards model reveals that the level of education as well as smoking behavior at home play a major role. Hence, a value of “+50 %” for the variable “smokers in the household” leads to an approximately 50 % higher probability of initiation of smoking habit for subjects living in a household with one or more smoking adults (see table). A lower prevalence of smoking among students in higher-level

Table Correlates of smoking initiation for 12 to 25-year-olds in Germany (Cox proportional hazard regressions for onset age)

Correlates	German birth cohorts 1978–1992
	Percent effects (95 % CI)
Woman ^{a)}	-0.2 (+9.4; -10.7)
German nationality ^{b)}	+18.1 (+36.2; -5.2)
Western German ^{c)}	-17.4 (-3.1; -33.6)*
Place of residence ≥ 100,000 inhabitants ^{d)}	-3.3 (+6.9; -14.6)
High educational level for respondent ^{e)}	-44.9 (-23.4; -70.1)***
Average educational level for respondent ^{e)}	-15.3 (+1.5; -35.1)
Smokers in the household ^{f)}	+50.0 ^{k)} (+55.2; +44.2)***
High educational level of father ^{g)}	+3.0 (+14.1; -9.5)
High educational level of mother ^{h)}	+8.8 (+19.5; -3.4)
n ⁱ⁾	2332
Including: never smoked (i. e. censored cases)	750
-2 Log likelihood	22355
Chi square	263***

Notes: CI Confidence interval, *** p < 0.001; * p < 0.05
Model adjusted for birth cohort.

^{a)} Reference category: Man

^{b)} Reference category: Other nationality

^{c)} Reference category: Eastern German

^{d)} Reference category: Place of residence < 100,000 inhabitants

^{e)} Reference category: Low educational level for respondent

^{f)} Reference category: No smokers in household

^{g)} Reference category: Average or low educational level for father

^{h)} Reference category: Average or low educational level for mother

ⁱ⁾ Unweighted sample size

^{k)} Reading assistance: Hence, a value of “+ 50 %” for the variable “smokers in the household” means an approximately 50 % higher probability of initiation of smoking for subjects living in a household with one or more adult smokers

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schools indicates a socioeconomic gradient in the onset of smoking in general.

Discussion

Statement of principal findings

The only two German cohort studies dealing with the issue of starting to smoke relate to birth cohorts before 1980. Their major finding was the steady equalization of gender difference in smoking prevalence since the middle of the last century. Secondly, the age of smoking onset continued to decline^{2,4,7}. The study presented here extends the window of surveillance to include the 1980–1992 birth cohorts. It concludes that both trends of the former studies are proceeding unabated among children and adolescents. Girls are just as likely to smoke as their male peers whereas the onset age is continuing to decline significantly regardless of gender.

Limitations of the study

The method report of the Federal Centre for Health Education Bzga⁵ did not provide information about the participation rate (neither in general nor for different subgroups). Also, the forsa GmbH, Berlin, did not handover these types of data to the authors. Therefore, a possible sample selection bias could not be estimated^{3,8}.

Relation to other studies

The increased smoking prevalence and younger age of smoking onset among German adolescents reported in this paper agree with the results of the two preceding German studies, the National Children and Youth Health Survey, and the German part of the international study Health Behaviour in School-aged Children (HBSC)^{9,10}.

It is particularly worrisome to note that young women are now displaying smoking prevalences similar to their male peers. They differ in this respect from the over-25 German population, in which smoking is still more prevalent in males of all ages¹¹. Over the past number of years girls are citing weight control (among other reasons) as an increasingly more important incentive to start smoking¹². Schoolgirls trying to lose weight or stay slim at ages 11 and 12, therefore, become persistent habitual smokers significantly more likely¹³. In parallel young women have become an attractive target group for the tobacco industry. Over the past number of years, it has increasingly promoted smoking in this target population by portraying smoking as sporty, emancipated, and youthful¹⁴. Both weight loss and advertisements may have contributed to girls keeping up with the early smoking onset of boys.

Our data also prove that socially underprivileged young people assessed as the type of school attended start to smoke earlier. In parallel, a higher smoking prevalence among students at schools leading to lower educational levels is well documented in Germany and on an international scale^{10, 12, 15}.

A closer look at recurrent regional disparities also appears interesting: Among adult Germans, smoking prevalences in Western and Eastern federal states equalized in recent years¹¹. This process was mainly rooted in a marked decline of smoking prevalences among men in the Eastern federal states¹⁶.

Our data suggests that the parental level of education alone has less impact in terms of our explanandum than whether parents (or other members of the household) actually smoke or not. This conclusion is supported by comparable international studies¹². The direct impact of smoking behavior of family members on smoking onset is well described¹⁷: The social learning theory (i. e. the “nonsmoking parents model”¹²) is significant, as are restrictive parental expectations and the normative articulation of prohibition of smoking inside and outside the home¹⁷. Another factor not to be underestimated is the availability of cigarettes in a household of smokers¹².

Open questions and future research

Little is known about a possible correlation between the decline in smoking onset age and increasingly early puberty. This phenomenon has become more apparent in the past

number of decades¹⁸. Adolescence is an important developmental period. It is often associated with emotional and behavioral problems¹⁹. In this context, smoking may serve as a coping response (albeit inappropriate) to the typical allostatic load.

Future epidemiological research should monitor trends in smoking onset in addition to standard documentation of smoking prevalences, given that early onset of smoking per se is a particular increased health risk. Starting to smoke while growing up has lasting adverse effects on ongoing organic development, and ensuing health problems that tend to be of earlier onset and greater severity²⁰.

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Zusammenfassung

Ziele: Die Bundesrepublik Deutschland gehört zu denjenigen europäischen Staaten mit den höchsten Rauchprävalenzen. Diese Analyse untersucht, ob das Einstiegsalter deutscher Jugendlicher in den letzten Jahren weiter zurückgegangen ist.

Methoden: Auf Basis der repräsentativen nationalen Querschnittsstudie „Die Drogenaffinität Jugendlicher in der Bundesrepublik Deutschland 2004“ wurden multivariable Ereignisdatenanalysen durchgeführt. Der Datensatz umfasste

eine Netto-Stichprobe von insgesamt 3032 Personen im Alter zwischen 12 und 25 Jahren.

Ergebnisse: Jugendliche aus dem ökonomisch schlechter gestellten Ostdeutschland, aus unteren Bildungsschichten und aus Raucherhaushalten beginnen signifikant früher mit dem Rauchen.

Schlussfolgerungen: Für die Geburtskohorten 1978–1992 hat sich das Durchschnittsalter von Rauchanfängern weiter verringert.

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