

## ORIGINAL ARTICLE

# Smoking and Passive Smoke Exposure Among Adolescents in Germany

Prevalence, Trends Over Time, and Differences Between Social Groups

Benjamin Kuntz, Thomas Lampert

## SUMMARY

**Background:** Children and adolescents are the most important target group for smoking prevention and non-smoker protection measures (smoke-free legislation). In this article, we discuss trends over time and differences between social groups with regard to smoking and passive smoke exposure among adolescents in Germany.

**Methods:** The data evaluated in this article were collected in two different study periods of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS), namely, 2003–2006 and 2009–2012. Adolescents aged 11 to 17 were asked about their smoking behavior and passive smoke exposure (6812 and 5258 respondents in the two study periods, respectively). Their social status was rated with an index based on information supplied by the adolescents' parents about their level of education, occupation, and income.

**Results:** The prevalence of smoking among adolescents fell in approximately six years from 20.4% to 12.0% ( $p < 0.001$ ), and that of daily smoking from 13.3% to 5.4% ( $p < 0.001$ ). The percentage of non-smokers who spent time several days per week, or every day, in rooms where other persons were smoking declined from 35.1% to 18.8% ( $p < 0.001$ ). The lower the respondents' social status, the more likely they were to smoke daily and to have regular passive exposure to smoking.

**Conclusion:** The findings suggest that the measures implemented in recent years to protect adolescents from the health risks of active and passive smoking have been beneficial independently of the adolescents' social backgrounds.

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Every year, more than 100 000 people in Germany die from the health effects of smoking; about 3300 deaths are attributed to passive smoke exposure (1, 2). Thus, the reduction of smoking in the general population and the protection of non-smokers are primary areas of activity in health and addiction policy (3) and fixed components of both the national health target process (4, 5) and the sustainable development strategy of the German Federal Government (6). Children and adolescents are regarded as the most important target group for smoking prevention (7), since the majority of smokers started their habit before the age of 18 years (8, 9). In addition, early initiation of smoking increases the likelihood of developing nicotine addiction later in life and of an early onset of tobacco-related diseases (10–12).

In recent years, numerous measures have been taken to protect especially children and adolescents from the health risks associated with smoking and passive smoke exposure (13, 14). Prices of cigarettes and other tobacco products have gone up significantly as a result of gradual increases in tobacco tax. The anti-smoking laws of the federal government and the federal states introduced in 2007 prohibit smoking in public buildings and public transport, educational facilities, bars, restaurants, and clubs, among others. On 1 September 2007, an amendment of section 10 of the German Protection of Young Persons Act (Jugendschutzgesetz) came into force, raising the age limit for obtaining and consuming tobacco products in the public from 16 to 18 years. Meanwhile, the compulsory use of age verification technology has made it more difficult for minors to access cigarette vending machines. The legal provisions for tobacco advertising have been tightened up as well. To support these measures, population- and setting-related programs have been extended, including the “rauchfrei” (“smoke-free”) campaign of the German Federal Centre for Health Education (BZgA, Bundeszentrale für gesundheitliche Aufklärung) (15), the nationwide “Be smart—don't start” competition for school groups (13, 16) and the “Aufklärung gegen Tabak” anti-tobacco awareness initiative founded by medical students (17, 18).

Regularly updated reliable data on the current prevalence and trends with regard to smoking and passive smoke exposure are needed to evaluate the effects of

Department of Epidemiology and Health Monitoring, Robert Koch Institute, Berlin: Dr. PH Kuntz, PD Dr. PH Lampert (on behalf of the KiGGS Study Group)

the measures implemented and to facilitate planning of future interventions (14). Data on smoking are provided by the German Health Interview and Examination Survey for Children and Adolescents (KiGGS) of the Robert Koch Institute (7, 19, 20), the representative surveys of the Federal Centre for Health Education (BZgA) (21), the European School Survey Project on Alcohol and Other Drugs (ESPAD) published by the Institute for Therapy Research (IFT, Institut für Therapieforschung) (22) and the Health Behavior in School-aged Children (HBSC) study of the World Health Organization (23). Unlike the other three studies, the KiGGS study also reports data on passive smoke exposure in children and adolescents. Cross-sectional prevalence rates of smoking and passive smoke exposure based on data collected between 2003 and 2006 as part of the KiGGS baseline study have been published in this journal (7).

With more recent data obtained from the first follow-up of the KiGGS study (KiGGS Wave 1), conducted between 2009 and 2012, now being available, the current prevalence and time trends of smoking and passive smoke exposure among young people aged 11 to 17 years can now be reported. Whether any differences with regard to age, sex, and social status are present will be evaluated in the following.

## Methods

KiGGS is part of the Robert Koch Institute's health monitoring program and designed as a combined cross-sectional and longitudinal study. The objectives, key study characteristics, and design of the KiGGS study have been described in detail elsewhere (24–27). KiGGS aims to regularly provide population-based data on the health situation of children and adolescents aged 0 to 17 years living in Germany. While the KiGGS baseline study (2003–2006) comprised interviews, questionnaires, physical examinations, and laboratory analyses, KiGGS Wave 1 (2009–2012) focused on telephone interview-based surveys. The KiGGS baseline study was conducted solely as a cross-sectional study including 17 641 subjects aged 0 to 17 years. The response rate was 66.6%. The persons invited to participate in this study were randomly drawn from the official population registers in a stratified random sample of 167 communities in Germany (25). The KiGGS Wave 1 study population consisted of a new cross-sectional sample of 0 to 6 year olds, randomly selected from the official population registers of the communities included in KiGGS baseline. In addition, the participants of the original study were invited to participate in the new survey. In total, 12 368 children and adolescents aged between 0 and 17 years participated in the study, of these 4455 subjects invited for the first time (response rate 38.8%) and 7913 re-invited subjects (response rate 72.9%) (27).

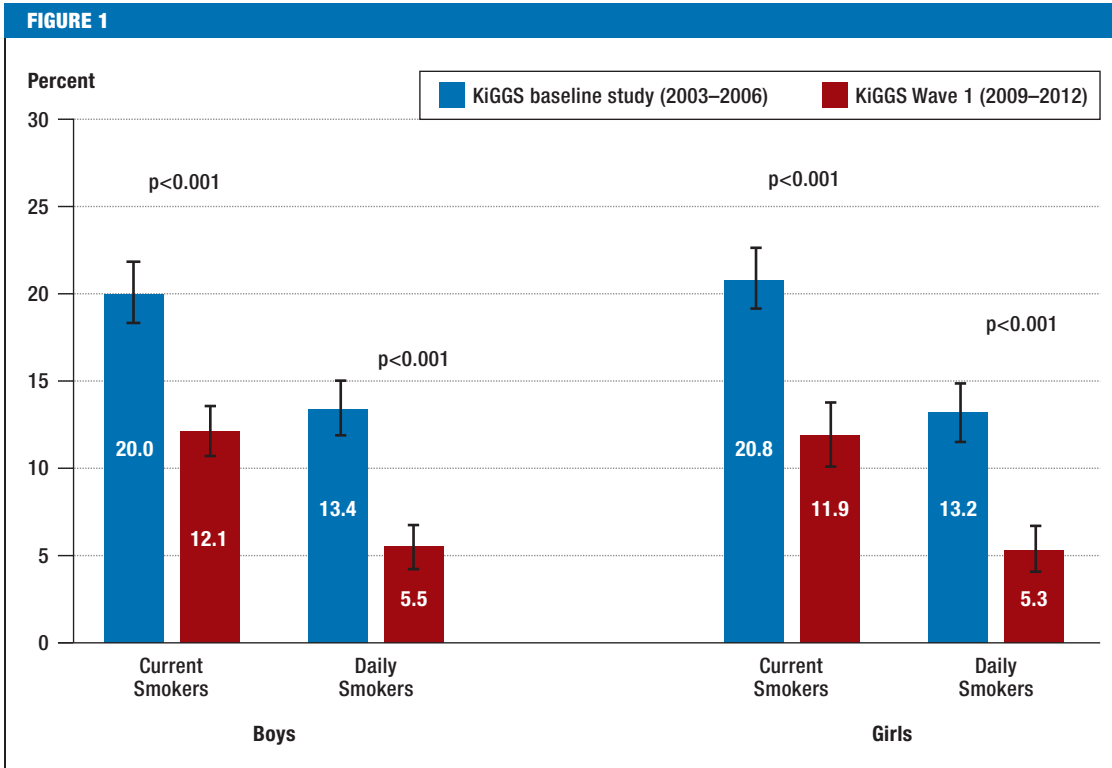
The analyses of data on smoking and passive smoke exposure were limited to the self-reported information provided by young people aged between 11 and 17

years (KiGGS baseline study:  $n = 6812$ , KiGGS Wave 1:  $n = 5258$ ) (eTable 1). Since almost all questions related to smoking and passive smoke exposure asked in KiGGS Wave 1 were identical with those in the KiGGS baseline study, trends over a period of approximately six years could be reported for most of the indicators (7, 19, 20). Smoking habits were assessed using multiple questions, including questions related to current tobacco consumption and smoking intensity (20). Following the initial question "Have you ever smoked?", those who answered in the affirmative were then asked how often they currently smoke (answer categories: "every day", "several times a week", "once a week", "less than once a week", "never"). To identify passive smoke exposure, the adolescents were asked how often they stay in rooms where people are smoking (identical choice of answers). The current smoking habit (i.e. any tobacco consumption, including occasional smoking) and daily smoking as well as the frequency of exposure to passive smoke (at least several times a week = "regularly" and "daily") are addressed in the following. Only non-smoking adolescents were included in the analysis of passive smoke exposure data.

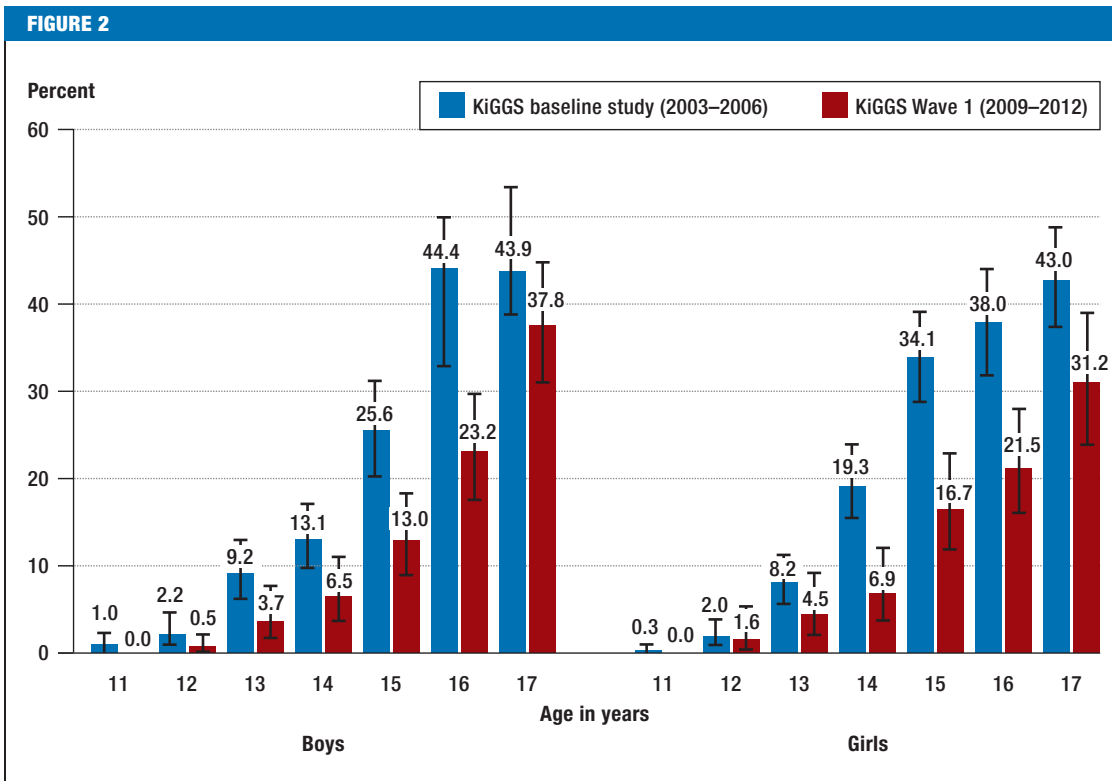
To determine the social status, an index developed at the Robert Koch Institute was used, combining information of the parents about their educational attainment and vocational training, their occupational status, and their income. Based on this information, the respondents were classified as belonging to a low, middle or high status group (28).

In all analyses, a weighting factor was introduced to adjust for any deviation of the study population from the structure of the general population (as of 31 December 2010) with regard to age, sex, region, nationality, type of community, and level of education of the head of household. In addition, the difference in willingness to participate was adjusted for among the former participants of KiGGS baseline by means of weighting (27). Prevalence rates with 95% confidence intervals are reported, taking into account age, sex, and social status differences. In addition, odds ratios (ORs) are reported which were calculated using binary logistic regression analysis. These state by which factor the statistical odds to smoke or be exposed to passive smoke is increased in the low or middle social status group compared with the high status group which is defined as the reference category.

The confidence intervals and p-values were calculated using procedures for complex samples to ensure that both the weighting and the correlation of the participants within a community were taken into consideration. Group differences were tested for significance using the Rao-Scott F adjusted chi-square statistic for complex samples. Differences were regarded as statically significant when the confidence intervals did not overlap or the p-value was less than 0.05. Analyses were performed using the SPSS version 20 software package.



Trends in smoking among 11 to 17 year olds in Germany. Results of the KiGGS baseline study and KiGGS Wave 1 adjusted for the 2009/2010 population structure



Trends in current smoking among 11 to 17 year olds by age and sex. Results of the KiGGS baseline study and KiGGS Wave 1 adjusted for the 2009/2010 population structure

**TABLE 1**

**Trends in smoking among 11 to 17 year olds by social status. Prevalences and age-adjusted ORs (calculated using binary logistic regression) with 95% CI and p-values\***

	Current smokers				Daily smokers			
	KiGGS baseline study (2003–2006)		KiGGS Wave 1 (2009–2012)		KiGGS baseline study (2003–2006)		KiGGS Wave 1 (2009–2012)	
	% (95% CI)	OR (95% CI) p-value	% (95% CI)	OR (95% CI) p-value	% (95% CI)	OR (95% CI) p-value	% (95% CI)	OR (95% CI) p-value
<b>Boys</b>								
Social status								
– low	21.7 (17.5; 26.6)	<b>1.75 (1.17; 2.63)</b> p<0.01	14.8 (10.2; 20.9)	1.31 (0.74; 2.35) p = 0.355	15.4 (11.9; 19.6)	<b>2.21 (1.35; 3.64)</b> p<0.01	8.5 (5.3; 13.4)	<b>2.65 (1.31; 5.36)</b> p<0.01
– middle	19.8 (17.8; 22.1)	1.37 (0.99; 1.89) p = 0.058	11.3 (9.6; 13.3)	1.10 (0.75; 1.62) p = 0.615	13.5 (11.6; 15.7)	<b>1.61 (1.07; 2.42)</b> p<0.05	5.1 (3.9; 6.6)	<b>1.70 (1.01; 2.85)</b> p<0.05
– high	16.2 (13.1; 19.9)	Ref.	10.3 (7.9; 13.2)	Ref.	9.5 (7.1; 12.7)	Ref.	3.1 (2.0; 4.7)	Ref.
<b>Girls</b>								
Social status								
– low	26.1 (21.7; 31.0)	<b>2.86 (1.95; 4.18)</b> p<0.001	13.9 (9.2; 20.5)	1.70 (0.90; 3.22) p = 0.101	19.3 (15.4; 23.9)	<b>5.06 (3.20; 7.99)</b> p<0.001	7.7 (4.7; 12.3)	<b>7.02 (1.87; 26.41)</b> p<0.01
– middle	20.7 (18.4; 23.3)	<b>1.77 (1.33; 2.35)</b> p<0.001	12.3 (10.1; 15.0)	<b>1.64 (1.02; 2.64)</b> p<0.05	12.9 (10.9; 15.1)	<b>2.53 (1.71; 3.73)</b> p<0.001	5.6 (4.0; 7.7)	<b>5.41 (1.54; 19.01)</b> p<0.01
– high	14.1 (11.8; 16.7)	Ref.	7.5 (5.2; 10.5)	Ref.	6.1 (4.5; 8.3)	Ref.	1.0 (0.3; 3.4)	Ref.
<b>Total</b>								
Social status								
– low	23.9 (21.1; 27.0)	<b>2.24 (1.72; 2.92)</b> p<0.001	14.4 (11.1; 18.5)	1.48 (1.00; 2.19) p = 0.052	17.4 (15.0; 20.1)	<b>3.30 (2.38; 4.58)</b> p<0.001	8.1 (5.8; 11.3)	<b>3.71 (2.05; 6.69)</b> p<0.001
– middle	20.3 (18.6; 22.0)	<b>1.55 (1.22; 1.96)</b> p<0.001	11.8 (10.4; 13.4)	1.33 (0.97; 1.82) p = 0.081	13.2 (11.7; 14.9)	<b>1.96 (1.43; 2.69)</b> p<0.001	5.3 (4.3; 6.5)	<b>2.61 (1.57; 4.32)</b> p<0.001
– high	15.2 (13.1; 17.5)	Ref.	8.9 (7.1; 11.1)	Ref.	7.9 (6.2; 9.9)	Ref.	2.1 (1.4; 3.2)	Ref.

\* Results of the KiGGS baseline study and KiGGS Wave 1 adjusted for the 2009/2010 population structure. 95% CI, 95% confidence interval; OR, odds ratio; Ref., reference group. Figures in bold indicate statistically significant results

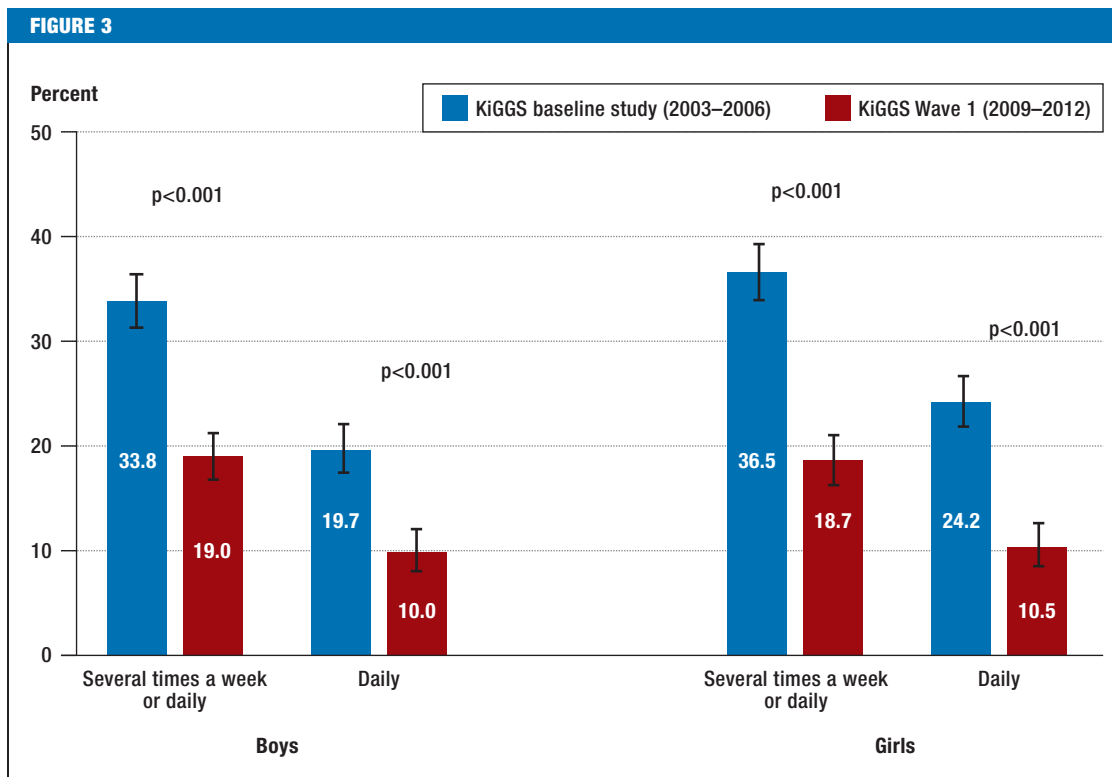
**Results**

According to data from KiGGS Wave 1 (2009–2012), 12.0% of the 11 to 17 year olds in Germany were current smokers; about half of these (5.4%) smoked on a daily basis. No notable sex-specific differences were found in the prevalence of smoking. However, prevalences rise sharply with age. While smokers only account for less than 5% of the 11 to 13 year olds, among the 17 year olds currently about one in three (34.5%) smokes and one in six (17.8%) smokes daily.

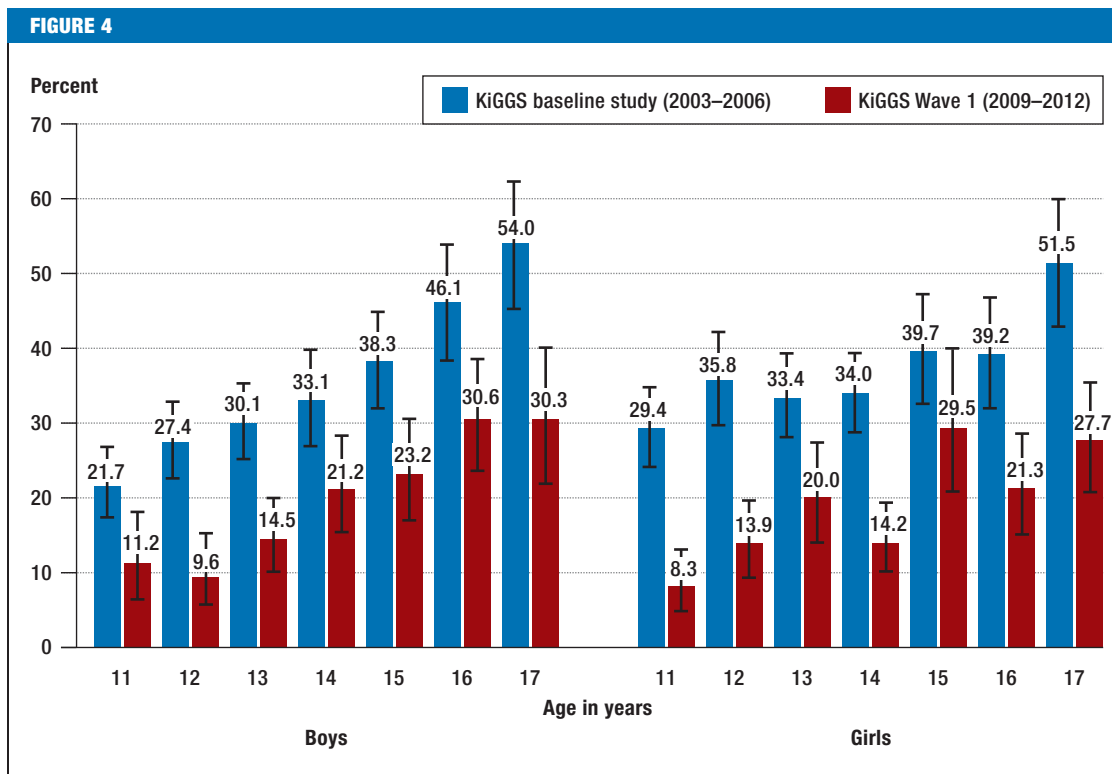
A comparison of the data from the KiGGS baseline study with those from KiGGS Wave 1 reveals that in Germany the number of adolescents who smoke continues to decline. Within a period of approximately six years, the proportion of adolescents currently smoking has dropped from 20.4% to 12.0% (p<0.001). At the same time, the proportion of adolescents smoking daily has dropped by more than a half from 13.3% to 5.4% (p<0.001). This significant reduction in current and daily smoking rates is ob-

served in boys and girls alike (Figure 1); it is noted across the entire age range of the 11 to 17 year olds, in particular among the 14 to 16 year olds (Figure 2, eTable 2).

As shown in Table 1, the prevalences of smoking during the follow-up period declined in all groups of the population, regardless of the adolescents' social backgrounds. In KiGGS Wave 1, the proportion of adolescents with low social status is comparable with that of adolescents with high social status in the KiGGS baseline study. While in the KiGGS baseline study, the risk to currently smoke was still significantly higher for boys and girls in the low social status group compared with that of their peers in the high social status group, these differences between social status groups were no longer statistically significant in KiGGS Wave 1. In contrast, daily smoking was strongly related to the social status of the adolescents in KiGGS Wave 1, too: The lower the social status, the higher the proportion of boys and girls smoking daily.



Trends in passive smoke exposure among 11 to 17 year olds in Germany (non-smoking adolescents only). Results of the KiGGS baseline study and KiGGS Wave 1 adjusted for the 2009/2010 population structure



Trends in regular passive smoke exposure (several times a week or daily) among 11 to 17 year olds by age and sex (non-smoking adolescents only). Results of the KiGGS baseline study and KiGGS Wave 1 adjusted for the 2009/2010 population structure

**TABLE 2**

**Trends in passive smoke exposure among 11 to 17 year olds by social status (non-smoking adolescents only). Prevalences and age-adjusted ORs (calculated using binary logistic regression) with 95% CI and p-values\***

Social status	Passive smoke exposure (several times a week or daily)				Passive smoke exposure (daily)			
	KiGGS baseline study (2003–2006)		KiGGS Wave 1 (2009–2012)		KiGGS baseline study (2003–2006)		KiGGS Wave 1 (2009–2012)	
	% (95% CI)	OR (95% CI) p-value	% (95% CI)	OR (95% CI) p-value	% (95% CI)	OR (95% CI) p-value	% (95% CI)	OR (95% CI) p-value
<b>Boys</b>								
Social status								
– low	43.0 (36.8; 49.5)	<b>3.25 (2.29; 4.62)</b> p<0.001	26.1 (19.9; 33.4)	<b>4.33 (2.53; 7.41)</b> p<0.001	30.7 (24.7; 37.4)	<b>4.53 (2.94; 6.98)</b> p<0.001	16.6 (11.3; 23.8)	<b>7.02 (3.33; 14.82)</b> p<0.001
– middle	35.3 (32.1; 38.7)	<b>2.25 (1.73; 2.93)</b> p<0.001	19.6 (16.8; 22.7)	<b>3.14 (2.04; 4.83)</b> p<0.001	19.9 (17.2; 22.8)	<b>2.50 (1.77; 3.54)</b> p<0.001	9.5 (7.4; 12.1)	<b>3.84 (2.00; 7.37)</b> p<0.001
– high	20.4 (17.0; 24.2)	Ref.	7.4 (5.2; 10.4)	Ref.	9.1 (6.8; 12.2)	Ref.	2.7 (1.5; 4.6)	Ref.
<b>Girls</b>								
Social status								
– low	48.5 (42.4; 54.5)	<b>2.94 (2.07; 4.18)</b> p<0.001	26.8 (20.2; 34.4)	<b>3.44 (2.12; 5.58)</b> p<0.001	37.9 (32.1; 44.0)	<b>3.56 (2.44; 5.19)</b> p<0.001	16.5 (11.9; 22.6)	<b>3.94 (2.14; 7.24)</b> p<0.001
– middle	36.8 (33.7; 40.0)	<b>1.75 (1.36; 2.25)</b> p<0.001	19.0 (16.2; 22.2)	<b>2.31 (1.59; 3.34)</b> p<0.001	23.3 (20.5; 26.4)	<b>1.77 (1.30; 2.41)</b> p<0.001	10.3 (8.0; 13.0)	<b>2.38 (1.37; 4.11)</b> p<0.001
– high	25.6 (21.6; 30.2)	Ref.	9.1 (6.9–11.8)	Ref.	14.7 (11.5–18.6)	Ref.	4.5 (2.9; 6.8)	Ref.
<b>Total</b>								
Social status								
– low	45.7 (41.5; 50.0)	<b>3.09 (2.41; 3.97)</b> p<0.001	26.4 (21.9; 31.5)	<b>3.84 (2.64; 5.57)</b> p<0.001	34.3 (30.2; 38.6)	<b>3.96 (3.01; 5.20)</b> p<0.001	16.6 (12.9; 21.0)	<b>5.14 (3.17; 8.31)</b> p<0.001
– middle	36.0 (33.7; 38.5)	<b>1.98 (1.66; 2.36)</b> p<0.001	19.3 (17.2; 21.5)	<b>2.67 (1.99; 3.60)</b> p<0.001	21.5 (19.4; 23.8)	<b>2.06 (1.63; 2.61)</b> p<0.001	9.9 (8.3; 11.8)	<b>2.94 (1.94; 4.45)</b> p<0.001
– high	23.0 (20.5; 25.7)	Ref.	8.2 (6.5; 10.3)	Ref.	11.9 (9.9; 14.2)	Ref.	3.6 (2.6; 4.9)	Ref.

\* Results of the KiGGS baseline study and KiGGS Wave 1 adjusted for the 2009/2010 population structure. 95% CI, 95% confidence interval; OR, odds ratio; Ref., reference group. Figures in bold indicate statistically significant results

According to data from KiGGS Wave 1, approximately two third (67.1%) of the non-smoking adolescents occasionally stay in rooms where people are smoking. Almost one in five adolescents (18.8%) is regularly at least several times a week exposed to passive smoke; one in ten adolescents (10.2%) even experience daily passive smoke exposure. As with active tobacco consumption, in passive smoke exposure, too, hardly any difference is noted between the sexes. With increasing age, the proportion of adolescents who regularly or daily stay in rooms where people are smoking tends to increase.

A comparison of the data from the KiGGS baseline study with those from KiGGS Wave 1 reveals that in Germany the number of adolescents exposed to passive smoke has significantly declined. The proportion of adolescents who stay at least occasionally in rooms where people are smoking has dropped from 83.2% to 67.1% (p<0.001). At the same time, the proportion of adolescents regularly or daily exposed to passive smoke decreased from 35.1% to 18.8% and 21.9% to

10.2%, respectively, by about one half (each p<0,001). This marked reduction in regular and daily passive smoke exposure is observed among boys and girls to a comparable extent (Figure 3) and extends across the entire age range of the 11 to 17 year olds (Figure 4, eTable 3).

As shown in Table 2, the passive smoke exposure during the follow-up period declined in all groups of the population, regardless of the adolescents' social backgrounds. However, both the KiGGS baseline study and KiGGS Wave 1 identified a marked social gradient. The following rule applies: The lower the social status, the higher the proportion of non-smoking adolescents regularly or daily staying in rooms where people are smoking.

**Discussion**

The results of the KiGGS study show that within about six years the proportion of the 11 to 17 year old boys and girls who smoke significantly declined from 20.4% to 12.0% (20). The proportion of daily smokers even

dropped by more than half. These findings are in line with those of other population-based studies regularly monitoring the smoking habits of adolescents in Germany, such as the representative surveys of the Federal Centre for Health Education (BZgA) (21) and the ESPAD (22) and HBSC (23) studies. Similarly, studies conducted in other advanced industrialized countries, such as the United States (29), England (30) and Finland (31), report declining smoking prevalence rates among adolescents.

Furthermore, data from the KiGGS study indicate a significant reduction in passive smoke exposure. The proportion of non-smoking adolescents regularly staying in rooms where people are smoking was in the KiGGS baseline study about twice as high as in KiGGS Wave 1. No comparable data from other studies are available for Germany. However, international studies confirm the observed trend of declining exposure to passive smoke among adolescents (32, 33).

Analyses stratified for social status show that the proportion of boys and girls who smoke or are regularly exposed to passive smoke has decreased. Despite this emerging trend observed in all social status groups, boys and girls with low social status still have an increased risk of smoking daily or being exposed to passive smoke regularly compared with their peers with high social status (7).

As mentioned above, some of the key measures to control smoking and protect the non-smoking population from exposure to passive smoke were implemented in Germany in the years 2007 and 2008. The two surveys of the KiGGS study conducted so far were carried out immediately before and after these extensive new regulations came into force. Although it can prove difficult to exactly quantify the effects of these measures, it is to be assumed that they contributed to the decline in numbers of adolescents who start smoking or are exposed to passive smoke (4, 13). However, this cannot be used to establish causality, especially since the studies of the BZgA show that the proportion of the adolescents who smoke already started to decline in the early 2000s (21).

The significant reduction in the proportion of adolescents who smoke which has been observed over the last few years can be partly explained by an increase in the average age at which smoking is tried for the first time noted during the same period of time. According to the KiGGS data, the average age of initiation of regular smoking among 17 year olds increased from 14.2 years (2003–2006) to 15.1 years (2009–2012) (20). This finding is confirmed by the BZgA's representative surveys (21). However, our analyses of KiGGS data stratified by single-year age groups reported here also showed that the prevalence of smoking decreased in all age groups; thus, the overall effect cannot be explained by falling prevalence rates in younger age groups alone.

Other methodological issues have to be taken into consideration when interpreting these findings (20). First, KiGGS study data on smoking and passive smoke exposure among adolescents are based on self-reports

of the respondents. No objective verification of the smoking status and passive smoke exposure status was attempted; this can be achieved, for example, by measuring cotinine levels in saliva or urine of the subjects (34). Thus, social desirability may have influenced the self-reported data on smoking habits, with some respondents potentially concealing or understating their tobacco consumption so that the actual smoking prevalence could have been higher (18, 35). However, studies comparing self-reported data of adolescents with objective measurements to determine the smoking status indicate a high level of agreement and thus support the validity of self-reported data on tobacco consumption (34, 36, 37). Second, the change in survey methodology between the KiGGS baseline study and KiGGS Wave 1 must be taken into consideration (27). While in the baseline survey self-administered questionnaires were used to collect data on smoking and passive smoke exposure, the follow-up survey relied on computer-assisted telephone interviewing. Since a stronger tendency towards social desirability has occasionally been found for interviews compared with written surveys (38, 39), the possibility cannot be ruled out that this type of answer bias is at least partially responsible for the decreasing trend in adolescent smoking prevalence.

Finally, it should be noted that apparently the numerous measures implemented in recent years to protect especially children and adolescents from the health risks associated with smoking and passive smoke exposure have had a positive effect. Data from the KiGGS study show that not only adolescents from families with a higher social status now smoke or are exposed to passive smoke less frequently, but that the same holds true for children and adolescents from families with a lower social status. However, since social differences in smoking and passive smoke exposure still persist, it remains an important aim of prevention to further reduce these disparities.

#### KEY MESSAGES

- Within a period of about six years, the smoking prevalence among 11 to 17 year olds in Germany has declined from 20.4% to 12.0%; the proportion of daily smokers even fell from 13.3% to 5.4%.
- While in the 2003–2006 period, more than one in three adolescents reported to be exposed to passive smoke several times a week or daily, less than one in five adolescents did so in the 2009–2012 period.
- The decline in smoking and passive smoke exposure was observed among boys and girls and in all age groups, regardless of the adolescents' social backgrounds.
- Yet, adolescents from families with low social status still have a significantly increased risk to smoke daily (OR: 3.71) and to be regularly exposed to passive smoke (OR: 5.14) compared with their peers with a high social status.
- These results suggest that the tobacco prevention measures implemented so far have been effective and that the increased protection of non-smoker health has had a positive impact.

**Conflict of interest statement**

The authors declare that no conflict of interest exists.

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**Corresponding author:**

Dr. PH Benjamin Kuntz  
 Robert Koch-Institut, Abteilung für Epidemiologie und Gesundheitsmonitoring  
 FG Soziale Determinanten der Gesundheit  
 General-Pape-Str. 62–66, 12101 Berlin, Germany  
 b.kuntz@rki.de

 **Supplementary material:**  
 eTables:  
[www.aerzteblatt-international.de/16m0023](http://www.aerzteblatt-international.de/16m0023)



Supplementary material to:

**Smoking and Passive Smoke Exposure Among Adolescents in Germany**

Prevalence, Trends Over Time, and Differences Between Social Groups

by Benjamin Kuntz and Thomas Lampert

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**eTABLE 1**

**Sample characteristics of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS) for the subset of adolescents aged between 11 and 17 years**

Variable	Categories	KiGGS baseline study (2003–2006) (n = 6812)			KiGGS Wave 1 (2009–2012) (n = 5258)		
		Sample size (n)	Unweighted sample (%)	Weighted sample* (%)	Sample size (n)	Unweighted sample (%)	Weighted sample* (%)
Age	11 years	1058	15.5	13.9	715	13.6	13.9
	12 years	1008	14.8	14.2	783	14.9	14.2
	13 years	1010	14.8	14.6	769	14.6	14.6
	14 years	1003	14.7	14.4	783	14.9	14.4
	15 years	969	14.2	14.0	726	13.8	14.0
	16 years	905	13.3	14.2	738	14.0	14.2
	17 years	859	12.6	14.8	744	14.1	14.8
Sex	Boys	3492	51.3	51.3	2683	51.0	51.3
	Girls	3320	48.7	48.7	2575	49.0	48.7
Social status	Low	1010	14.8	19.1	649	12.3	23.0
	Middle	4031	59.2	62.1	3318	63.1	59.7
	High	1561	22.9	18.8	1224	23.3	17.2
	Missing values	210	3.1	–	67	1.3	–
Smoking	Daily	826	12.1	13.3	234	4.5	5.4
	Several times a week	141	2.1	2.2	71	1.4	1.3
	Once a week	49	0.7	0.7	42	0.8	0.7
	Less than once a week	274	4.0	4.2	226	4.3	4.6
	Never	5409	79.4	79.6	4371	83.1	88.0
	Missing values	113	1.7	–	314	6.0	–
Passive smoke exposure	Daily	1000	14.7	21.9	335	6.4	10.2
	Several times a week	670	9.8	13.3	347	6.6	8.6
	Once a week	546	8.0	10.3	479	9.1	10.8
	Less than once a week	2091	30.7	37.8	1693	32.2	37.4
	Never	991	14.5	16.8	1513	28.8	32.9
	Missing values	228	3.3	–	319	6.1	–
	Excluded (active smoker)	1286	18.9	–	572	10.9	–

\* Weighted figures without missing values (population figures based on official statistics as of December 31, 2010; and education distribution of head of household in the 2009 German microcensus)

**eTABLE 2**

**Trends in daily smoking among 11 to 17 year olds by age and sex\***

Age	Boys		Girls		Total	
	KiGGS baseline study (2003–2006) % (95% CI)	KiGGS Wave 1 (2009–2012) % (95% CI)	KiGGS baseline study (2003–2006) % (95% CI)	KiGGS Wave 1 (2009–2012) % (95% CI)	KiGGS baseline study (2003–2006) % (95% CI)	KiGGS Wave 1 (2009–2012) % (95% CI)
11 years	0.2 (0.0; 1.5)	–	–	–	0.1 (0.0; 0.8)	–
12 years	0.1 (0.0; 0.5)	0.3 (0.0; 1.8)	0.3 (0.1; 1.3)	–	0.2 (0.1; 0.6)	0.1 (0.0; 0.9)
13 years	3.7 (2.3; 5.9)	2.1 (0.7; 5.9)	2.5 (1.4; 4.4)	1.5 (0.3; 7.4)	3.1 (2.2; 4.4)	1.8 (0.7; 4.4)
14 years	6.8 (4.6; 10.1)	1.5 (0.7; 3.4)	11.1 (7.9; 15.3)	1.7 (0.4; 6.8)	8.9 (6.8; 11.6)	1.6 (0.7; 3.7)
15 years	16.8 (12.9; 21.6)	5.6 (2.9; 10.5)	22.2 (17.6; 27.6)	7.9 (4.6; 13.3)	19.4 (16.5; 22.7)	6.8 (4.5; 10.0)
16 years	30.4 (25.6; 35.7)	10.8 (6.5; 17.2)	26.5 (21.4; 32.3)	8.9 (5.4; 14.3)	28.5 (25.0; 32.2)	9.8 (7.1; 13.5)
17 years	35.5 (30.0; 41.3)	18.6 (13.7; 24.7)	29.2 (23.9; 35.2)	16.9 (12.0; 23.3)	32.4 (28.4; 36.7)	17.8 (14.1; 22.1)
<b>Total</b>	<b>13.4 (12.0; 15.0)</b>	<b>5.5 (4.4; 6.9)</b>	<b>13.2 (11.6; 14.9)</b>	<b>5.3 (4.2; 6.8)</b>	<b>13.3 (12.2; 14.5)</b>	<b>5.4 (4.7; 6.3)</b>

\* Results of the KiGGS baseline study and KiGGS Wave 1 adjusted for the 2009/2010 population structure. 95% CI, 95% confidence interval

**eTABLE 3**

**Trends in daily passive smoke exposure among 11 to 17 year olds by age and sex (non-smoking adolescents only)\***

Age	Boys		Girls		Total	
	KiGGS baseline study (2003–2006) % (95% CI)	KiGGS Wave 1 (2009–2012) % (95% CI)	KiGGS baseline study (2003–2006) % (95% CI)	KiGGS Wave 1 (2009–2012) % (95% CI)	KiGGS baseline study (2003–2006) % (95% CI)	KiGGS Wave 1 (2009–2012) % (95% CI)
11 years	15.6 (12.0; 20.1)	7.7 (3.9; 14.6)	24.0 (19.3; 29.4)	3.9 (2.1; 7.2)	19.7 (16.6; 23.1)	5.9 (3.5; 9.5)
12 years	16.9 (13.0; 21.7)	6.1 (3.3; 10.9)	23.4 (18.5; 29.2)	8.7 (5.4; 13.5)	20.1 (16.8; 23.9)	7.3 (5.2; 10.3)
13 years	22.2 (17.9; 27.1)	5.5 (2.9; 10.4)	24.4 (19.7; 29.8)	10.4 (6.8; 15.6)	23.3 (19.8; 27.2)	7.9 (5.3; 11.6)
14 years	18.0 (13.3; 23.9)	9.7 (5.8; 15.7)	25.2 (20.1; 31.2)	7.3 (4.4; 11.9)	21.4 (17.4; 26.0)	8.5 (6.0; 11.9)
15 years	22.1 (17.2; 27.9)	15.6 (9.9; 23.7)	24.8 (18.5; 32.5)	16.6 (10.3; 25.5)	23.4 (19.3; 27.9)	16.1 (11.8; 21.5)
16 years	22.4 (16.7; 29.5)	18.7 (12.5; 27.1)	21.8 (16.0; 28.9)	12.2 (7.6; 18.8)	22.1 (18.1; 26.6)	15.4 (11.2; 20.9)
17 years	24.2 (17.7; 32.2)	9.3 (4.9; 16.9)	25.6 (18.9; 33.6)	17.4 (11.3; 25.7)	24.9 (19.9; 30.7)	13.5 (9.4; 19.1)
<b>Total</b>	<b>19.7 (17.6; 22.0)</b>	<b>10.0 (8.1; 12.1)</b>	<b>24.2 (21.9; 26.6)</b>	<b>10.5 (8.8; 12.5)</b>	<b>21.9 (20.2; 23.6)</b>	<b>10.2 (9.0; 11.6)</b>

\* Results of the KiGGS baseline study and KiGGS Wave 1 adjusted for the 2009/2010 population structure. 95% CI, 95% confidence interval