

Trends in socioeconomic inequalities in adolescent alcohol use in Germany between 1994 and 2006

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Abstract

Objectives To examine socioeconomic differences in adolescent alcohol use in Germany as well as their changes between 1994 and 2006.

Methods Data were obtained from the “Health Behaviour in School-aged Children” study conducted in North Rhine-Westphalia, Germany in 1994, 1998, 2002 and 2006. The analysis is based on 5,074 15-year-old students. Prevalence and trends were analysed for each category of family affluence and educational track separately using log-binomial regression models.

Results An increase in weekly alcohol use between 1994 and 2002 was followed by a strong decrease from 2002 to 2006. Family affluence only had a weak effect on weekly drinking with a tendency for lower-affluent students

reporting less alcohol use. Educational track showed almost no relationship with weekly alcohol use. Trend analyses within the subgroups revealed that the overall trend in alcohol use was similar in all socioeconomic and educational groups.

Conclusions Socioeconomic patterns in drinking behaviour are not yet developed in 15-year-old adolescents. Adolescence could therefore be an important time frame for tackling inequalities in alcohol use later in life.

Keywords Adolescence · Alcohol · Socioeconomic position · Trends · HBSC · Germany

Introduction

Socioeconomic position (SEP) has been consistently found to predict health and longevity in adulthood (Mackenbach 2012). One of the major factors contributing to these health inequalities are socioeconomic differences in risk behaviours, e.g. smoking, excessive alcohol consumption and lack of physical activity (Cavelaars et al. 1997; Brunner et al. 1999). Many of these behaviours are established in adolescence and produce a variety of undesirable health outcomes in adolescence and beyond (Holmen et al. 2000; Rehm et al. 2009). While the existing studies on the relationship between SEP and behavioural factors in adulthood provide strong evidence on a pronounced social gradient, socioeconomic differences in risk behaviour among adolescents are less consistent. This is important because most health-compromising behaviours such as alcohol use are initiated in adolescence (Kuntsche et al. 2006). The study of the development of inequalities in alcohol use during adolescence may provide a better understanding of the origins of socioeconomic differences in adult health and

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may identify possible pathways by which adult health inequalities are generated (Starfield et al. 2002).

Alcohol use is one of the most prevalent risk behaviours during adolescence and early adulthood. It is a significant public health problem that creates impaired health, harmful behaviours, and major economic and social burdens (Windle 2003; Rehm et al. 2009). Existing studies on the relationship between socioeconomic position and adolescent drinking behaviour provided inconsistent evidence. Some studies have identified a higher risk of excessive alcohol use among lower socioeconomic groups in adolescence (Geckova et al. 2002; Goodman and Huang 2002; Droomers et al. 2003), while others have found no or even inverse social gradients in alcohol consumption (Tuinstra et al. 1998; Vereecken et al. 2004; Hanson and Chen 2007a; Andersen et al. 2007; Liu et al. 2012; Pitel et al. 2012).

One potential explanation for the inconsistent findings is that existing studies used a variety of indicators of SEP, ranging from parental income or education to neighbourhood characteristics and adolescents' enrolment in a specific educational track or type of school (Hanson and Chen 2007b; Droomers et al. 2003). As adolescents grow older, they spend less time at home and more time with their peers. Thus, parental SEP markers may decrease in importance as indicators of adolescents' socioeconomic position (Hagquist 2007; Friestad and Klepp 2006; Koivusilta et al. 2006). In contrast, adolescents' own socioeconomic position may become increasingly relevant, especially with respect to behaviours that are typically initiated during adolescence, such as alcohol use (Hanson and Chen 2007b). Thus, it is reasonable to focus on the 'future' socioeconomic position of the adolescent. Several authors argue that 'alternative' indicators such as educational track or academic orientation might be better suited to analyse and identify health inequalities in adolescence (Vereecken et al. 2004; Geckova et al. 2002; Hagquist 2007; Koivusilta et al. 2006).

From a public health perspective, it is important to study changes in alcohol use over time to monitor trends and identify target populations. Our analysis covers exactly the period of the years before and after the documented peak in alcohol and other substance use behaviours in Europe (Simons-Morton et al. 2009; Hibell et al. 2011). In this context, it is relevant to get more insight into the association between socioeconomic position and adolescent alcohol use. The aims of the present paper are (1) to report time trends in adolescents weekly drinking in 1994, 1998, 2002 and 2006, (2) to investigate whether differences in alcohol use can be found according to two different measures of SEP, family affluence and educational track and (3) to examine whether these relationships have changed over time.

Methods

The paper is based on German data of the Health Behaviour in School-aged Children (HBSC) study. The aim of the study is to describe young people's health and health behaviour and to analyse how these outcomes are related to the social context (Currie et al. 2009). Cross-sectional surveys of 11-, 13- and 15 year-old adolescents attending school are carried out every 4 years in a growing number of countries based on an internationally agreed protocol. A detailed description of the aims and theoretical framework of the study can be found online at www.hbsc.org or elsewhere (Roberts et al. 2009).

Sample

The data presented here are from four consecutive HBSC surveys conducted in Northrhine-Westphalia, the largest federal state of Germany with about 18 million residents, in 1994, 1998, 2002 and 2006. All surveys used identical protocols considering target group, sampling and data collection (Ottova et al. 2012). In each of the four waves, stratified by administrative district and educational track, the sample was drawn by systematic cluster sampling in which schools served as primary sampling unit. Only students whose parents had signed an informed consent were included in the study. The study was approved by the federal data protection commissioner of Northrhine-Westphalia. Response rates on school level varied across survey years between 39 and 48 %. Unfortunately, information on refusal rates at the individual level was not available for the 1994 and 1998 surveys, but in 2002 and 2006 the refusal rate was 14 %. The main reasons for nonparticipation included sickness and lack of parental consent. The present analysis is based on 2,493 boys and 2,581 girls ($N = 5,074$) aged 15 years. 11- and 13-year-olds were excluded as weekly alcohol consumption in these age groups is still rather rare. Table 1 shows the characteristics of the four different samples by gender and socioeconomic background.

Instrument and variables

Data were collected using a standardized questionnaire. A strong effort was made to retain a core of identical items in each survey to facilitate the monitoring of trends (Roberts et al. 2009). During one school hour (45 min), teachers administered the questionnaires in the classroom and students were instructed to answer questions about procedure only. To ensure anonymity, after completion of the survey students were asked to seal the questionnaire in an envelope and hand it over to the teacher.

Table 1 Basic characteristic of the samples, Health Behaviour in School-aged Children (HBSC) study, Germany 1994–2006

	1994				1998				2002				2006			
	Boys		Girls		Boys		Girls		Boys		Girls		Boys		Girls	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
	508	49.1	526	50.9	797	50.0	797	50.0	479	47.3	533	52.7	709	49.4	725	50.6
Family affluence																
High	210	41.3	174	33.1	331	41.5	299	37.5	189	39.5	201	37.7	187	26.4	151	20.7
Medium	184	36.2	186	35.4	319	40.0	285	35.8	172	35.9	174	32.6	254	35.8	286	39.3
Low	114	22.4	166	31.6	147	18.4	213	26.7	118	24.6	158	29.6	268	37.8	291	40.0
Educational track																
High	152	29.9	185	35.2	298	37.4	331	43.7	155	32.4	173	32.5	235	33.1	252	34.8
Medium	120	23.6	135	25.7	203	25.5	226	29.9	112	23.4	150	28.1	187	26.4	205	28.3
Mixed	85	16.7	67	12.7	80	10.0	61	8.1	61	12.7	69	12.9	124	17.5	131	18.1
Low	151	29.7	139	26.4	216	27.1	139	18.4	151	31.5	141	26.5	163	23.0	137	18.9

Weekly alcohol use

The frequency of alcohol use was gathered through the question “At present, how often do you drink anything alcoholic, such as beer, wine or spirits (including small amounts)?”. For each alcoholic drink, response options were: ‘every day’, ‘every week’, ‘every month’, ‘rarely’ and ‘never’. An overall alcohol use index was constructed taking into account the highest frequency of any alcoholic beverage consumed. According to the procedure of the international reports (Currie et al. 2012), responses indicating daily or weekly alcohol consumption were recoded into a new category at least “weekly drinking” (coded as 1) and contrasted against “less than weekly” (coded as 0).

Family affluence

Income and material wealth represent important dimensions of socioeconomic position. Material wealth was measured using the family affluence scale (FAS) (Currie et al. 2008). This scale is an internationally validated measure of material affluence derived from the characteristics of the household and consists of three items: “does your family own a car?” (0, 1, 2 or more), “how many times did you travel away on holiday with your family during the past 12 months?” (0, 1, 2, 3 or more) and “do you have a bedroom for yourself?” (no = 0, yes = 1). In the 2002 survey, a fourth item “number of computers” was introduced to the FAS scale. We decided not to include the item to increase consistency. Because of the different measurement levels of the items, categorical principal components analysis (CATPCA) was used to create a composite index. This method has been used previously to track inequalities over time (Richter and Leppin 2007; Levin et al. 2009). CATPCA is a non-parametric version of

factor analysis suitable for analysis of categorical (ordinal) variables. According to Currie et al. (2008), the obtained factor score was subsequently recoded into tertiles of high, medium and low family affluence.

Educational track

Educational track was included in the analysis as an indicator of students’ own socioeconomic position. Based on their achievement in elementary school, students in Germany are referred to a specific school type for secondary education. In Northrhine-Westphalia four school types exist at the secondary level, which offer education programs of varying length, depth and emphasis: the most basic type is secondary general school (low educational track: coded as 1), followed by the relatively more advanced intermediate school (medium educational track: coded as 2) and the most advanced grammar school (high educational track: coded as 4), which leads to the examination that qualifies for university education. The only school type that does not fit completely into this hierarchical system is comprehensive school (mixed track), which unites students of all levels of ability under one roof and offers options for all the three “tracks” above (coded as 3).

Statistical analysis

As previous studies have demonstrated clear differences in adolescent alcohol use between boys and girls in Germany (Lampert and Thamm 2007), the prevalence of weekly drinking in the four survey years is presented separately for boys and girls. Time trends were estimated using log-binomial regression models. Survey year was

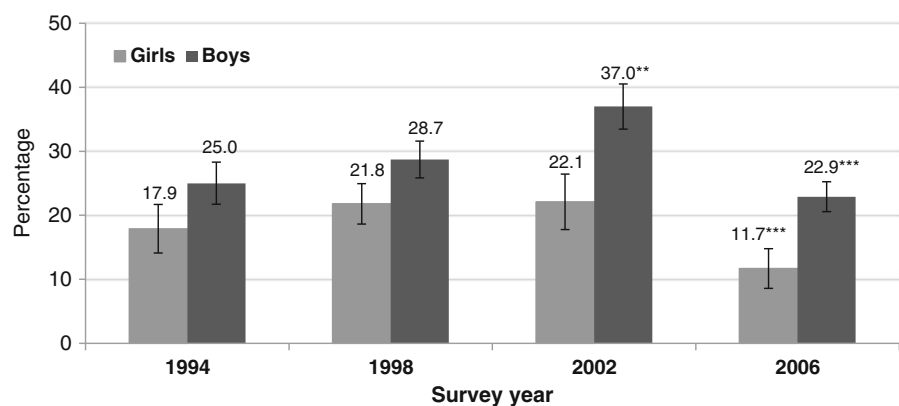
included in the model as a series of dichotomous “dummy” variables (1994 as reference for 1998, 1998 for 2002 and 2002 for 2006). Regression parameters are based on risk ratios (RR), as the odds ratio tends to overestimation when the outcome of interest is common (e.g. >10 %), an effect which can be reinforced by trend analyses (Khang et al. 2008). Differences in alcohol use according to family affluence and educational track were analysed for the total sample as well as for each period (1994, 1998, 2002, and 2006). In each model the highest group (i.e. high family affluence and educational track) served as the reference category with risk ratios being computed for the other two/three groups in comparison. In addition, time trends were computed separately for each category of family affluence and educational track, to estimate for each group whether there had been significant changes between 1994 and 1998, 1998 and 2002 and 2002 and 2006. For all analyses, cases with missing values on alcohol use, family affluence, educational track as well as age and gender were excluded ($N = 50$). All statistical analyses were done using the Stata 11 (Stata Corp, College Station, Texas, USA). To take into account the possible effect of cluster sampling, robust standard errors were estimated according to Huber and White (Wooldridge 2002).

Results

Overall trends in weekly drinking

Figure 1 shows prevalence rates and changes in weekly drinking among 15 year-old German girls and boys between 1994 and 2006. Rates of weekly alcohol use increased between 1994 and 2002 for both genders. However, between 2002 and 2006 a strong decrease became apparent. In 2006, 22.9 % of the 15-year-old boys and 11.7 % of the girls reported drinking alcohol at least once a week.

Fig. 1 Weekly alcohol use by gender and survey year among 15-year-old German students, 1994–2006 (percentages). Stars illustrate a significant variation in weekly alcohol use from the previous survey year and are based on log binomial regression models with robust standard errors. * $p < 0.01$, ** $p < 0.005$, *** $p < 0.001$



Socioeconomic differences in weekly drinking by family affluence and educational track

In the overall group including all four cohorts, a significant association between family affluence and weekly drinking became apparent for boys and girls, indicating a decreasing risk of weekly drinking with decreasing family affluence (Table 2). Within the four cohorts, a significant effect for boys was only found in 2006 and for girls in 1994. However, in all cohorts there was a tendency for low-affluent students to report the lowest rates of weekly alcohol use. With respect to socioeconomic differences in alcohol use by educational track across all cohorts and for boys as well as girls, no significant educational differences for weekly drinking were found. However, in 1998, the RRs for students from low-track schools among boys increased to 1.54 and for girls from medium-track schools to 1.42 compared to students from high-track schools.

Trends over time in the association between weekly drinking, family affluence and educational track

Looking at time trends in the different FAS groups, in all three subgroups and for both genders the prevalence of weekly alcohol use increased between 1994 and 2002 and then decreased between 2002 and 2006 (Fig. 2). These changes were significant between 1998 and 2002 for high-affluent boys and between 2002 and 2006 for all affluence groups and for both genders.

Figure 2 also indicates an increased rate of weekly drinking between 1994 and 2002 among all educational groups among boys except for mixed-track students. Between 2002 and 2006, however, the risk ratios decreased among boys except for mixed-track students. For girls, the RRs for weekly alcohol use remained rather stable across all educational tracks between 1994 and 2002, but significantly decreased between 2002 and 2006. The only exception was comprehensive track students which showed a peak in 1998. However as the wide confidence intervals

Table 2 Prevalence of weekly alcohol use between 1994 and 2006 by family affluence and educational track among 15-year-old German students, percentages, risk ratios (RR) and 95 % confidence intervals (95 % CI) log-binomial regression

	All years		1994		1998		2002		2006	
	%	RR (95 % CI)	%	RR (95 % CI)	%	RR (95 % CI)	%	RR (95 % CI)	%	RR (95 % CI)
Family affluence										
Boys										
High	32.1	1	29.1	1	31.1	1	40.2	1	28.9	1
Medium	26.9	0.85 (0.74–0.98)	23.4	0.81 (0.58–1.13)	27.3	0.88 (0.69–1.12)	35.5	0.88 (0.68–1.15)	23.2	0.80 (0.59–1.11)
Low	23.3	0.76 (0.64–0.90)	20.2	0.70 (0.46–1.06)	26.6	0.85 (0.62–1.17)	33.9	0.84 (0.62–1.15)	18.3	0.63 (0.45–0.89)
Girls										
High	19.9	1	22.4	1	21.7	1	21.4	1	11.3	1
Medium	21.2	1.14 (0.95–1.37)	18.8	0.84 (0.56–1.26)	25.6	1.18 (0.88–1.58)	27.0	1.26 (0.88–1.81)	14.8	1.32 (0.78–2.24)
Low	13.3	0.73 (0.59–0.91)	12.1	0.54 (0.33–0.88)	16.9	0.78 (0.54–1.12)	17.7	0.83 (0.54–1.27)	8.9	0.79 (0.59–0.91)
Educational track										
Boys										
High	27.0	1	27.0	1	23.5	1	35.5	1	26.0	1
Medium	28.6	1.08 (0.91–1.28)	24.2	0.90 (0.59–1.35)	29.6	1.26 (0.94–1.69)	44.6	1.26 (0.94–1.69)	20.9	0.80 (0.56–1.14)
Mixed	25.4	0.96 (0.78–1.18)	28.2	1.05 (0.68–1.61)	26.3	1.12 (0.73–1.70)	24.6	0.69 (0.43–1.13)	23.4	0.90 (0.61–1.32)
Low	29.5	1.09 (0.92–1.27)	21.9	0.81 (0.54–1.21)	36.1	1.54 (1.17–2.02)	38.8	1.06 (0.79–1.43)	20.3	0.78 (0.54–1.13)
Girls										
High	17.8	1	17.8	1	18.4	1	24.9	1	11.9	1
Medium	20.8	1.18 (0.97–1.44)	19.3	1.08 (0.68–1.72)	26.1	1.42 (1.03–1.94)	24.7	0.99 (0.68–1.45)	13.2	1.11 (0.68–1.80)
Mixed	15.9	0.96 (0.72–1.28)	9.0	0.50 (0.22–1.15)	27.9	1.51 (0.95–2.40)	13.0	0.53 (0.27–1.02)	15.3	1.28 (0.76–2.17)
Low high	17.3	0.97 (0.77–1.21)	20.9	1.17 (0.75–1.83)	20.7	1.12 (0.78–1.62)	20.6	0.83 (0.55–1.25)	5.8	0.49 (0.23–1.04)

Bold values indicate significant effect; 95 % CI does not include 1

indicate, this is probably due to the rather low number of students in this track.

Discussion

While health inequalities in adolescence are receiving renewed scientific interest (Koivusilta et al. 2006; Hanson and Chen 2007a, b; Hagquist 2007; Friestad and Klepp 2006), little is known about the relationship between socioeconomic position and drinking behaviour in adolescence; data on trends over time are even more limited. The present study revealed that the rates of weekly drinking among 15-year-olds in Germany increased from the mid 1990–2002, then decreased in 2006 and even fell below the level of 1994. In the different cohorts, when taken separately, family affluence only had a small effect on weekly alcohol use. However, when all cohorts were combined there was evidence that family affluence was positively associated with drinking frequency in adolescence. For educational track, largely no significant effects were found. Looking at trends in socioeconomic differences in alcohol use between 1994 and 2006, no clear trends were observed; the socioeconomic differences remained largely unchanged

over time. Prevalence for weekly alcohol use generally increased in all socioeconomic groups between 1994 and 2002 and decreased significantly thereafter.

Comparison with previous research and interpretation

The general increase in the levels of alcohol use among 15-year-olds during the 1990s followed by a decrease starting from early 2000 is in line with other studies in Germany (BZgA 2011). Further, the weak association between weekly drinking and SEP confirm previous studies which have identified weak or even no links between parental SEP and alcohol use in adolescence (Hanson and Chen 2007b; Liu et al. 2012; Pitel et al. 2012). The present study adds to the previous literature by suggesting that the direction of the socioeconomic differences in adolescent alcohol use might vary according to different dimensions of SEP. Although the effects were not of large scale, adolescent alcohol use was positively associated with family affluence, while the observed associations with educational track were rather negative. Family affluence measures only one aspect of SEP, which is more related to income, material wealth and spending patterns. Thus, it might also be presumed that the differing effects of

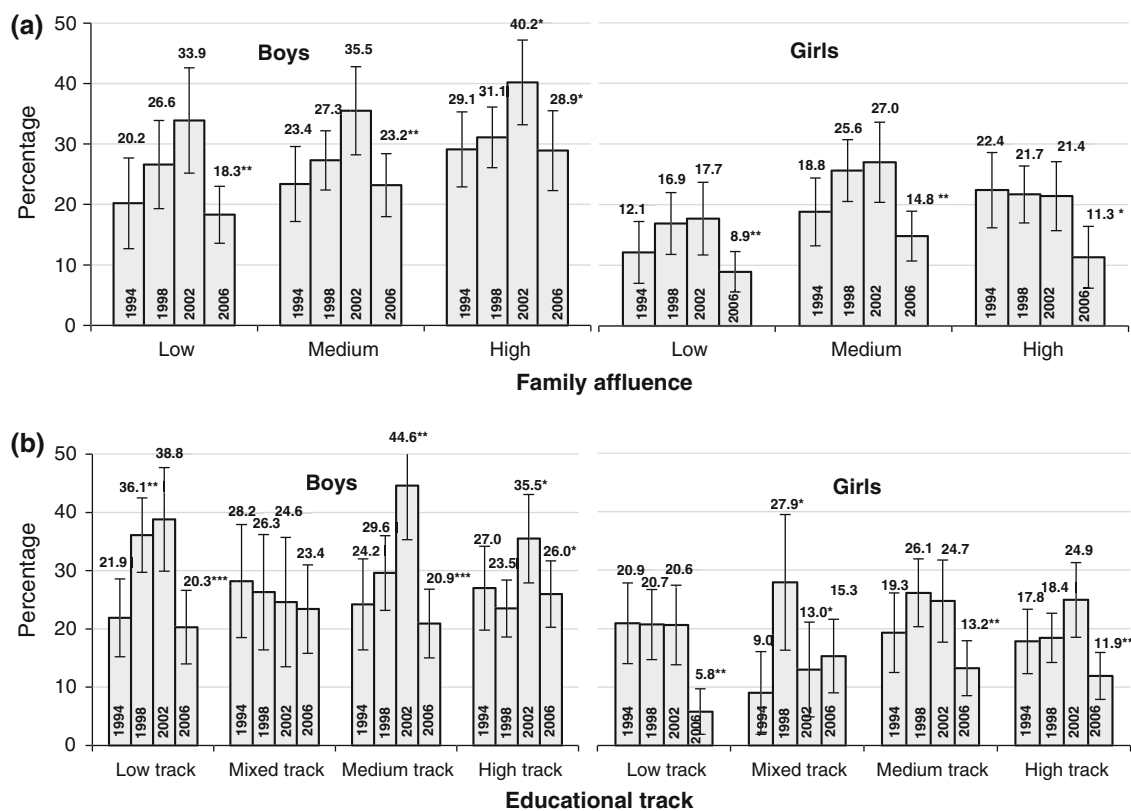


Fig. 2 a Trends in weekly alcohol use by family affluence (a) and educational track (b) among 15-year-old German students, 1994–2006, percentages (RR) and 95 % confidence intervals. Stars

illustrate a significant variation in weekly alcohol use from the previous survey year and are based on log-binomial regression models with robust standard errors. * $p < 0.01$, ** $p < 0.005$, *** $p < 0.001$

affluence and educational track on alcohol use could be due to a differential impact of sub-dimensions of SEP, i.e. income versus education, as well as due to the difference between parental SEP versus adolescents' future social status. Unfortunately, the number of observations was too low to test the association between family affluence and weekly drinking in different educational tracks. Therefore, the interpretation of results is difficult and further research is certainly required.

Regarding the relatively small socioeconomic differences in weekly alcohol use, our findings suggest that there might be other determinants, which may have a greater impact on adolescent drinking behaviour than parental or own SEP. As adolescents grow older, they become less dependent on the social circumstances of their parents and the influence of the peer group—which could operate across all educational tracks—increases (Chen et al. 2002). This process may lead to a decreasing influence of the family background and increasing influence of peers and related factors, which in turn are closely related to different aspects of risk behaviour in adolescents (Simons-Morton et al. 2000). This applies especially to those behaviours which do not start until adolescence, such as alcohol consumption, which may generate an (desired) adult status among peers.

In addition to the influence of peers, the school setting, which might also act independently of SEP or educational track, may also account for the low effect of educational track. Different studies showed a close relation between specific components of school (such as quality of education, school, school requirements) and risk behaviour (McLellan et al. 1999). Overall, these preliminary reflections on the influence of school and peers context on adolescent alcohol use and others risk behaviours suggest that they need to be considered when analysing health inequalities in adolescence. Therefore, further investigations need to assess to what extent those factors, which are distinctive for adolescents, influence or weaken the effect of family background (West and Sweeting 2004).

Methodological considerations

The strengths of this study include the use of large regional datasets covering 12 years (1994–2006) using the same procedures and protocol across survey years as well as the availability of different measures of socioeconomic position. The sample size also allowed separate analyses for girls and boys. A limitation of this study is that it is based

on self-report, so the reported prevalence rates may be biased due to over- or underreporting. Yet, the overall prevalence rates of drinking behaviours reported in this study are consistent with other studies among German adolescents (BZgA 2011; Lampert and Thamm 2007). The relatively low response rate on school level might introduce a selection bias. However, the response rate is similar to other German school surveys and many schools refused because they recently participated in other surveys. Unfortunately, detailed information on refusal was not available. Also, while dichotomous classifications of alcohol use might be considered somewhat crude, such classifications are probably less vulnerable to reporting errors. Finally, to underline the importance of honest responses, students were assured of the anonymity of the study and that neither parents nor teachers would find out about their individual answers. A potential threat to this study is that social desirability may be more likely to occur in adolescents from a more advanced social background; this would lead to an underestimate of socioeconomic differences in alcohol consumption. Unfortunately, it is unknown to what degree such mechanisms actually are at work in adolescence and whether such an effect would be substantial or negligible.

Another limitation of the present study is that parental SEP was assessed by adolescent self-reports. We used the family affluence scale which was especially developed to measure family SEP in surveys for adolescents (Currie et al. 2008). One advantage of this index is a relatively high response rate to the questions in contrast to other socioeconomic indicators (educational achievement or occupational status). Further, a previous study showed that the FAS items coincided with parents' responses and were correlated with parents' professional status (Andersen et al. 2008; Molcho et al. 2007). Future studies should replicate our analysis using different indicators of SEP.

Conclusions

So far, epidemiological data on trends in socioeconomic differences in adolescent drinking behaviours have been rare. Our findings suggest a decrease in weekly alcohol use among adolescents in Germany from 2002 to 2006 after an initial increase between 1994 and 2004. For public health purposes, it is important to monitor whether this decreasing trend continues and whether this development remains similar across socioeconomic subgroups. This study further shows that parental SEP and educational track are only of minor importance for the prediction of drinking patterns among German adolescents. Moreover, there were no clear trends in these effects over a time period of 12 years. Our findings are important from a life course perspective (Batty et al. 2012). Some studies suggest that the association

between drinking and SEP increases with age (Casswell et al. 2003; Melotti et al. 2011). Our study highlights that socioeconomic patterns in drinking behaviour are not yet developed or fully established in 15-year-old adolescents. This age period could therefore be an important time frame for tackling inequalities in alcohol use later in life. Thus, it might be interesting for future research to investigate the effects of different socioeconomic determinants and mechanisms of alcohol use in adolescence and early adulthood, preferably in a longitudinal design.

Conflict of interest None declared.

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