

RESEARCH REPORT

**Trends in adolescent alcohol use.**

**Findings from 1992 to 2003 from the Dutch National School Survey on  
Substance Use**

KARIN MONSHOUWER<sup>1</sup>, SASKIA VAN DORSSELAER, JACQUELINE VERDURMEN,  
RON DE GRAAF<sup>1</sup>, INGRID SCHULTEN<sup>1</sup>, JIM VAN OS<sup>3</sup> AND WILMA VOLLEBERGH<sup>1,4</sup>

<sup>1</sup>*Trimbos Institute (Netherlands Institute of Mental Health and Addiction),*

<sup>2</sup>*Vrije Universiteit, Department of Clinical Psychology*

<sup>3</sup>*Maastricht University, Department of Psychiatry and Neuropsychology*

<sup>4</sup>*University of Utrecht, Faculty of Social and Behavioural Sciences*

Correspondence to:

Karin Monshouwer, MSc.

Trimbos Institute (Netherlands Institute of Mental Health and Addiction),

PO Box 725, 3500 VJ, Utrecht, The Netherlands

Tel: +31 30 2971100

Fax: +31 30 2971111

E-mail: [kmonshouwer@trimbos.nl](mailto:kmonshouwer@trimbos.nl)

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## Abstract

**Objective.** To investigate whether the increase of alcohol use among Dutch adolescent is explained as a general trend or by changes in the risk of specific (demographic) groups or parental factors.

**Method.** Data were derived from 4 waves (1992, 1996, 1999 and 2003) of the Dutch National School Survey on Substance Use, a nationally representative cross-sectional study, with a total of 25,885 respondents (50% girls). Written questionnaires on alcohol, tobacco, other drug use and socio-demographic and behavioural variables were administered in classroom settings.

**Results** Last month prevalence increased significantly from 40% in 1992 to 57% in 2003. Additive models showed significant interaction effects between year of survey and the demographic variables gender, age and ethnicity on last month alcohol use. Most importantly, from 1992 to 2003 the risk for last month alcohol use increased strongest among the youngest age group (12-14 years) (risk difference: 9%). Parental factors were strongly related to respondents alcohol use; respondents reporting that there parents were weekly drinkers and/or had a neutral or positive attitude towards alcohol use of their children were at higher risk for last month alcohol use. The prevalence of these parental factors increased in 2003. Furthermore, the effect of parental alcohol use on respondents' last month use was stronger in 2003 as compared to 1992.

## **Conclusions.**

Preventive activities should focus on young adolescents. Furthermore, the results of this study warrant further experimental research into the influence of parental behaviour and attitudes on adolescent alcohol use.

## **Introduction**

International comparative surveys have revealed that in recent years Dutch adolescents are among the heaviest drinkers in the whole of Europe (Currie et al., 2004; Hibell et al., 2004). Among 35 European countries participating in the ESPAD survey, the Netherlands showed the highest percentage (25%) of regular alcohol users (10 times or more during the month prior to the survey). Dutch students, especially boys, also appeared to be the most frequent 'binge drinkers' (5 or more drinks in a row) (Hibell et al., 2004). These drinking patterns at such young ages are a worrying phenomenon. Numerous studies have shown that regular and heavy drinking in early adolescence is a serious risk factor for physical damage, in particular brain damage (Tapert et al., 2002; Hiller-Sturmhöfel et al., 2004), later alcohol problems and alcohol dependence (Grant et al., 2006), and the occurrence of numerous other risk behaviour and behavioural problems (Hingson et al., 2000; Bonomo et al., 2001; Verdurmen et al., 2005). However, Dutch adolescents do not seem to worry much about these risks, as their attitudes towards drinking are very tolerant and reveal an ignorance concerning the risks related to drinking alcohol in comparison to the attitudes of adolescents in other countries. For example, the ESPAD study showed that only 17% of the Dutch students expected negative consequences of their alcohol use (e.g. get sick, harm my health, do something I would regret) to be very likely or likely. This was the lowest percentage among the 35 countries participating in the 2003 ESPAD study (Hibell et al., 2004). Thus, in the Netherlands a tolerant climate towards teenage drinking seems to exist, revealing itself in high alcohol consumption rates at young ages.

It is not clear to what extent these alcohol consumption patterns among early adolescents are a recent phenomenon. General alcohol consumption patterns in the Netherlands do not seem to

have changed much over the past years. Per capita alcohol consumptions appears to have stabilized since the early 1990s at 8 liters of pure alcohol per capita (Van Laar et al., 2007). Thus, no upward trend in alcohol consumption in general appears to have evolved. However, data from an ongoing Dutch survey on self-reported alcohol use in school children, strongly suggests that in the youngest age groups an upward trend may have been developing (Kuipers, Mensink, De Zwart, 1993; Kuipers, Stam, De Zwart, 1997; De Zwart, Monshouwer, Smit, 2000, Monshouwer et al., 2004). This hypothesis of an upward trend has been confirmed by the results of the Dutch Twin Register, which revealed rising alcohol consumption patterns in the youngest age groups (Poelen et al., 2005). However, to our knowledge no systematic analysis of survey data about the trend in alcohol consumption patterns in the general population of adolescents in the Netherlands over the last decennia has been made and only a few of those studies were found from other North West European countries, i.e. trend-analysis among Finnish adolescents (Lintonen et al., 2000), Swedish 15-16 year olds (Andersson, et al., 2002) and 15 year old Swiss students (Kuntsche, 2004). In Finland, regular (i.e. monthly or weekly) alcohol consumption in adolescents increased considerably over time (1977-1999), while the onset of drunkenness moved towards an earlier age (Lintonen et al., 2000). In Sweden, the highest proportion of alcohol consumers was found in the 1970, this percentage decreased in the 1980s and stabilised at that level through the 1990s. However, alcohol consumption rates in adolescents in Finland and Sweden are much lower than those in the Netherlands (Hibell et al., 2004) and therefore trends in alcohol use may not be comparable. Kuntsche (2004) reporting on trends in substance use over the period 1986 to 1998, found an overall increase, but for alcohol only a drunkenness measure was used. The goal of this paper is to combine the results of several large representative surveys in school-aged children that have been conducted in similar designs since the early nineties (1992-2003) and to assess

whether the increase of alcohol use among Dutch adolescents is explained as a general trend or by changes in specific demographic subgroups or parental factors.

It is widely known that drinking alcohol has its onset at young ages and develops into regular drinking in the course of adolescence (O'Malley et al., 1998). This sharp rise with age is witnessed in almost all countries (Currie et al., 2004). In general, research strongly suggests that adolescents tend to mature at increasing earlier ages, in particular when it comes to risk behaviours that used to be characteristic for older adolescents. For example, a recent analysis showed that age of onset of cannabis use in the Netherlands tended to decline in the nineties (Monshouwer et al., 2005) The first question that we would like to address is therefore whether we find any age effects in the trend among young people, in particular whether the alcohol consumption has grown especially in the youngest groups over the last years.

Drinking has long been a male phenomenon. Women tended to drink much less and much less often. However, among the young this male 'dominance' appears to have disappeared in the last years (Verdurmen et al., 2003). Therefore, the second question of this study is whether any gender specific trends in alcohol consumption in adolescents are found.

In the past decennia the population of Dutch schools has changed considerably due to growing numbers of children originating from migrant families, in particular those coming from non-Western countries. At present, approximately 15% of all school children in the Netherlands are from a non-Dutch and non-Western ethnic background. It has been shown that in childhood and adolescence, these children tend to report (much) lower levels of alcohol use (Monshouwer et al., 2004). The third question addressed in this study is whether trends in alcohol use were dependent on ethnic status. We hypothesize that parallel to a growing integration or assimilation of migrant children, levels of alcohol consumption within these groups may have risen at a faster pace than in Dutch children. If so, the impact of ethnic background may have decreased over the past years.

Finally, it has regularly been shown that one of the most important determinants of alcohol consumption is its availability (Babor et al., 2003 Chaloupka, 1993). When alcohol is easily available – i.e. cheap and easy to buy – people drink more. However, in young adolescents the availability of alcohol is not so much influenced by prices or selling strategies. Although buying alcohol (beer, wine) is illegal in the Netherlands for adolescents up to the age of sixteen and spirits up to the age of eighteen, alcohol is easily available for most youngsters due to the fact that their environment appears to be very lenient towards adolescents' alcohol use. Also, in the Netherlands, drinking alcohol at young ages is not illegal. Recent surveys in the Netherlands, that assessed the place of consumption and the way the alcohol was obtained, revealed that the majority of the young adolescents had their first drink at home or in the home of friends (Monshouwer et al., 2004). Early adolescents furthermore reported that they usually drink alcohol at home or with friends, and that they only rarely buy their own drinks – in which case buying alcohol, although illegal, appears to be fairly easy (Bieleman, Kruize, Nienhuis, 2006). Thus, not only the adolescents themselves display little worries about drinking alcohol at such young ages, this tolerance manifests itself in their regular social environment. Recent studies have shown that the family is one of the most influential social contexts for early adolescents' alcohol use (Van der Vorst et al. 2005) Thus, parental attitudes and parental rules in the family are important predictors of adolescents' alcohol use. In line with these studies our fourth hypothesis is that parental tolerance towards alcohol use of young adolescents may have grown in the past decennia. In extension to this it might even be hypothesized that growing parental tolerance has been one of the determinants of a possible rise in early adolescents' alcohol consumption in the Netherlands. Former studies have shown that parental alcohol use is related to the alcohol consumption of their children (Yu, 2003), possibly through modelling processes. Furthermore, as suggested by Van der Vorst et al. (2005) the relation between parental attitude and their child's alcohol use is possibly affected

by their own alcohol use. Therefore, we will analyse whether parental alcohol consumption is related to their child's alcohol use as well.

In short, in this paper we will present the data from the Dutch National School Survey on Substance Use in order to analyse the trend in alcohol consumption among Dutch school children aged 12-16 years from 1992-2003. Our main hypothesis is that in these years a systematic rise in alcohol consumption patterns in this age group will be discerned. Four additional hypotheses will be put to the test. We expect that 1. the increase in alcohol use will be particularly strong in the youngest age groups; 2. gender differences will have become smaller; 3. ethnic differences will have decreased and 4. parental tolerance towards alcohol consumption of their children has grown.

## **Methods**

### *Sample*

The data were derived from the ongoing Dutch National School Survey on Substance Use among secondary school students aged 12-18 years, conducted every four years since 1984. Because of differences between the surveys in the alcohol prevalence questions it was decided not to include the 1984 and 1988 data. The samples of the 1992, 1996 and 1999 studies were obtained in the following way. First, all Regional Health Services in the Netherlands were requested to participate in the study. At every wave, at least half of these Health Services agreed to collaborate. Second, within each region, school classes were stratified according to school level (five levels) and grade (ranging from four to six, depending on the school level) and drawn proportionately to their number in the region. Within classes all students were drawn as a single cluster. In 2003, a two stage random sampling procedure was used. First, schools were stratified according to level of urbanisation and drawn proportionally to their

number in the corresponding urbanisation level. Second, within each school, a maximum of 5 classes (depending on school size) were selected randomly from a list of all classes provided by each participating school. Within classes all students were drawn as a single cluster. Because of small and non-representative number of students in the 10 to 11 and 17 to 18 year age groups (in the Netherlands secondary school is compulsory until the age of 16 and almost all 10-11 year olds attend primary school) only the 12-16 year olds were included. These procedures resulted in samples of 6,170, 6,144, 6,376 and 7,195 students from secondary schools (mean age 14.1, 14.1, 14.0 and 13.9 years) in the respective waves, with a sum total of 25,885 students. The participation rates within classes were high, with an average of 95%. To make it possible to compare results across the waves and to generalise the results to the general school-going population of this age, a weighting procedure was applied. Post-stratification weights were calculated by comparing the joint sample distributions and known population distributions of school type, grade and level of urbanisation (the latter only in 1999 and 2003) of the corresponding year (the national statistics were obtained from Statistics Netherlands).

#### *Data collection*

All data were collected by questionnaire, distributed in classes and administered by staff of the Regional Health Services or research assistants during a regular lesson (usually 50 minutes). All administrators were instructed to use the standard introduction text as provided. Administrators also received written instructions and guidelines on how to answer questions from students filling out the questionnaire. The administrators stressed the anonymity of the respondents when presenting the questionnaire and teachers were asked to leave, or take a place at the back of the classroom. The questionnaire included questions on substance use (alcohol, tobacco, cannabis, ecstasy, cocaine, heroin, magic mushrooms), socio-demographics

(e.g. age, ethnicity), family (e.g. family structure, parental substance use), peers (perceived substance use among peers) and behavioural variables (e.g. delinquency, school performance).

The questionnaire was improved and updated for every wave, but the core questions used in this paper remained unchanged.

## **Measures**

### *Alcohol use*

The question ‘How often did you drink alcohol during the last 4 weeks’ identified last month alcohol users. Students could answer by ticking off the number of times they had used alcohol (categories: 0/1/2/3/4/5/6/7/8/9/10/11-19/20-29/40 times or more). Answers were recoded, resulting in two categories: ‘not used during the last month’ and ‘used 1 time or more during the last month’.

### *Risk factors*

To investigate group specific trends, the following demographics were included gender (male, female), age (2 categories: 12-14 and 15-16 years) and ethnic status (ethnic Dutch, ethnic minority). The variable age was recoded into two categories because it was hypothesized that alcohol use has risen especially among the younger age groups. Ethnic status was assessed by asking the students to indicate country of birth of themselves and of both parents. Those reporting that either (s)he, her/his father or mother was born in a foreign country were scored as ethnic minority students. Furthermore, two parental variables; parental attitude and parental alcohol use were investigated. Parental attitude was measured by the question: how do your parents react on your alcohol use (or, in case the respondents don’t use or the parents don’t know about it: how do you think they would react)? Since this study wants to investigate if a negative parental attitude is associated with a higher risk for adolescent alcohol use, it was

decided to dichotomise this variable in: negative (those answering their parents: forbid it, discourage it; tell them to drink less) and neutral/positive (those answering: don't discuss it or parents approve of drinking). Parental alcohol use was assessed by asking respondents how often their parents drank alcohol (answer categories: never, now and then, weekly, daily, don't know/don't want to answer the question). These answers were recoded into two categories: never/now and then (reference category) versus weekly/daily. The categories don't know/don't want to answer (N=340; 1,7%) were recoded as missing values.

### *Analyses*

Two characteristics of the data needed to be taken into account in the analysis. First, students from the same class were drawn as a cluster. A cluster sample will not affect point estimates, such as prevalence rates and hazard rates, but it does affect variance-related estimates, such as sample errors, 95% confidence intervals (95% CI) and p-values. Second, weights had to be applied. In order to obtain correct 95% CI and p-values in a reweighted and clustered sample, robust standard errors were obtained by means of the Huber/White/sandwich method as implemented in Stata (StataCorp, 2001). Analyses included prevalence estimates for four-week alcohol use and parental variables in 1992, 1996, 1999 and 2003. The strength of the association between demographic and parental variables were assessed by using (multivariate) logistic regression analyses. To investigate whether the strength of the association had changed over the investigated period (1992-2003), that is, whether year of survey interacted with demographic and/or parental variables, we used an additive, rather than a multiplicative model. Additive interaction is said to exist if the combined effect of year of survey and demographic or parental variable is stronger than the sum of the separate effects. Additive interactions cannot be tested directly in a logistic regression model, because logistic models are multiplicative. Therefore, we estimated additive interaction effects by using generalised

linear models with a binominal distribution and identity link function. All analyses were carried out with Stata (version 7.0) (StataCorp, 2001).

## **Results**

### *Trend in last month prevalence of alcohol use*

The results of table 1 show that over a period of 10 years there was a marked increase in last month prevalence, from 40.2% in 1992 to 56.8% in 2003. The results by gender, age group and ethnic status show that the increase in prevalence occurred in all subgroups, although not significant in the oldest age group and ethnic minority group .

### *(Changes in) demographic risk indicators*

The results of table 2 show that year of study, gender, age, and ethnicity are all significant risk indicators of last month alcohol use. The risk is higher for students included in the 1996, 1999 and 2003 survey as compared to 1992 (with OR's varying around 2) and for ethnic Dutch students. Being a girl and of a young age (12-14) lowered the risk for last month alcohol use. To investigate if the strength of these risk indicators changed over the period 1992-2003, interaction effects were calculated (table 3). The results of these analyses show that compared to 1992 the increase in risk in 1996 and 1999, was less strong among girls than among boys (risk differences were respectively 4 and 5%). However, in 2003 the risk difference between boys and girls was back to the 1992 level. The results for age show that between 1992 and 2003 the increase in risk for last month alcohol use was stronger among the younger age group (i.e. 12-14 years) as compared to the 15 and 16 year olds (risk difference: 9%). Significant interaction effects were also found for the variable ethnicity, with ethnic Dutch students showing a stronger increase in risk (10%) from 1992 to 2003 as compared to ethnic minority students.

*Trends in parental variables*

Table 4 shows the results of the student reports of perceived parental alcohol use and parental reactions on respondent's alcohol use (expected or experienced depending on respondents alcohol use status and parents knowing about it). The prevalence of perceived weekly or daily drinking by the parents was stable during the period 1992-1999 (around 37%) but increased sharply to 49% in 2003. Parental attitude shows a similar pattern, stable around 37% between 1996 and 1999 (data from 1992 are not available) followed by an increase in 2003 (50%).

*(Changes in) parental risk indicators*

The results of table 5 show that the parental variables are strong risk indicators of last month alcohol use of the respondents. Respondents reporting that their parents are weekly or daily alcohol users are at higher risk for last month alcohol use, so are respondents who report that their parents (would) approve the alcohol use or don't discuss it. Additional analyses showed that this was independent of parents own drinking pattern: when correcting for parental alcohol use the strength of the association was reduced only slightly and parental attitude remained a strong and significant risk indicator (OR: 3.97, 95% CI: 3.62-4.34). A similar result was found when parental alcohol use was corrected for parental attitude, the strength of the association with last month alcohol use was slightly reduced but still significant (OR: 2.0, 95% CI: 1.8-2.2). It should be noted that these analyses were performed on the 1996-2003 data, because parental attitude was not measured in the 1992 survey. These findings suggest that, a negative parental attitude is associated with a lower risk for adolescents alcohol use, also among parents who are regular drinkers.

Table 6, presenting the results of analyses on the interaction of year of study and parental variables, indicates that there were no significant changes in the strength of the risk indicator

‘parental attitude’ during the observed period. However, the association between parental alcohol use and respondents alcohol use, was significantly stronger in 1996 and 2003 as compared to 1992, i.e. an increase of the risk difference with 5 respectively 6%.

## **Discussion**

### *Limitations*

Potential limitations of this study include the reliance on self-report data. First, responses to sensitive questions about undesirable or illegal behaviour may be biased. However, the administration of the questionnaires in school classes and assuring anonymity, as was done in this study, may have helped to generate reliable and valid data (Smit et al., 2002). Second, information on the parents was obtained from the respondents and thus probably differed from results that would have been obtained if the parents themselves were interviewed. However, in this study we are primarily interested in the perceptions of the respondents and the relation with their own alcohol use and not so much in the actual situation. The same argument applies to the fact that the question on parental attitude is hypothetical for some respondents because they do not (yet) drink, while for others their parents have actually expressed their reaction towards their alcohol consumption.

Finally, there are some limitations with respect to the representativeness of the sample. The sampling method used in 2003 was somewhat different from the previous waves. A weighting procedure was applied to all surveys to ensure comparability between the waves, unfortunately in the 1992 and 1996 survey information on urbanisation level was not available while the 1999 and 2003 surveys had shown that this factor was related to alcohol use. However, additional analyses showed that urbanisation level differences were for a large part

due to differences in the ethnic composition, a variable that was adjusted for in the multivariate analyses.

### *Key findings*

With these limitations in mind, this study showed that over the past 10 years there was an increase in the percentage of adolescents reporting that they drank alcohol recently (i.e. in the month previous to the survey). A higher age, being male and of ethnic Dutch origin were all significant risk indicators of last month alcohol use. The strength of these risk indicators varied over the investigated period. Most importantly the risk for last month alcohol use increased stronger among the youngest age group (12-14 year) as compared to the 15 and 16 year olds, thus confirming our hypothesis that alcohol consumption has grown especially in the youngest age groups. The results of this study did not confirm the expected decrease of the gender gap in alcohol consumption; in contrast, from 1992 to 1999 the risk increased stronger in boys than in girls. However, in 2003 the gender risk difference returned to the 1992 level. Contrary to our expectation, the difference between ethnic Dutch and ethnic minority students increased, due to a much stronger raise in alcohol consumption among the ethnic Dutch students. Finally, the data showed a strong association between adolescents' alcohol use and parental attitude, independent of parents own alcohol use, and confirmed the expectation of a growing tolerance of parents for the alcohol use by their children, that seemed to be paralleled by growing alcohol consumption in the parents of the children.

### *Trends in alcohol consumption*

Our hypothesis of a rise in alcohol consumption over the last 10 years was confirmed. Last month prevalence rates increased significantly, especially from 1992 to 1996. Logistic regression analyses confirmed the overall time trend: while adjusting for gender, age and

ethnic status, year of survey was a significant risk indicator for last month alcohol use, with highest Odds Ratio's found in 2003 (ref. 1992).

In this study, last month prevalence rates among boys were slightly higher than among girls, but did not differ significantly in any of the survey years. This finding was in line with the Dutch Twin Study concluding that there were no gender differences among the 12-15 year olds (Poelen et al., 2005), although their conclusion seems to be based mainly on the results on the drunkenness measures, while measures on life time prevalence, frequency of drinking and quantity of drinking did show gender differences in some years. Multivariate analyses revealed that girls as compared to boys were at a small but significantly lower risk for last month alcohol use. In 1996 and 1999 these gender differences increased, but returned in 2003 to the 1992 level. We have no explanation for this gender specific trend. Possibly the downward shift in 2003 is related to the pre-mixes and alcopops, which during the period 1999-2003 became increasingly popular among this age group, especially among girls.

The results of this study showed an increasing ethnic difference, with much higher prevalence rates among ethnic Dutch as compared to ethnic minority students. This was contrary to our hypothesis that an increasing integration of ethnic minority groups into the Dutch society would affect their alcohol use patterns as well. However, although our data showed an increase in last month prevalence among the ethnic minority groups, this trend was much stronger among the ethnic Dutch students. Possibly this is explained by the fact that the majority of ethnic minority groups in the Netherlands is Islamic. The Islamic religion has strong rules, opposing alcohol use and this influence is possibly so strong that it neutralizes factors increasing the risk for alcohol use.

Our hypothesis that the increase in alcohol use over the past decade was particularly strong in the youngest age groups was confirmed. Last month prevalence of alcohol use among the 12-14 year olds almost doubled over the last decade while prevalence rates among the 15-16 year

olds increased, but much slower. Furthermore, while the overall increase appeared to have occurred especially in the period 1992-1996, the youngest age group also showed an increase in recent years. The results of the analysis on interaction effects of year of study and age group confirmed this finding, with a 9% extra increase in prevalence rates in 2003 among the youngest age group as compared to the 15 and 16 year olds. Thus, although prevalence rates among the 15 and 16 year olds are still significantly higher, the gap with the younger age group is decreasing, especially in recent years. Poelen et al., (2005) in a sample of 12-30 year old Dutch twins, came to a similar conclusion, i.e. an increase in drinking frequency from 1993 to 2000, especially among the 12-15 year olds. Lintonen et al. (2000) found significant increases in monthly alcohol use from 1991-1999 among Finnish 14 year olds and 16 year old girls, but not among the 12 year olds. Welte et al., (1999) studying adolescent alcohol trends from 1983 to 1994, observed an increase in the average daily alcohol consumption from 1990-1994. These trends occurred in all demographic groups (i.e. gender and ethnicity), but an interaction effect was found for year of survey and grade level, indicating that the increase in alcohol use was strongest in the youngest age groups. The reason for this age specific increase in alcohol use in the Netherlands is still unclear, but several explanations can be put forward. As Poelen et al. (2005) suggest, a possible explanation is the introduction of alcopops and pre-mixes and the popularity of these drinks especially among young adolescents. In 2003 pre-mixes were the most popular drinks among 12-13 year olds and 14-18 year old girls, while boys of this age group preferred beer, but were also frequent consumers of pre-mixed drinks (Monshouwer et al., 2004). However, this could only offer an explanation for the recent increase, because in the period 1992-1996 alcopops and pre-mixes were not introduced yet. Lintonen et al. (2000) suggested that changes in adolescent alcohol use in Finland were related to macro-economic developments, although the authors note that an economic recession in 1991-1993 did not decrease drunkenness. In the Netherlands adolescent income

does not seem to be of importance, as this seemed to increase only slightly over the period 1996-2003 (NIBUD, 2002; 2005). Furthermore, in the youngest age group (12-14 years) the majority of adolescents does not purchase alcoholic drinks themselves (Monshouwer et al., 2004), although the percentage of young adolescents spending money on alcohol seemed to have increased since 1999 (NIBUD, 2005). Another explanation for observed trends in the Netherlands is an increasing tolerance for alcohol use by young adolescents, resulting in an increasing availability. Compared to other countries alcohol policies are lenient: only selling of alcohol to underage people is illegal (16 years for light alcoholic beverages like beer and wine and 18 years for strong alcoholic beverages) and not the use alcohol it self. Furthermore, these criteria do not always prevent young people from buying alcohol. For example in 2005 almost one quarter of adolescents younger than 16 years, bought alcohol when going out (in pubs, disco's etc) (Bieleman, Kruize, Nienhuis, 2006 ). Trend data from 2001-2005 showed no significant changes in the percentage of underage adolescents succeeding in buying light alcoholic beverages when going out, because this percentage had already risen to its maximum for that age (85% or more) (Bieleman, Kruize, Nienhuis, 2006).

A final explanation for observed trends in adolescent alcohol use could be found in parental factors. The present study showed that parental factors, especially parental attitude was strongly related to adolescent alcohol use, with permissive parents increasing the risk for adolescent alcohol use. These strength of this associations did not change between 1996 and 2003, suggesting that the influence of parents on their children's alcohol use did not change over the investigated period. Several studies support these findings and suggest that parental attitude can influence alcohol use patterns by their children. For example Ary et al. (1993) concluded from a 1-year prospective study that parental attitude towards alcohol use by their children was strongly related to change in adolescent alcohol use. A recent Dutch study showed strong associations between alcohol-specific socialization (particularly of enforcing

rules) and adolescent alcohol use (Van der Vorst et al., 2005). This association was found for younger as well as older adolescents. Gerrard et al. (1999) in a longitudinal study found that the perceptions of parents of 'a young person who drinks frequently' were predictive of adolescent alcohol use three years later, i.e. a more favourable perception increased the risk of alcohol use. This effect was strongest in adolescents who did not associate with drinking peers. Welte et al. (1999) found trends in parental attitude consistent with trends in adolescent alcohol use, i.e. a lowering trend in parental disapproval was paralleled by an increase in adolescent alcohol use, although it should be noted that this does not necessarily mean that these trends are related. The results of the present study further showed that parental attitude was significantly related to adolescent alcohol use, also when the results were adjusted for parents own alcohol use. These findings are in line with Van der Vorst et al. (2005) finding that parental drinking didn't influence the relation between alcohol-specific socialization practices and adolescent's alcohol use. Thus, there are strong indications that parental permissiveness is a strong risk indicator for adolescent alcohol use. Therefore it is alarming that the results of the present study show that in recent years, parents appear to become more lenient towards alcohol use by their (young) children. The reason for this trend is unclear, possibly parents are less informed in recent years on the risks of alcohol use by young people. In addition, they might underestimate the alcoholic content of pre-mixes and breezers. Barnes et al. (1999) showed that parental monitoring predicted alcohol consumption by their children. Possibly parental monitoring is decreasing in recent years and parents are expecting their children to be able to make their own choices and find their own way at a younger age. Finally, changing parental attitudes and alcohol consumption patterns may be the result of a cohort effect, as the generation of parents of adolescents in the 2003 survey was among the first generations that grew up with a considerable alcohol lenience and growing alcohol consumption patterns while they were young (Van Laar et al., 2005)

Finally, from 1999 to 2003 an increasing number of respondents reported their parents to be weekly or daily users of alcohol. This is surprising because there are no indications that overall alcohol consumption has increased (Van Laar et al., 2005). Thus, it seems that parental alcohol use is more visible for adolescents, possibly because of a change in drinking patterns, i.e. more during meals when children are not in bed yet or maybe parents are less hesitant in drinking alcohol when their children are present. The results of our study showed that parental alcohol use and their children's alcohol use were related. Results of other studies confirm this finding (e.g. Yu, 2003; Gerrard et al., 1999; Ary et al., 1993). Thus, the trend found in this study might partially explain the observed increase in last month prevalence. Although it should be noted that parental attitude appeared to be a much stronger risk indicator, independently of parental alcohol use. Interaction analyses showed that the association between parental alcohol use and adolescent alcohol use was slightly stronger in 2003 as compared to 1992. We have no explanation for this finding.

### *Implications*

The results of this study, underscores the importance of the systematic monitoring of alcohol use in adolescents. This should be done on demographic subgroup level, because our data showed that certain subgroups may especially be at risk. Current preventive activities should focus on the young adolescent age groups and on their parents. The current literature indicates the need to curb the observed trend of an increasing permissiveness of parents towards alcohol use by their children. The causes for this trend are not clear, but possibly it is related to a lack of parental knowledge of the negative effects of alcohol use in young children or an underestimation of their role in their children's alcohol use behaviour.

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Table 1: 4-week prevalence with 95% confidence interval (95% CI) in 1992, 1996, 1999 and 2003 for the total sample and by gender, age, ethnicity (in %)

	1992	1996	1999	2003
<i>Total sample</i>	40.2	52.7 <sup>a</sup>	51.3	56.8
<i>Gender</i>				
Boys	42.0	56.3 <sup>a</sup>	56.2	58.1
Girls	38.4	49.0 <sup>a</sup>	46.7	55.5
<i>Age group</i>				
12-14	24.2	40.6 <sup>a</sup>	37.7	47.0 <sup>a</sup>
15-16	61.0	70.8	73.2	74.0
<i>Ethnic status</i>				
Ethnic Dutch	42.7	57.7 <sup>a</sup>	55.9	61.2
Ethnic minority	23.9	30.5	29.8	33.8

<sup>a</sup> Significant difference compared to the previous survey (95% CI did not overlap)

Table 2: Demographic risk indicators of last month alcohol use, results of unadjusted and adjusted<sup>a</sup> analyses (OR, 95% CI)

	OR	95% CI	adj OR	95% CI
Survey (ref 1992)				
1996	1.66	1.33-2.06	2.00	1.70-2.36
1999	1.56	1.28-1.92	1.94	1.65-2.29
2003	1.96	1.64-2.34	2.51	2.18-2.89
Girls (ref boys)	0.80	0.75-0.85	0.76	0.72-0.81
Young age <sup>b</sup> (ref 15-16 years)	0.27	0.24-0.30	0.23	0.21-0.25
Ethnic Dutch (ref. ethnic minority)	2.80	2.41-3.25	3.52	3.00-4.14

<sup>a</sup> For all other variables in the model (year of survey, gender, age, ethnic status)

<sup>b</sup> 12-14 years

Table 3: Main and interaction effects<sup>a</sup> of year of survey and demographic risk factors (gender, age and ethnic status) on last month alcohol use, analysed in three separate models, while adjusting for all other main effects (year of survey, gender, age, ethnic status). Results of generalised linear modelling with a binominal distribution<sup>b</sup> and identity link function.

	adj coefficient	p-value
<b>Model 1: Gender</b>		
Girl (ref boy)	-0.03	0.02
Year of survey (ref. 1992)		
1996	0.16	<0.01
1999	0.16	<0.01
2003	0.18	<0.01
Girl*survey (ref. 1992)		
1996*girl	-0.04	0.02
1999*girl	-0.05	<0.01
2003*girl	0.00	ns
<b>Model 2: Age</b>		
Young age <sup>c</sup> (ref 15-16 years)	-0.37	<0.01
Year of survey (ref. 1992)		
1996	0.11	<0.01
1999	0.13	<0.01
2003	0.14	<0.01
Young age*survey (ref. 1992)		
1996*young age	0.07	ns
1999*young age	0.02	ns
2003*young age	0.09	<0.01
<b>Model 3: Ethnic status</b>		
Ethnic Dutch (ref. ethnic minority)	0.17	<0.01
Year of survey (ref. 1992)		
1996	0.08	0.01
1999	0.08	0.04
2003	0.10	<0.01
Ethnic Dutch*survey (ref.1992)		
1996*ethnic Dutch	0.09	<0.01
1999*ethnic Dutch	0.07	ns
2003*ethnic Dutch	0.10	<0.01

‘Ns’ denotes coefficients not significantly different from 0.00 (p≥0.01)

<sup>a</sup> Coefficients are risk differences

<sup>b</sup> Because of estimation problems the interaction effects for young age were estimated with a Gaussian distribution

<sup>c</sup>12-14 years

Table 4: Trends in parental alcohol use and parental attitude (as reported by the students)

	1992	1996	1999	2003
<i>Parental alcohol use</i>				
No use or less than weekly	63.9	61.2	63.2	51.3 <sup>a</sup>
Weekly or daily use	36.1	38.8	36.8	48.7 <sup>a</sup>
<i>Parental attitude</i>				
Negative	Na	63.0	62.5	49.7 <sup>a</sup>
Neutral/positive	Na	37.0	37.6	50.3 <sup>a</sup>

NA: data not available because question was not included in the 1992 survey

<sup>a</sup> Significant difference compared to the previous survey (95% CI did not overlap)

Table 5: Parental risk indicators of last month alcohol use, results of unadjusted and adjusted<sup>a</sup> analyses (OR, 95% CI)<sup>b</sup>

	OR	95% CI	adj OR	95% CI
Parents drink weekly or daily <sup>c</sup>	2.67	2.44-2.92	2.30	2.13-2.48
Parents have neutral or positive attitude <sup>d</sup>	5.99	5.38-6.67	4.37	3.98-4.79

<sup>a</sup> Adjusted for all main effects included in table 2 (year of survey, gender, age and ethnic status)

<sup>b</sup> Results do not include 1992 survey (not available in 1992 dataset)

<sup>c</sup> Reference group: no use or less then weekly use of alcohol

<sup>d</sup> Reference group: parents have a negative attitude (discourage or forbid use)

Table 6: Main and interaction effects<sup>a</sup> of year of survey and parental risk factors (parental alcohol use and parental attitude) on last month alcohol use, analysed in two separate models, while adjusting for confounding factors (year of survey, gender, age, ethnic status). Results of generalised linear modelling with a binominal distribution and identity link function.

	coefficient	p-value
<b>Model 1: Parental alcohol use</b>		
Weekly or daily parental use (ref. no use or less than weekly)	0.13	<0.01
Year of survey (ref. 1992)		
1996	0.11	<0.01
1999	0.11	<0.01
2003	0.12	<0.01
Parental alcohol use*survey (ref. 1992)		
1996*weekly or daily parental use	0.05	0.03
1999* weekly or daily parental use	0.04	ns
2003* weekly or daily parental use	0.06	<0.01
<b>Model 2: Parental attitude</b>		
Parents neutral/positive (ref. negative)	0.33	<0.01
Year of survey (ref. 1996) <sup>b</sup>		
1999	-0.01	ns
2003	0.02	ns
Parents neutral/positive (ref. 1996) <sup>3</sup>		
1999*parents neutral/positive	0.00	ns
2003*parents neutral/positive	-0.03	ns

<sup>c</sup>‘Ns’ denotes coefficients not significantly different from 0.00 (p≥0.01)

<sup>a</sup> Coefficients are risk differences

<sup>b</sup> The variable ‘parental attitude’ was not included in the 1992 survey