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ALCOHOL CONSUMPTION, ALCOHOL-RELATED PROBLEMS, PROBLEM DRINKING, AND SOCIOECONOMIC STATUS

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Abstract — In general, a lower socioeconomic status (SES) is related to a lower health status, more health problems, and a shorter life expectancy. Although causal relations between SES and health are unclear, lifestyle factors play an intermediate role. The purpose of the present study was to obtain more insight into the relation between SES, alcohol consumption, alcohol-related problems, and problem drinking, through a general population survey among 8000 people in Rotterdam. Odds ratios were calculated using educational level as independent, and alcohol consumption, alcohol-related problems, and problem drinking as dependent variables. Abstinence decreased significantly by increasing educational level for both sexes. For men, excessive drinking, and notably very excessive drinking, was more prevalent in the lowest educational group. For women, no significant relation between educational level and prevalence of excessive drinking was found. After controlling for differences in drinking behaviour, among men the prevalence of 'psychological dependence' and 'social problems' was higher in intermediate educational groups, whereas prevalence of 'drunkenness' was lower in intermediate educational groups. For women, a negative relation was found between educational level and 'psychological dependence'; prevalence of 'symptomatic drinking' was higher in the lowest educational group. Prevalence of problem drinking was not related to educational level in either sex. It is concluded that differences exist between educational levels with respect to abstinence, but only limited differences were found with respect to excessive drinking. Furthermore, there is evidence for higher prevalences of alcohol-related problems in lower educational levels, after controlling for differences in drinking behaviour, in both sexes.

INTRODUCTION

During the last decade, much research has been done on the relation between socioeconomic status (SES) and health. Available evidence shows important differences in health between people in relation to their SES. These differences are mostly to the disadvantage of people in lower socioeconomic groups, and find expression in a wide range of health indicators, including subjective health, health complaints, chronic diseases, and mortality (Townsend, 1988*a*,*b*; Mackenbach, 1992). The reduction of existing socioeconomic health differences is an important target of the WHO programme 'Health For All By The Year 2000' (World Health Organization, 1985). Causal relations between SES and health are still largely unclear, but lifestyle factors, such as smoking, dietary habits, and alcohol consumption, are likely to play an important intermediate role. Therefore, information on prevalence of 'at risk' lifestyles by SES in the general population is of great importance. In this way, the identification of high-risk subpopulations in terms of SES can provide indications for further development of prevention programmes and health promotion activities.

To achieve a reduction in socioeconomic health differences, in which excessive alcohol consumption might play a role, knowledge of prevalences of excessive alcohol use and alcohol-related (health) problems in relation to SES is of particular interest. In the literature, different interpretations of the role of alcohol in the relationship between SES and health are given. One line of research suggests that individuals from different socioeconomic groups have a different attitude towards risk behaviour and self-efficacy. It is suggested that individuals with a higher SES

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are more aware of the consequences of their behaviour, and therefore more prone to make healthier choices (Kenkel, 1991). Other findings in the literature suggest the possibility that (excessive) alcohol consumption might lead to a lower income and educational level (Cook and Moore, 1993; Ruhm, 1995; Mullahy and Sindelar, 1996).

The relation between alcohol consumption, drinking patterns, alcohol-related problems, and SES seems to be complex. In general population studies, a higher prevalence of abstinence in lower socioeconomic groups is found, for both men and women (Cummins *et al*., 1981; Knupfer, 1989; Romelsjö, 1989; Hulshof *et al*., 1991; Knibbe and Swinkels, 1992; Bennett *et al*., 1996; Marmot, 1997). In most general population studies, a higher prevalence of light or moderate drinking is found in higher socioeconomic groups, for both sexes (Cummins *et al*., 1981; Jacobsen, 1989; Knupfer, 1989; Hulshof *et al*., 1991; Knibbe and Swinkels, 1992; Bennett *et al*., 1996; Marmot, 1997). A study among a representative sample of the general youth population also showed a higher prevalence of abstinence in lower socioeconomic groups, but, contrary to findings in other studies, it was found that lower socioeconomic groups reported more frequent drinking (Crowley, 1991). In a number of studies, no relation at all was shown between social class and moderate alcohol consumption in either sex (Romelsjö, 1989; Clarke *et al*., 1990). In a study by Braddon *et al*. (1988), no relation between moderate alcohol consumption and social class for men and a negative relation for women, was found.

As regards the relation between excessive alcohol consumption and socioeconomic class, less is known than about socioeconomic class and abstinence. Studies so far have shown inconsistent results. In several general population studies, it was found that education was negatively associated with heavy alcohol consumption in both sexes (Cummins, 1981; Knupfer, 1989; Hulshof *et al*., 1991; Tejera *et al*., 1991). Results from other studies showed a negative relation between heavy alcohol consumption and SES for men, and a positive relation for women (Knibbe and Swinkels, 1992), a negative relation for men and no relation for women (Tenconi *et al*., 1992) or no relation for men and a positive relation for women (Marmot, 1997).

Little is known about the relation between SES and problem drinking, although it is stated in the literature that more information is needed about the kinds of alcohol-related problems associated with SES (Knupfer, 1989). The reasons for this lack of information are that alcohol-related problems are not measured, and the absence of sufficient numbers of respondents in most studies. In the Whitehall II Study (Marmot, 1997), psychological problems associated with alcohol consumption were measured using the CAGE questionnaire. For men, no relation was found between SES and prevalence of positive cases on the CAGE. For women, a positive relation between SES and prevalence of positive cases was found. However, prevalence of heavy alcohol consumption among women varied from 3.2% in the lowest, to 29.8% in the highest, socioeconomic group, and prevalence of alcohol-related problems only varied from 4.2 to 14.3% among those groups.

Possible explanations for the inconsistencies found in the literature may be that heavy alcohol consumption was not defined in the same way in all studies, and that different indicators for SES were used. Furthermore, inconsistencies might be due to the fact that results were based on studies from different countries or different regions within a country, with different drinking cultures and attitudes towards alcohol-related problems. However, differentiating between ‘wet’ countries and ‘dry’ countries did not lead to clarification of the inconsistencies.

To obtain more insight into the relationship between SES, alcohol consumption and problem drinking, the present study was set up. The first research question dealt with the relationship between SES and alcohol consumption in the general population, taking into account different patterns of excessive alcohol consumption. The second research question investigated the relation between SES and alcohol-related problems in the drinking population, taking into account the possible influence of differences in alcohol consumption between the different socioeconomic groups.

METHODS

Data collection

This study was part of a large scale general population survey called ‘Risky Lifestyles in

Rotterdam'. For this survey, a random sample of 8000 people was drawn from the municipal population register of Rotterdam. The sample included inhabitants between 16 and 69 years of age and, to avoid language problems, persons with at least Dutch nationality. Data collection took place in spring 1994 by postal questionnaire and personal interview (7500 and 500 people respectively). Personal interviewing of 500 people was carried out to allow for valid comparison with results of earlier surveys. The overall response rate was 44.2% ($n = 3537$); for the postal and the personal interviews, the response rates were respectively 43.9% ($n = 3287$) and 50% ($n = 250$). No differences were found in self-reported drinking habits by the method of data collection (Bongers and van Oers, 1998). The response, however, was found to be selective towards sex and age, i.e. women between 16 and 44 years of age were most likely to respond, and men were least likely to respond. Therefore analyses were carried out using a data set weighted by sex- and age-specific response rates (Bongers *et al*., 1997*a*).

Measurements

Alcohol consumption was measured using the quantity–frequency–variability method, as described by Garretsen (1983). In this method, four questions are asked: (1) 'which alcoholic drinks do you usually drink when you drink?'; (2) 'how many days a month do you drink on average?'; (3) 'if you drink alcohol, how many glasses do you drink on average?'; (4) 'have you ever drunk six or more glasses on 1 day during the past 6 months?'. Based on these four measurements, an alcohol-consumption index is generated, distinguishing the categories of abstainers, light drinkers, moderate drinkers, and excessive drinkers (Bongers *et al*., 1997*b*). For this study, the group of excessive drinkers was further subdivided into three different excessive drinking pattern subgroups: (1) the 'very excessive drinkers', drinking on 21 or more days a month six or more glasses a day; (2) the 'irregular excessive drinkers', drinking on 9 to 20 days a month six or more glasses a day; (3) the 'regular excessive drinkers', drinking on 21 or more days a month four or five glasses a day.

The measurement of alcohol-related problems was based on the concept introduced by Cahalan (1976). In this concept, the five problem areas of psychological dependence, symptomatic drinking, social problems, health problems/accidents, and frequent drunkenness and/or hangovers, are distinguished. Problems in each problem area are measured by a variable number of questions. Based on the number of problems reported, subjects are categorized as having no, moderate or severe problems in a problem area scoring 0, 1 or 2 points respectively. Subsequently, the scores in the five separate problem areas are summed up and form a problem index, ranging from 1 to 10. Having alcohol-related problems is defined by scoring one or more points on the problem index (Garretsen, 1983; Bongers *et al*., 1997*b*).

Problem drinking was defined as a combination of alcohol-related problems and a certain level of drinking. To be classified as a problem drinker, a person had to score at least one point on the problem index. To ascertain that these problems are alcohol-related, the person in question also had to drink excessively, or once or twice a week drink six or more glasses.

Indicators for SES at the individual level focus mainly on the field of income, education, and occupation. Although income, education, and occupation show strong mutual correlations, each of these indicators is partially referring to different aspects of SES (Liberatos *et al*., 1988). Income reflects access to material goods, education reflects access to non-material goods, and occupation reflects the power and prestige associated with specific jobs. In general population surveys, measurement of SES by educational level has advantages above income or occupational level. Thus all respondents have a certain level of education, whereas not all respondents (especially women) have a personal income or occupation. Furthermore, income as an indicator of SES has the practical disadvantage that a relatively large proportion of the respondents are reserved in giving information about their income. Therefore, in this survey, SES of a respondent is measured by the highest educational level. This was classified into five categories: (1) primary school; (2) lower vocational or lower general; (3) intermediate vocational, intermediate or higher general; (4) higher vocational; (5) university.

Analysis

Prevalence figures for abstinence, excessive drinking, excessive drinking patterns, alcohol-

Table 1. Number of respondents by educational level in the total population and the drinking population

Population and gender	Educational level[a]					Total
	1	2	3	4	5	
Total population						
Men	146	549	409	275	267	1646
Women	194	777	451	220	147	1789
Drinking population						
Men	107	478	357	254	256	1452
Women	98	576	357	194	140	1365

[a]1, Primary school; 2, lower vocational/general; 3, intermediate vocational and intermediate/higher general; 4, higher vocational; 5, university.

related problems, and problem drinking were calculated for men and women separately for all subpopulations defined by educational level. Prevalence figures for abstinence were based on the total population; all other prevalences were based on the drinking population. Significance was tested at the 5% level by the χ^2 statistic or Fisher's exact test, when expected frequencies were lower than 5 in more than 20% of the cells.

Logistic regression was performed to calculate odds ratios with 95% confidence intervals for abstinence, excessive drinking, excessive drinking patterns, alcohol-related problems, and problem drinking. Educational level was used as an independent variable, using the highest educational group as the reference category. In the analysis of abstinence, excessive drinking and excessive drinking patterns, age was controlled for. Controlling for age was done to make a comparison of the drinking behaviour between the educational classes, which is not influenced by different age-structures between the different classes. In the analysis of alcohol-related problems and problem drinking, age and alcohol consumption were controlled for. This was done to make a comparison of alcohol-related problems and

Table 2. Prevalence of abstinence (total population), excessive drinking, and excessive drinking patterns (drinking population) by educational level

Drinking status	Educational level[a]					χ^2 (d.f.)	*P*	*n*
	1	2	3	4	5			
Abstinence (in total population)								
Men	26.0	12.5	12.6	7.6	4.3	46.69 (4)	0.00	1646
Women	48.2	25.8	21.1	11.6	4.8	109.89 (4)	0.00	1789
Excessive drinking (in drinking population)								
Men	24.0	16.7	18.1	14.0	12.6	8.77 (4)	0.07	1452
Women	4.2	3.8	2.8	3.1	3.0	0.98 (4)	0.91	1365
Excessive drinking patterns (in drinking population)								
Very excessive drinking								
Men	17.1	6.5	6.3	3.3	2.4	31.84 (4)	0.0	1452
Women	3.1	1.7	0.2	0.5	0.0	10.04 (4)	0.04[b]	1365
Irregular excessive drinking								
Men	3.6	4.0	5.1	5.9	6.6	3.05 (4)	0.55	1452
Women	0.0	0.7	1.9	1.3	1.8	4.01 (4)	0.40[b]	1365
Regular excessive drinking								
Men	3.5	6.3	6.9	5.1	3.6	4.53 (4)	0.34	1452
Women	1.2	1.4	1.0	1.3	1.2	0.32 (4)	0.99[b]	1365

[a]Educational levels are as in Table 1.
[b]Too many cells with expected frequency < 5.

problem drinking between different educational classes, which is not influenced by differences in age-structures and drinking behaviour between the different classes. Odds ratios are presented before (crude) and after (controlled) controlling for the variables mentioned. Analyses were carried out using the SPSS/PC+ 4.0 program.

RESULTS

Abstinence, excessive drinking, and drinking patterns

In Table 1, the number of respondents in each educational group is given, for the total and the drinking populations separately. Percentages and odds ratios in all other tables are based on these numbers of respondents.

The results in Table 2 show significantly decreasing prevalences of abstinence by increasing level of education for both sexes. Notable is the decreasing gender difference by increasing educational level. At lower educational levels, the percentage abstainers for women is about twice as high as for men, whereas, at the highest educational level, the percentage is almost the same for men and for women. No significant differences in the prevalence of excessive drinking were found between educational levels for both sexes. For men, analysis of specific excessive drinking patterns showed significant differences in prevalence between educational levels in the category 'very excessive drinking' only. For women, similar results were obtained, but it must be noted that the number of respondents was small.

Logistic regression, when controlling for age, led to similar results for both sexes for the relation between educational level and abstinence (Tables 3 and 4). With respect to excessive drinking, a significantly higher prevalence of excessive drinking was found in the lowest educational category for men. Also a significantly higher prevalence of 'very excessive drinkers' for men was found in the lowest educational category. For men, 'irregular excessive drinking' and 'regular excessive drinking' did not show any differences between educational groups. For women, no significant results were obtained for any type of excessive drinking pattern.

Table 3. Differences in abstinence (total population), excessive drinking, and excessive drinking patterns (drinking population) among men by educational level: odds ratios before and after controlling for age, with 95% confidence intervals

Drinking status	Odds ratios [95% confidence intervals] for educational level[a]				
	1	2	3	4	5
Abstinence (in total population; $n = 1646$)					
Crude	7.81[b] [3.86–15.83]	3.17[b] [1.66–6.04]	3.20[b] [1.65–6.21]	1.84 [0.88–3.86]	1
Controlled	11.82[b] [5.51–25.36]	3.88[b] [1.81–8.32]	3.14[b] [1.61–6.12]	2.03 [0.96–4.28]	1
Excessive drinking (in drinking population; $n = 1452$)					
Crude	2.20[b] [1.22–3.96]	1.40 [0.90–2.17]	1.53 [0.97–2.43]	1.13 [0.68–1.89]	1
Controlled	2.34[b] [1.25–4.40]	1.35 [0.85–2.13]	1.50 [0.95–2.39]	1.11 [0.66–1.86]	1
Excessive drinking patterns (in drinking population; $n = 1452$)					
Very excessive drinking					
Crude	8.34[b] [3.21–21.67]	2.82 [1.17–6.80]	2.72 [1.10–6.76]	1.36 [0.47–3.93]	1
Controlled	6.05[b] [2.22–16.52]	2.05 [0.83–5.03]	2.69 [1.07–6.73]	1.12 [0.39–3.27]	1
Irregular excessive drinking					
Crude	0.54 [0.17–1.73]	0.59 [0.30–1.17]	0.77 [0.39–1.53]	0.88 [0.43–1.83]	1
Controlled	1.53 [0.43–5.38]	0.96 [0.48–1.95]	0.77 [0.39–1.55]	1.08 [0.52–2.26]	1
Regular excessive drinking					
Crude	0.98 [0.27–3.48]	1.82 [0.85–3.89]	2.01 [0.92–4.38]	1.46 [0.61–3.49]	1
Controlled	0.75 [0.20–2.78]	1.48 [0.67–3.22]	1.93 [0.88–4.24]	1.31 [0.55–3.20]	1

[a]Educational levels are as in Table 1.
[b]Odds ratio significantly different from reference category.

Table 4. Differences in abstinence (total population), excessive drinking, and excessive drinking patterns (drinking population) among women by educational level: odds ratios before and after controlling for age, with 95% confidence intervals

Drinking status	Odds ratios [95% confidence intervals] for educational level[a]				
	1	2	3	4	5
Abstinence (in total population; $n = 1789$)					
Crude	18.59[b] [8.14–42.24]	6.93[b] [3.18–15.24]	5.33[b] [1.65–6.21]	2.62[b] [1.10–6.19]	1
Controlled	22.99[b] [9.86–53.57]	7.82[b] [3.56–17.20]	5.82[b] [2.38–11.70]	2.60[b] [1.09–6.19]	1
Excessive drinking (in drinking population; $n = 1365$)					
Crude	1.42 [0.35–5.80]	1.27 [0.44–3.68]	0.92 [0.29–2.94]	1.03 [0.29–3.66]	1
Controlled	1.30 [0.29–5.83]	1.08 [0.35–3.31]	0.92 [0.28–2.96]	1.01 [0.28–3.60]	1
Excessive drinking patterns (in drinking population; $n = 1365$)					
Very excessive drinking					
Crude	—	—	—	—	—
Controlled	—	—	—	—	—
Irregular excessive drinking					
Crude	—	0.38 [0.08–1.92]	1.04 [0.24–4.56]	0.73 [0.12–4.29]	1
Controlled	—	0.33 [0.06–1.86]	0.96 [0.21–4.28]	0.71 [0.12–4.23]	1
Regular excessive drinking					
Crude	1.00 [0.09–11.50]	1.16 [0.22–6.08]	0.81 [0.13–5.07]	1.06 [0.15–7.47]	1
Controlled	0.88 [0.47–1.64]	0.98 [0.17–5.65]	0.82 [0.13–5.25]	1.04 [0.15–7.35]	1

[a]Educational levels are as in Table 1.
[b]Odds ratio significantly different from reference category.

Alcohol-related problem areas and problem drinking

From Table 5, it is obvious that certain alcohol-related problems are more prevalent in lower educational categories. For men and women, this clear trend is found for the alcohol-related problem area 'psychological dependence' and for men it is also found for 'health problems'. Furthermore, Table 5 shows that 'drunkenness/hangover' is more prevalent for women in higher educational categories. Prevalence of problem drinking is about three to four times higher for men than for women at all educational levels. No significant differences between educational levels were found for problem drinking, for either sex alone.

When controlling for age and drinking behaviour, logistic regression analysis showed significantly higher prevalence of 'psychological dependence' and 'social problems' and a significantly lower prevalence for 'drunkenness/hangovers' for lower and intermediate educational levels, among men (Table 6).

In Table 7, results of the logistic regression analysis for women are shown. After controlling for age and drinking behaviour, a clear negative relation was found between SES and 'psychological dependence'. Also, 'symptomatic drinking' was higher in the lowest educational group. No significance was reached for the relation between educational level and problem drinking for men and women. For women, this is probably due to the small number of observations.

DISCUSSION

The purpose of this study was to obtain more insight into the relation between SES, alcohol consumption, and problem drinking, based on a survey among the general Rotterdam population. Before discussing the results of this study, attention will be paid to the possible effects of the response rate on the results of this survey.

During the last decades, non-response in Dutch national household surveys rose from 28% to about 50%; in the 1994 Dutch national health survey, the non-response was about 45% (Heer and Israels, 1992; Frenken, 1994). Besides this general observed increase in non-response in surveys, factors like data collection method, saliency of the research topic, location of the

Table 5. Prevalence of alcohol-related problems and problem drinking in the different problem areas (in the drinking population) by educational level

Problems	Educational level[a] 1	2	3	4	5	χ^2 (d.f.)	*P*	*n*
Alcohol-related problem areas								
Psychological dependence								
Men	21.0	20.4	17.3	13.3	10.2	15.25 (4)	0.00	1452
Women	20.5	14.7	12.0	13.8	4.3	14.35 (4)	0.01	1365
Symptomatic drinking								
Men	17.8	16.6	16.9	16.0	16.2	0.21 (4)	0.99	1452
Women	7.5	3.8	5.0	7.7	4.7	5.65 (4)	0.23	1365
Social problems								
Men	12.2	11.2	12.1	10.5	6.3	6.07 (4)	0.19	1452
Women	1.7	2.6	1.3	3.6	2.0	3.27 (4)	0.501[b]	1365
Health problems								
Men	13.7	8.9	5.2	3.2	3.6	21.50 (4)	0.00	1452
Women	0.0	1.5	0.8	1.3	0.6	2.33 (4)	0.68[b]	1365
Drunkenness/hangovers								
Men	13.1	12.3	13.3	16.2	19.7	8.43 (4)	0.08	1452
Women	1.0	2.2	4.0	5.7	8.3	16.61 (4)	0.00	1365
Problem drinking								
Men	20.9	19.3	16.5	14.4	17.1	3.77 (4)	0.44	1452
Women	5.3	2.5	2.9	5.9	5.9	8.13 (4)	0.09	1365

[a]Educational levels are as in Table 1.
[b]Too many cells with expected frequency < 5.

study, and nature of the organization performing the study play a role in the size of the non-response (Molenaar, 1991; Dillman *et al*., 1993; Hox and de Leeuw, 1994). So, considering the data collection method (in the majority of cases postal questionnaires), the low saliency of the research topic (risky lifestyles) and the location of the study (a highly urbanized city), the response rate of 44.2% in this study is in agreement with response rates in other survey research in The Netherlands.

As mentioned in the methodology section, response was shown to be selective towards sex and age. To correct for this, analyses were performed using a data set weighted by sex- and age-specific response rates (Bongers *et al*., 1997*a*). Due to the type of analysis, the results presented are not influenced by a response selective towards SES. However, it is important to know if the response is selective towards alcohol consumption and problem drinking and whether this selection is the same for all socio-economic groups. Follow-up studies among non-respondents of earlier Dutch alcohol surveys did not indicate that non-respondents generally drink more, or that alcohol abuse is more common among them (Garretsen, 1983; Lemmens *et al*., 1988). However, little is known about possible selectiveness towards drinking behaviour or problem drinking in different socioeconomic groups. A follow-up study among a sample of non-respondents in our study ($n = 131$) revealed that about 34% of the non-respondents ($n = 44$) could not be reached (addresses unknown, moved, chronically ill, dead) and 66% ($n = 87$) refused to co-operate with the survey. About 50% of the group refusers consisted of 'total refusers', who refused co-operation with any survey. Despite the small number of participants and the low willingness of the group to co-operate with this follow-up study, results indicate that non-response is unlikely to be selective towards SES, alcohol consumption or problem drinking (Jansen and Hak, 1996).

From this study, it can be concluded that abstinence is significantly related to SES: prevalence of abstinence is lower in higher educational groups, for both sexes. These results are consistent with findings in the literature

Table 6. Differences in problem drinking and alcohol-related problems in the different problem areas (in the drinking population) among men by educational level: odds ratios before and after controlling for age and drinking behaviour with 95% confidence intervals

	Odds ratios [95% confidence intervals] for educational level[a]				
Problems	1	2	3	4	5
Alcohol-related problem areas (in drinking population; $n = 1452$)					
Psychological dependents					
Crude	2.33[b] [1.19–4.56]	2.25[b] [1.41–3.60]	1.84[b] [1.12–3.01]	1.35 [0.78–2.34]	1
Controlled	1.91 [0.87–4.22]	1.76[b] [1.03–3.00]	1.75[b] [1.02–3.00]	1.42 [0.78–2.60]	1
Symptomatic drinking					
Crude	1.12 [0.59–2.11]	1.03 [0.68–1.56]	1.05 [0.68–1.63]	0.99 [0.61–1.58]	1
Controlled	0.91 [0.39–2.14]	0.86 [0.51–1.45]	0.95 [0.56–1.59]	1.05 [0.60–1.84]	1
Social problems					
Crude	2.07 [0.87–4.88]	1.88[b] [1.04–3.40]	2.05[b] [1.12–3.75]	1.74 [0.90–3.33]	1
Controlled	2.93 [0.91–9.44]	2.42[b] [1.15–5.06]	3.03[b] [1.47–6.25]	3.21[b] [1.48–6.95]	1
Health problems					
Crude	4.25[b] [1.74–10.38]	2.61[b] [1.25–5.46]	1.48 [0.66–3.34]	0.90 [0.34–2.35]	1
Controlled	2.76 [0.89–8.55]	2.00 [0.85–4.72]	1.30 [0.52–3.25]	1.00 [0.35–2.85]	1
Drunkenness/hangovers					
Crude	0.62 [0.33–1.18]	0.57[b] [0.38–0.87]	0.62[b] [0.40–0.96]	0.79 [0.50–1.24]	1
Controlled	1.14 [0.43–3.04]	0.54[b] [0.30–0.97]	0.55[b] [0.31–0.99]	0.91 [0.50–1.68]	1
Problem drinking (in drinking population)					
Crude	1.28 [0.74–2.31]	1.16 [0.78–1.73]	0.96 [0.62–1.48]	0.82 [0.51–1.32]	1
Controlled	1.54 [0.41–5.71]	1.16 [0.53–2.57]	1.01 [0.44–2.30]	0.82 [0.34–2.00]	1

[a]Educational levels are as in Table 1.
[b]Odds ratio significantly different from reference category.

(Romelsjö, 1989; Knupfer, 1989; Knibbe and Swinkels, 1992; Bennett *et al.*, 1996; Marmot, 1997). Furthermore, gender differences in abstinence decrease with increasing educational level. A possible explanation for this might be that alcohol drinking by women is more widely accepted in higher socioeconomic groups. As the participation of women in the workforce increases, workplace influence may also be a factor.

Because of the higher prevalence of drinkers at higher educational levels, a higher prevalence of excessive drinking might also be expected. However, results indicate a significant increase in excessive drinking in the lowest educational group for men. Sub-division into different excessive drinking patterns leads to even more pronounced significantly higher odds ratios for the 'very excessive drinkers' specifically. No significant differences between educational groups were found for the 'irregular' and 'regular' excessive drinkers. These results indicate that only the 'very excessive' drinking pattern, which, in the long term, is the most health-threatening (e.g. leading to hepatitis, cirrhosis or Korsakoff's psychosis) seems to be related to educational level. The other excessive drinking patterns, which are more likely to be associated with problems, such as drink-driving, social problems, financial problems or problems with police/justice, were not related to educational level. Studies by Cummins *et al*. (1981), Knupfer (1989), Tejera *et al*. (1991), Hulshof *et al*. (1991), Knibbe and Swinkels (1992), and Tenconi *et al*. (1992) are in line with our findings with regard to men. However, in the Whitehall II Study (Marmot, 1997), no relation was found between socioeconomic group and excessive drinking among men. Furthermore, in our study, as in the study of Tenconi *et al*. (1992), no association was found between educational group and excessive drinking among women. Results reported by Cummins *et al*. (1981), Knupfer (1989), Hulshof *et al*. (1991), and Tejera *et al*. (1991) suggest a negative association, whereas Knibbe and Swinkels (1992) and Marmot (1997) suggest a positive association. As the cut-off point for heavy alcohol consumption might have been different for the several studies mentioned above, this could have led to different

Table 7. Differences in problem drinking and alcohol-related problems in the different problem areas (in the drinking population) among women by educational level: odds ratios before and after controlling for age and drinking behaviour with 95% confidence intervals

	Odds ratios [95% confidence intervals] for educational level[a]				
Problems	1	2	3	4	5
Alcohol-related problem areas (in drinking population; $n = 1365$)					
Psychological dependents					
Crude	5.68[b] [2.07–15.54]	3.80[b] [1.62–8.94]	2.99[b] [1.24–7.22]	3.53[b] [1.41–8.83]	1
Controlled	8.06[b] [2.57–25.26]	5.34[b] [2.15–13.27]	3.64[b] [1.47–9.02]	3.66[b] [1.43–9.37]	1
Symptomatic drinking					
Crude	1.63 [0.52–5.08]	0.80 [0.33–1.95]	1.07 [0.43–2.66]	1.69 [0.70–4.06]	1
Controlled	5.28[b] [1.11–25.02]	1.59 [0.50–5.06]	2.06 [0.69–6.14]	2.59 [0.86–7.79]	1
Social problems					
Crude	0.887 [0.09–8.59]	1.33 [0.35–5.07]	0.65 [0.14–3.04]	1.86 [0.44–7.81]	1
Controlled	1.65 [0.12–22.32]	1.76[b] [0.36–8.53]	0.67 [0.13–3.55]	2.14 [0.45–10.09]	1
Health problems					
Crude	—	2.48 [0.26–24.04]	1.31 [0.11–15.44]	2.28 [0.34–2.35]	1
Controlled	—	1.24 [0.09–16.78]	0.75 [0.05–11.52]	1.87 [0.14–24.72]	1
Drunkenness/hangovers					
Crude	0.11[b] [0.01–0.93]	0.25[b] [0.11–0.56]	0.46 [0.21–1.03]	0.66 [0.28–1.56]	1
Controlled	—	0.62 [0.18–2.17]	0.61 [0.21–1.80]	0.71 [0.23–2.18]	1
Problem drinking (in drinking population)					
Crude	0.89 [0.28–2.81]	0.40[b] [0.17–0.98]	0.48 [0.19–1.23]	0.99 [0.39–2.50]	1
Controlled	—	0.70 [0.03–17.13]	0.70 [0.04–13.69]	1.90 [0.10–37.53]	1

[a]Educational levels are as in Table 1.
[b]Odds ratio significantly different from reference category.

results. As our study revealed that only among the 'very excessive drinkers' was a negative association with educational status found, this could contribute to the explanation of inconsistent results in earlier research. For women, no significant differences in excessive drinking between educational levels were found. This might be due to small numbers of excessive drinkers among women, leading to very wide confidence intervals in logistic regression analysis. To overcome this problem, special surveys among women or including more women in general population surveys, may be necessary.

For both sexes, 'psychological dependence' has proved to be more prevalent in lower educational groups. For men, 'alcohol-related health problems' were more prevalent in lower educational groups, and, for women, 'drunkenness/hangovers' was more prevalent in higher educational groups. When controlling for age and drinking behaviour, 'psychological dependence' appears to be negatively associated with educational level. For women, this relation is more pronounced than for men. Furthermore, 'social problems' were significantly negatively associated with educational level among men, but not among women. The lack of significance in the logistic regression analysis among women might be due to the small numbers. It must be kept in mind that these self-reported problems may have different meanings for different educational groups. It might be that individuals who live in a more abstinent subculture are more likely to experience their own drinking as a problem than individuals in a less abstinent subculture, even at equal levels of alcohol consumption. Furthermore, the relation between 'social problems' and educational level among men might be that coping behaviour is different in the different educational groups.

Although 'very excessive drinking' is more prevalent among men in the lowest educational group, no higher prevalence of 'health problems' was found. This is possibly because the questions on alcohol-related health problems did not focus on long-term health problems which are related to very excessive drinking patterns, such as liver cirrhosis, Korsakoff's syndrome or hepatitis. Problem drinking in general seems unrelated to

educational level, when corrected for differences in drinking behaviour, for both sexes. For men, this is in line with results based on the CAGE, as reported by Marmot (1997); for women, however, possibly due to the small numbers, there was no agreement with the results reported by Marmot (1997).

Overall, it can be concluded that, with regard to drinking behaviour, differences exist between educational groups with respect to abstinence, but only a limited difference is found between educational groups with respect to excessive drinking. Furthermore, there is evidence for differences in alcohol-related problems related to educational level. At equal levels of alcohol consumption, higher prevalences of alcohol-related problems are found in lower educational groups in both sexes.

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