Adolescents from affluent city districts drink more alcohol than others

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ABSTRACT

Aims To estimate the level of alcohol consumption and problems among adolescents in city districts with different socioeconomic composition; to test whether differences in alcohol consumption are related to district differences in socio-demographic characteristics; and to analyse whether such associations remain significant after controlling for individual-level variables. **Design** Cross-sectional survey. **Setting** Oslo, Norway. **Participants** 6,635 secondary school students, in 62 schools, living in 15 different city districts. **Measurements** Frequency of alcohol consumption and alcohol intoxication; alcohol problems; and individual characteristics such as immigrant status, religious involvement, and parental norms with regard to alcohol. Socio-economic indicators in city districts, such as education, income, and unemployment, were combined into a district-level socio-economic index (DLSI). **Statistics** Multilevel linear regression analyses with individual responses at the lowest level and city-district data at the highest level. **Findings** DLSI scores were positively related to alcohol use ($r = 0.31$, $P < 0.01$) and alcohol intoxication ($r = 0.25$, $P < 0.01$) but negatively related to alcohol problems among alcohol users ($r = -0.18$, $P < 0.01$). DLSI scores remained significant for alcohol consumption and alcohol intoxication, after controlling for individual-level variables ($P < 0.01$), but this was not the case for alcohol problems. **Conclusion** Adolescents in affluent areas report the highest levels of alcohol consumption and alcohol intoxication; neighbourhood characteristics seem to play a role in such drinking behaviour. Alcohol users in the poorer districts reported more alcohol problems; however, here neighbourhood effects do not seem to play a role.

INTRODUCTION

A key finding from alcohol research is that there is more heavy drinking in "areas of disadvantage" (1, 2). This may be due to socioeconomic conditions such as substandard housing, lack of residential stability, and poor employment (3), as exposure to such stressors may be a risk factor for the subsequent development of substance use problems (4).

However, a review of studies on area-level SES and substance use shows that the disadvantage hypothesis primarily seems to apply to serious alcohol problems in adult samples (5). Less consistent findings have been reported for younger populations and less heavy alcohol consumption patterns. Concerning adult populations, a few studies even suggest that neighbourhood *advantage* may be associated with more alcohol consumption. For instance, a study from New York revealed that wealthy neighbourhoods had more alcohol users and an increased frequency of drinking among drinkers compared with areas with lower incomes (6). Similarly, a Dutch study reported less prevalent alcohol use in poor neighbourhoods (7). Likewise, among adolescent populations, some studies suggest that what we may label an "affluence hypothesis" may be valid at least for light, recreational alcohol use (5, 8). However, two recent reviews reported that very few studies in this area had adequate quality and that those who had, reported mixed results (5, 9). Thus, "the affluence hypothesis" has so far gained some, but limited, support.

Alcohol is associated with a wide variety of harms and diseases, placing it as one of the leading preventable causes of death and disability (10). At the same time, a huge body of research shows that all types of health-related problems are increased among those with low level of education and income (11). Thus, if adolescents from areas of affluence have increased levels of alcohol problems, that would indeed be an exception from the general picture.

Why would adolescents in areas of affluence drink more than others? High disposable family income is one obvious reason. Alcohol may also play a more central role in these families' everyday life; adolescents may be socialized into their parents' alcohol consumption patterns (12), and they may also have easier access to alcohol (13). A host of individual-level factors may as well play a role, such as immigrant status and religious involvement (14), and such factors may, in turn, be related to the socio-demography of certain areas.

However, there may also be unique "neighbourhood effects" at work. Sociocultural patterns and lifestyles may be passed within affluent milieus, through a type of social contagion (15). Previous research from Oslo (where the present study was conducted) revealed that immigrants from Muslim countries such as Turkey and Pakistan reported low levels of alcohol consumption (16). However, those with ethnic Norwegian backgrounds in areas with many immigrants were also influenced by Muslims in their neighbourhoods; hence they tended to reduce their own alcohol consumption (17).There are a number of limitations with previous research in this area (for a review, see: 5): most studies use a limited number of indicators of area-level SES, the ethnic backgrounds is not always reported, few measures are used to determine alcohol use and alcohol problems. In the present study, we will try to overcome such limitations.

We will investigate whether the use of alcohol represents an anomaly in a general pattern, where risk factors for social problems and poor health typically cluster among the poor and those who are living in areas of social disadvantage. The results of the present study may help us to better identify the key target groups for alcohol prevention efforts.

Aims of the study

1. To describe (i) the frequency of alcohol consumption, (ii) the level of alcohol intoxication, and (iii) the prevalence of alcohol problems among adolescents in Oslo's city districts.

2. To analyse whether differences in alcohol use and alcohol problems across city districts are related to district-level socio-economic characteristics, and whether this relationship may be explained by individual-level characteristics of the respondents and their families.

METHODS

Participants and procedure

The Norwegian capital Oslo is the largest city in the country with about 600,000 inhabitants. The study is based on the Young in Oslo cross-sectional survey study (for details, see 18). In 2012, all public and private schools with students in grades 9–11 were invited to participate in an anonymous study. Parents were informed in advance and the students decided whether to participate; 72% of those who were invited, from 62 schools, participated. This constitutes 65% of the Oslo population in these cohorts. The sample was representative with respect to immigrant status, gender and age. An electronic questionnaire was completed under the supervision of teachers. Alcohol consumption was low-frequent among ninth graders; thus the analyses here include only the 6,635 tenth and eleventh graders (49.8% boys, 50.2% girls).

Individual-level variables

Alcohol

Alcohol consumption was measured by the question: "Do you drink any form of alcohol?" The response options were: (0) never, (1) have only tasted a few times, (2) sometimes, but not as often as monthly, (3) quite regularly, around 1–3 times a month, (4) each week. To measure alcohol intoxication, we asked: "In the course of the last six months, how often have you drunk so much that you clearly felt intoxicated?" The response options ranged from: (0) never, (1) 1 time, (2) 2–4 times, (3) 5–10 times, to (4) more than 10 times. Alcohol problems were measured by a 5-item version of the Rutgers Alcohol Problem Index (RAPI) (19). The

instrument covers a number of problems related to the use of alcohol. Here, we used these items: ”Suddenly found yourself in a place that you could not remember getting to”; “Missed a day of school”; “Had a sad period”; “Got into a fight, acted bad or did mean things”; and “Was told by a friend or neighbour to stop or cut down drinking”. A RAPI score was constructed by computing the mean across all five items of the scale (range 0-4). Conduct problems was measured calculating the mean (scale 0-4) of 12 items that covered less serious norm violations (e.g., pilfering, fare dodging on a tram) to more serious forms of gain crimes (for the instrument, see: 20). We constructed a violence variable based on the mean of four questions about violent behaviours (each item range 0–6) (see: 21). We also asked participants about their grades for courses in Norwegian, Mathematics, and English (range 1–6). Finally, we asked them about their religious affiliation, where “No religion”, Christianity”, “Islam” and “other religions” were options. The main differences with regard to alcohol consumption were between those belonging to Islam (coded as 1) and the rest (coded as 0). We also asked whether participants believed in God (for details, see: 22) with values 0-3, and about participation in religious organizations (see: 22) with values 0-3.

Parental characteristics

We created a parental socio-economic status variable by using a composite score based on self-reports on four items: (i) level of education (with 0, 1 or 2 parents with education on college/university level); (ii) work involvement (0, 1, or 2 parents in full-time employment); (iii) perceived economic security over the past two years (a 5-point scale that ranged from “We have been well off all the time” to “We have struggled financially all the time”); and finally (iv) about how many books the respondents had in their homes (a 6-point scale from 0 to more than 1,000). Based on the average of these four items, we constructed a single SES score (Cronbach’s $\alpha = 0.65$) that placed each respondent in a ranked decile (1–10). We also

asked whether parents had immigrated to Norway (no/yes). Parents' alcohol consumption was measured on separate (mother and father) 5-point scales that ranged from "never" to "daily". We asked whether parents allowed them to drink alcohol and whether the respondents got alcohol from their parents' homes (no/yes). Finally, based on Olweus (23), we measured parental monitoring. Respondents were asked to indicate agreement with statements regarding e.g. whether their parents usually know where they are during their leisure time, with whom they spend their time, and whether their parents know their friends' parents. A parental monitoring score (0-3) was constructed by computing the mean across all items.

District-level variables

Oslo is divided into 15 city districts. A neighbourhood's socio-economic position can be best captured by a composite measure that includes a number of indicators (24). Thus, for each district we obtained information from the municipality of Oslo pertaining to seven domains: (i) median income among parents with children age 0-17, (ii) percentage of residents aged 40-54 doing paid work, (iii) percentage of residents aged 40-49 with no education beyond primary school, (iv) percentage of residents aged 40-49 unemployed, (v) percentage of residents age 0-17 who live with a single provider, (vi) percentage of all residents who were immigrants, and (vii) death rate among residents aged 50-69. The seven indicators were selected to represent the socio-economic position of the age group that typically would be parents of the students included in the study. All indicators but the two first were reversed, so that high values represent high socio-economic positions of the city district. Factor analyses with direct quartimin rotation showed that all indicators loaded strongly on one factor (all factor loadings > .40). Moreover, the correlations between the indicators were high and consistent (mean $r = 0.79$, Cronbach's $\alpha = 0.95$). For each district, we combined all variables into a

single district-level socio-economic index (DLSI). All indicators were transformed into standardized scores, and the index was constructed as an average of z-scores across all items.

Statistics

Intra-class correlations (ICC) were computed to obtain measures of the variance in the "individual alcohol measures" accounted for by the district-level alcohol measures. Moreover, we conducted multilevel linear regression analyses using the XTMIXED model (random intercepts only) with ML estimation in Stata version 13.1 to examine the association between alcohol measures and the DLSI. As a next step, covariates were stepwise included in the analyses to examine how much of this association was accounted for by individual level variables (introduced in four blocks: A – immigrant and religiosity variables, B – individual level SES, gender and school grades, C – parental monitoring and alcohol norms, D – conduct problems and violent behaviour). Additionally, potential differences in the relationship between DLSI and alcohol measures were tested by introducing interaction terms for covariates such as gender, parental socio-economic status and parents' immigrant status in the analyses. As none of these terms were statistically significant we report only results without interactions. When examining predictors of alcohol problems we only included respondents who reported being "regular users of alcohol" (n = 1,546) because we considered only them to be at risk for developing such problems. The level of significance was set to $p < .01$ to account for the relatively large sample size used.

RESULTS

In Table 1, we present socio-demographic characteristics for the 15 administrative city districts of Oslo. Note the large variations: For instance, the share of immigrants varied from

15 to 50 % across districts, while unemployment rates were three times higher in the district with the highest level compared to the one with the lowest level.

We then examined whether alcohol use and alcohol problems varied across city districts. The proportion of abstainers clearly reflected the socioeconomic composition of the districts, as only 16–19% of the respondents in the three most affluent districts reported abstinence versus 54–55% reported not drinking alcohol in the three poorest districts. Figure 1 shows the frequency of alcohol consumption by city district (using a 5-point scale, range 0–4, mean = 1.38, SD = 1.30). Adolescents in the affluent western districts reported the highest frequency of alcohol consumption, whereas the poorer eastern city districts were at the bottom. The differences in alcohol consumption between city districts were also reflected by an ICC of 0.11, indicating that 11% of the variance in alcohol consumption was accounted for by differences between districts. Between-district differences also accounted for some of the variance in alcohol intoxication, which had an ICC of 0.07.

Figure 2 shows the district levels of alcohol problems among alcohol users (n = 1,546). The poorer eastern districts had the most alcohol problems, whereas the three most affluent city districts had the lowest rates. Moreover, a negative association with the DLSI was revealed ($r = -0.18$, $p < 0.001$). The ICC for alcohol problems was 0.05, indicating less variance accounted for by district-level differences, relative to the ICC for alcohol consumption.

However, still the total group of adolescents reporting alcohol problems was considerably larger in the affluent districts, as these districts had a much higher prevalence of alcohol users: In the five city districts with highest DSLI scores (N = 3,313), 21.2 % reported a score higher than zero on the RAPI (N = 702). In the eight city districts with lowest DSLI scores, inhabiting approximately the same number of adolescents (N = 3,043), the proportion

reporting higher than zero on the RAPI was only 7.3 % (N = 234). Increasing the cutoff to e.g. 0.6+ the proportions were 11.0 % (N = 365) and 5.1 % (N = 155), respectively.

We then examined whether district-level differences could be explained by socio-economic differences at the district level. Multilevel models were used for all three alcohol measures, with DLSI as covariate. The inclusion of DLSI led to reductions of the ICC, from 0.11 to 0.03 for alcohol consumption, from 0.07 to 0.02 for alcohol intoxication, and from 0.05 to less than 0.01 for alcohol problems. Thus, most of the variation in alcohol measures at the district level was due to differences in socio-demographic characteristics.

Next, we examined the association between alcohol measures and individual-level and parental variables. Table 2 shows negative associations between immigrant background, religious involvement and DLSI scores, whereas parental alcohol consumption and DLSI scores were positively correlated. There were negative associations between immigrant background, religious involvement, parental monitoring and frequency of drinking and alcohol intoxication. Alcohol use and alcohol intoxication were positively associated with socio-economic background, alcohol-related norms in the parental home, parental alcohol consumption, and alcohol access at home, as well as to conduct problems and violent behaviours. The correlation patterns were rather similar for frequency of alcohol consumption and alcohol intoxication, as these variables were also highly correlated ($r = 0.81$, $p < 0.001$).

Note however, that the associations to alcohol problems to some degree showed an opposite pattern: Here, we found positive associations to immigrant background, a seemingly counter-intuitive positive association to Islamic affiliation and a negative association to socio-economic background. The association to parental alcohol use was positive, but small. There were, however, strong positive associations to conduct problems and violent behaviours.

Next, we used multilevel analyses to investigate whether including parental and individual-level variables reduced the associations between DLSI scores and alcohol

consumption. In Table 3, parental and individual-level variables were included in four blocks. As we gradually included control variables, the regression coefficient of the association between alcohol frequency and DLSI was reduced to approximately half. Immigrant status and religiosity were of particular importance. For alcohol intoxication, the results were more or less the same as for the frequency of alcohol consumption (results not shown).

Finally, in Table 4, the same analyses are reported with alcohol problems as dependent variable. Here, the negative association between alcohol problems and DLSI was completely accounted for by including parental and individual variables. Controlling for immigrant background and religiosity reduced the bivariate association to the half (from b = -0.18 to b = -0.10). The rest of the association was accounted for by parental variables. In addition, there was a strong association to violent behaviour in the full model (Model 4).

DISCUSSION

Adolescents in the affluent western parts of Oslo reported the most frequent consumption of alcohol and the highest level of alcohol intoxication. However, among alcohol users, the highest frequency for alcohol problems was found among adolescents in the poorer eastern parts of the city. Thus, while a few studies have uncovered that adolescents in "areas of affluence" report higher alcohol consumption (5), our study presented a more nuanced picture: Adolescents from such areas drink indeed more than other adolescents, but those who drink do not as often experience problems associated with their alcohol consumption. Hence, the findings do not unambiguously represent an anomaly from the near universal finding that the poor and those living in areas of disadvantage also report increased level of psychosocial problems (11). On the other hand, due to the much higher prevalence of alcohol use in the wealthier areas, these areas all the same contribute more to the total population of adolescents experiencing alcohol-related problems.

We also investigated the extent to which district level socio-economic characteristics (DLSI scores) statistically explained the observed city district differences. For all alcohol measures, we found that controlling for DLSI scores clearly reduced the variance explained by the city district variables. Finally, we investigated whether the relationship between DLSI and the alcohol measures remained significant when family and respondent characteristics were also controlled for. After such control, a moderate association between DLSI scores and alcohol consumption and alcohol intoxication remained. In contrast, the association between DLSI scores and alcohol problems was not significant after such control.

Previous studies with adult samples have indicated that alcohol problems are more prevalent in ‘‘areas of disadvantage”. Such a pattern was also uncovered in our study among alcohol users. However, in our study, such problems seem to reflect family-based and individual risk factors, and not neighbourhood factors. The counter-intuitive positive association between Muslim affiliation and alcohol problems is probably due to the fact that only regular alcohol users were included in these analyses. In the Muslim community, alcohol-using adolescents may be a marginalised group. The strong relationship between alcohol problems and self-reported violence should also be noted; this may be indicative of early developing substance and antisocial problems (25).

This study has several strengths. The sample covered approximately 65% of all adolescents in the relevant age groups in Oslo. Non-response was not associated with key variables such as immigrant status. We used a broad range of measures, and had access to a variety of socio-economic indicators at city-district level. However, there are also limitations. First, the city districts were designed for administrative purposes and do not reflect “natural” and homogeneous communities. Possible neighbourhood effects may therefore be under-estimated. Second, due to the anonymous nature of the study, no information about participants’ school affiliation was available. Hence, analyses with control for school-level

variables were not possible. Third, even though we included a number of parental and individual-level control variables, we certainly have omitted some, and thus we may have overestimated the remaining effect of DLSI scores. Fourth, some respondents may under-report their alcohol consumption (26), and religious groups, for example, may under-report more than other groups. This could artificially increase differences in reported alcohol consumption between the wealthier and poorer city districts.

The primary focus in previous neighbourhood studies has been on disadvantaged areas, where alcohol may be used to cope with psychosocial problems (27-29). Less is known about alcohol consumption in affluent neighbourhoods. However, we do know that residents of such areas often embrace health-related lifestyles (30), and one explanation could be that "ordinary" use of alcohol, as opposed to e.g. daily smoking, is regarded as compatible with such a healthy lifestyle. Those living in these areas may perceive the benefits related to alcohol use to be more important than its risks (31). Our study also suggest that some other mechanisms may lie behind the high alcohol consumption in areas of affluence: DLSI scores were positively associated with alcohol consumption among parents, with easy access to alcohol in the parents' homes, and with parents' permissive norms regarding alcohol. All these associations point in the direction of "wet" affluent neighbourhood contexts. However, even if the *relative* frequency of alcohol-related problems among alcohol users in these areas was much lower than in the poorer eastern districts, our study revealed that these areas nevertheless will experience more alcohol-related problems at population level, due to the much higher prevalence of adolescent alcohol users (see also: 32).

It may be surprising that these distinct area-based socio-economic patterns were revealed in a welfare state such as Norway, which is characterized by high levels of equality. However, socio-economic differences seem to have characterized the city of Oslo for

centuries (33). Area-based socio-economic differences in alcohol consumption may therefore play a smaller role in other parts of the country.

CONCLUSION

Adolescents in affluent parts of Oslo reported higher levels of alcohol use and more frequent alcohol intoxication than did those in more disadvantaged areas. After control for other variables, a neighbourhood effect remained. With regard to alcohol problems, the opposite pattern was revealed. Here, alcohol users from "areas of disadvantage" were mostly at risk. However, no statistical effect of neighbourhood characteristics remained after control for family-based and individual characteristics. Thus, adolescent alcohol problems may to a larger degree reflect individual and family-based risk factors. Note that even if the frequency of alcohol problems among alcohol users was lower in the wealthier western parts of the city, the total level of such problems was greater in these areas, due to the higher prevalence of alcohol use.

The study points to area-based socioeconomic characteristics in the shaping of alcohol consumption patterns, even in a Nordic-type welfare state. Future research should investigate such associations and possible mechanisms in more detail. There is also a need for longitudinal studies, highlighting to what degree such differences persist into adult age.

The adequate policy responses to these patterns should be to reduce the general level of alcohol consumption, in particular in affluent areas. Harm-reduction oriented strategies aiming at safer-drinking practices to avoid alcohol problems could also be an option (see: 34), not least aiming at alcohol users in poorer areas. However, as all these adolescents are still under the legal age for alcohol consumption, such strategies will be politically controversial.

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Figure 1 Frequency of alcohol consumption in Oslo city districts. Range of measure 0–4, mean scores reported. Total sample (*N* = 6,746)

Figure 1 here.

Figure 2 Level of alcohol problems in Oslo city districts. Range of measure 0–4, mean scores reported. The sample is "regular alcohol users" (N = 1,546)

Figure 2 here.

Table 1. Descriptive statistics of seven socio-economic indicators and DSLI for the 15 administrative city districts of Oslo

Indicator	*Min*	*Max*	*Mean*	*SD*
Median income among parents with children age 0-17 (in 1.000 NOK)	604	1002	750	140
Proportion of residents aged 40-54 doing paid work	64.0%	87.0%	75.8%	6.8
Proportion of residents aged 40-49 with no education beyond primary school	6.0%	31.0%	17.5%	8.4
Proportion of residents aged 40-49 unemployed	2.3%	6.7%	4.8%	1.5
Proportion of residents age 0-17 who live with a single provider	11.2%	25.1%	16.9%	4.0
Proportion of all residents who are immigrants	15.3%	50.0%	31.1%	13.1
Death rate among residents aged 50-69	3.8%	11.3%	7.2%	3.8
District-level socio-economic index (DLSI)	-1.08	1.31	0.00	0.83

Table 2 Descriptive statistics and correlations with three alcohol measures and district-level socio-economic index.

			Correlations (Pearson's r)			
	Mean	*SD*	*Frequency of drinking*	*Alcohol intoxication*	*Alcohol problems*	*DLSI*
City district-level socio-economic index (DLSI)	8.71	4.04	0.31	0.25	–0.18	–
Immigrant background (yes = 1)	0.31	0.46	–0.37	–0.28	0.22	–0.45
Religious affiliation (Islam = 1)	0.17	0.38	–0.34	–0.23	0.22	–0.34
Religious belief in God (0–3)	1.58	1.23	–0.26	–0.20	0.11	–0.26
Religious participation (0–3)	0.34	0.79	–0.11	–0.08	0.17	–0.17
Socio-economic background (1–10)	5.52	2.90	0.26	0.20	–0.19	0.45
School grades (1–6)	3.88	0.88	0.06	0.04	–0.16	0.20
Gender (girl = 1)	0.50	0.50	0.02	0.02	–0.06	0.00
Allowed to drink by parents (yes = 1)	0.12	0.33	0.37	0.31	0.14	0.08
Parents' use of alcohol (0–4)	1.24	1.01	0.37	0.27	0.08	0.33
Parental monitoring (0–3)	2.11	0.63	–0.13	–0.14	–0.29	0.08
Gets alcohol from their parents (yes = 1)	0.05	0.22	0.14	0.10	0.21	–0.03
Takes alcohol at home (yes = 1)	0.15	0.36	0.33	0.31	0.08	0.15
Conduct problems (0–4)	0.23	0.50	0.26	0.28	0.59	–0.06
Violent behaviour (0–6)	0.31	0.83	0.18	0.20	0.65	–0.08
Mean			1.38	0.91	0.58	
SD			1.30	1.27	0.81	
N=			6,413	6,489	1,475	

* All correlations are statistically significant ($P < 0.01$), except for gender, where no significant correlations were found.

Table 3 Multilevel linear regression analysis of the frequency of alcohol consumption (scale 0–4). N = 5 822, number of city districts: 15.

	Model 0			*Model 1 (controlling for A)*			*Model 2 (controlling for A+B)*			*Model 3 (controlling for A+B+C)*			*Model 4 (controlling for A+B+C+D)*		
	b	*se b*	*z*	*b*	*se b*	*z*	*b*	*se b*	*z*	*b*	*se b*	*z*	*b*	*se b*	*z*
City district-level socio-economic index (DLSI)	0.52	0.07	7.4*	0.28	0.06	4.5*	0.28	0.06	4.5*	0.19	0.04	4.8*	0.20	0.04	5.4 *
BLOCK A															
Immigrant background (yes = 1)	–0.46	0.05	–10.3*	–0.46	0.05	–10.1*	–0.44	0.05	–9.3*	–0.35	0.04	–8.3*	–0.32	0.04	–7.7 *
Religious affiliation (Islam = 1)	–0.56	0.05	–10.7*	–0.56	0.05	–10.7*	–0.59	0.05	–10.9*	–0.36	0.05	–7.3*	–0.44	0.05	–9.2 *
Religious belief in God (0–3)	–0.06	0.02	–4.2*	–0.06	0.02	–4.3*	–0.07	0.02	–4.7*	–0.02	0.01	–1.6	–0.03	0.01	–2.1 *
Religious participation (0–3)	–0.01	0.02	–0.4	–0.01	0.02	–0.4	0.00	0.02	0.1	–0.01	0.02	–0.3	–0.04	0.02	–2.1 *
BLOCK B															
Socio-economic background (1–10)	0.07	0.01	11.5*				0.03	0.01	4.2*	0.03	0.01	5.7*	0.04	0.01	6.3 *
School grades (1–6)	–0.07	0.02	–3.5*				–0.13	0.02	–6.9*	–0.11	0.02	–6.4*	–0.10	0.02	–6.1 *
Gender (girl = 1)	0.06	0.03	2.0				0.08	0.03	2.7	0.11	0.03	4.1*	0.17	0.03	6.2 *
BLOCK C															
Allowed to drink by parents (yes = 1)	1.04	0.04	24.2*							1.01	0.04	23.5*	0.92	0.04	21.9 *
Parents' use of alcohol (0–4)	0.27	0.01	19.1*							0.14	0.02	8.9*	0.10	0.02	6.6 *
Parental monitoring (0–3)	–0.21	0.02	–9.6*							–0.26	0.02	–11.8*	–0.20	0.02	–8.8 *
Gets alcohol from their parents (yes = 1)	–0.03	0.06	–0.4							0.05	0.06	0.8	–0.07	0.06	–1.01
Takes alcohol at home (yes = 1)	0.81	0.04	20.8*							0.76	0.04	19.7*	0.68	0.04	18.1 *
BLOCK D															
Conduct problems (0–4)	0.61	0.04	17.0*										0.41	0.04	11.3 *
Violent behaviour (0–6)	0.11	0.02	5.1*										0.10	0.02	4.8 *

b: unstandardized regression coefficients; se b: standard error of the estimate.
* $P < 0.01$.

Table 4 Multilevel linear regression analysis of alcohol problems. The dependent variable is the RAPI score, scale 0–6; *N* = 1,373; number of city districts 15).

	Model 0			*Model 1 (controlling for A)*			*Model 2 (controlling for A+B)*			*Model 3 (controlling for A+B+C)*			*Model 4 (controlling for A+B+C+D)*		
	b	*se b*	*z*	*b*	*se b*	*z*	*b*	*se b*	*z*	*b*	*se b*	*z*	*b*	*se b*	*z*
City district-level socio-economic index (DLSI)	–0.18	0.05	–4,0*	–0.10	0.04	–2,7*	–0.07	0.03	–2.0	–0.06	0.03	–1,8	0.00	0.02	0.1
BLOCK A															
Immigrant background (yes = 1)	0.21	0.08	2.7*	0.18	0.08	2.3	0.12	0.08	1.4	0.14	0.08	1.8	0.10	0.06	1.5
Religious affiliation (Islam = 1)	0.55	0.11	5.6*	0.53	0.11	5.0*	0.48	0.11	4.5*	0.40	0.10	3.9*	–0.07	0.08	–0.9
Religious belief in God (0–3)	0.01	0.11	0.5	0.01	0.02	0.6	0.01	0.02	0.6	0.04	0.02	2.4	0.00	0.01	0.0
Religious participation (0–3)	0.13	0.03	4.3*	0.13	0.03	4.3	0.14	0.03	4.4*	0.10	0.03	3.5	0.02	0.02	1.0
BLOCK B															
Socio-economic background (1–10)	–0.04	0.01	–4.5*				–0.02	0.01	–2.6*	–0.01	0.01	–1.0	0.00	0.01	–0.1
School grades (1–6)	–0.09	0.03	–3.7*				–0.09	0.03	–3.6*	–0.08	0.02	–3.4*	–0.06	0.02	–3.3*
Gender (girl = 1)	–0.08	0.04	–1.9				–0.04	0.04	–0.9	–0.02	0.04	–0.5	0.15	0.03	4.6*
BLOCK C															
Allowed to drink by parents (yes = 1)	0.09	0.05	2.0							0.10	0.04	2.4	0.04	0.04	1.1
Parent´s use of alcohol (0–4)	0.04	0.02	2.1							0.08	0.02	3.8*	0.03	0.02	1.8
Parental monitoring (0–3)	–0.29	0.03	–9.9*							–0.27	0.03	–9.2*	–0.10	0.02	–4.0*
Gets alcohol from their parents (yes = 1)	0.43	0.07	6.0*							0.34	0.07	4.9*	0.10	0.06	1.7
Takes alcohol at home (yes = 1)	0.09	0.04	2.1							0.11	0.04	2.8*	0.06	0.03	1.7
BLOCK D															
Conduct problems (0–4)	0.29	0.03	9.3*										0.16	0.03	4.7*
Violent behaviour (0–6)	0.31	0.02	16.8*										0.35	0.02	17.8*

b: unstandardized regression coefficients; se b: standard error of the estimate.
* $P < 0.01$.