

Decline in adolescent drinking: Some possible explanations

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Abstract

Introduction and Aims. Adolescent drinking has decreased in numerous high-income countries in the 2000s, and how to explain this downward trend is far from clear. Focussing on the decline in drinking to intoxication among youth in Norway, we examined the following potential explanatory factors: family/home-based and peer-oriented leisure-time activities, perceived parental drinking, drug substitution, school conscientiousness and delinquency. **Design and Methods.** Data stemmed from cross-sectional surveys of adolescents aged 13–17 years in the four largest cities in Norway in 2002 ($n = 1204$) and in 2013/2015 ($n = 31\,441$). We examined the extent to which the decline in intoxication prevalence was attributable to the possible explanatory variables using logistic regression analysis. **Results.** The proportion reporting any past-year intoxication episodes dropped markedly from 2002 (41%) to 2013/2015 (22%). Family/home-oriented leisure-time activities and school conscientiousness increased, whereas hanging out with friends in the evening and delinquent behaviours decreased. These factors together accounted for 43% of this decline. Decrease in going out with friends was the most important factor. We found no empirical support for assumptions that perceived parental drinking or drug substitution had contributed to the decrease in drinking to intoxication. **Discussion and Conclusions.** Since the millennium shift, urban adolescents in Norway have become more home-, family- and school-oriented, and less involved in unsupervised socialising with peers and delinquency. These changes may have contributed to some of the reduction in the prevalence of intoxication in this population group. [Rossow I, Pape H, Torgersen L. Decline in adolescent drinking: Some possible explanations. *Drug Alcohol Rev* 2020;39:721–728]

Key words: alcohol, intoxication, adolescents, time change, surveys.

Introduction

Since the millennium shift, adolescent drinking has declined in numerous high-income countries [1]. Insight into the driving forces behind the decline may be important in order to maintain this progress and to take action to further curb alcohol use by youth [2]. Several possible explanatory factors have been suggested [1–10], and a growing number of studies have pursued the issue empirically [6]. However, why youth drinking has declined is still far from clear. The present study of Norwegian youth offers some tentative answers to the question.

In their systematic review, Vashishta *et al.* [6] noted that there is limited and/or inconclusive evidence regarding several assumed drivers of the downward drinking trend. The most robust evidence was identified for shifts in parental practices, notably stricter alcohol-related parenting and increased monitoring.

Additional evidence that improved parental monitoring may have contributed to the decline in drinking has been published recently [11–14]. However, parental monitoring has consistently been operationalised as parents' knowledge about their offspring's whereabouts, and such knowledge is generally not attained through parents' surveillance and control, but through adolescents' free disclosure [15]. This, in turn, is indicative of a high-quality parent–child relationship, which is one of the most important parental factors that protects against underage drinking [16]. Parental knowledge may also have increased in the 2000s because adolescents spend less time away from home.

Few studies on the downward drinking trend have examined the potential importance of changes in home/family-oriented leisure-time. A slight increase in spending time with parents was found in a Swedish study, yet this change was not independently related to the decline in adolescent drinking [17]. What did

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make a difference was a large reduction in leisure-time social interaction with peers, which corroborates the results of other recent studies [14,17–19]. However, the frequency of ‘going out with friends’ *increased* among Finnish youth in the 2000s, and paradoxically, Raitasalo *et al.* [12] found that this change—in a statistical sense—explained some of the reduction in drinking.

Changes in parents’ drinking practices may potentially also have contributed to less adolescent drinking [2,7]. Specifically, some scholars have proposed that parents probably have become less likely to drink in the presence of their children, and thereby reduced adolescents’ exposure to parental modelling of drinking. If so, a decline in parents’ frequency of consuming alcohol—as perceived by the adolescents—would be expected. This seems to be another potential explanatory factor that has barely been scrutinised empirically.

Educational commitment is inversely related to adolescent drinking [20], and it has also been suggested that stronger school conscientiousness may have fostered the decline in drinking [2,12]. Some countries have witnessed a weak parallel decline in truancy [12,21,22], and a recent study found that a small proportion of the reduction in youth drinking in both Norway, Sweden and Finland could be ascribed to a decline in skipping school [14]. Other indicators of school conscientiousness, such as time spent on homework, have barely been taken into account.

Another issue of interest in the context of our study pertains to the trend towards a more law-abiding and safe way of life. Thus, a decrease in adolescents’ involvement in hazardous driving, unsafe sex, crime and delinquency has been observed, which may reflect wide-ranging cultural and normative shifts. In the USA, the decline in such risky and deviant behaviours preceded the drop in drinking to intoxication [7,10]. On the other hand, it has been suggested that the decline in drinking to some extent reflects that cannabis had substituted alcohol, but the few studies that addressed the issue, provided no evidence in support of this suggestion [6]. Furthermore, trend data from the European Study on Alcohol and Drugs show that among countries with declining alcohol use, a majority experienced downward trends or no change in cannabis use but, notably, few countries experienced an increase in cannabis use [23].

Aims

In this study, we examined whether changes in home/family-oriented leisure-time activities, spending time with friends, school conscientiousness, perceived

parental drinking, cannabis use and involvement in delinquency could account for the decline in drinking among Norwegian youth. Specifically, we assessed the relative as well as the overall importance of these factors in explaining the decline.

Methods

Samples

The data stemmed from two sets of cross-sectional school surveys, conducted 11–13 years apart in Norway. The first data set is taken from the nation-wide ‘Young in Norway’ survey in 2002 (overall response rate: 92%), which included a balanced selection of junior and senior high schools from all national regions [24]. Detailed descriptions of study design, data collection procedures and ethical approval are provided elsewhere [24]. For this study, we used a sub-sample comprising students from the four largest cities in Norway, that is, Oslo, Bergen, Trondheim and Stavanger.

The second data set is taken from surveys conducted in the same four cities in the years 2013 (Bergen, Stavanger and Trondheim) and 2015 (Oslo), as part of a quality assured and standardised system of school surveys in Norwegian municipalities [25]. These surveys all build on a common template, which to a large extent resembles the 2002 survey.

The response rates ranged from 65% in Bergen to 83% in Stavanger, leaving Trondheim (78%) and Oslo (79%) in between. Although conducted 2 years apart, we treated these data as reflecting one-time point; 2013/2015. Moreover, we restricted the study samples to 8th–11th graders (aged 13 to 17 years). The number of respondents in our study was 1396 in 2002 and 40 125 in 2013/2015. The large difference in sample sizes reflects that the 2002 survey included a balanced selection of schools in each city, while the 2013/2015 surveys included all eligible schools.

Measures

The *frequency of intoxication* was the only measure of alcohol use that was identical across the surveys. The students were asked: ‘During the past 12 months, how many times have you drunk so much that you felt clearly intoxicated?’. Response categories were ‘0 times’, ‘once’, ‘2 to 5 times’, ‘6 to 10 times’ and ‘11 times or more often’, and these were coded as 0, 1, 4, 8 and 15, respectively, to obtain a semi-continuous measure. In some analyses, a dichotomous measure was applied; 0 versus 1+ intoxication occasions.

Demographic variables included gender and age in terms of the class grade.

Potential explanatory factors. The social contexts of leisure-time activities included three semi-continuous measures. The students were asked how many times per week they spent time on: (i) *staying at home alone or with family*; (ii) *engaging in activities together with parents* (e.g. hobbies, sports, games); and (iii) *hanging out with friends in the evening*. Response categories were '0 times', 'once', '2 to 5 times' (coded 4) and '6 or more times' (coded 7).

We assessed three aspects of school conscientiousness. The average *time per day spent on homework* was reported on a seven-point scale ranging from 'never or hardly ever' to 'more than 4 hours'. We recoded the scale to reflect a semi-continuous measure (range 0–5). We obtained *school truancy* and *school misconduct* in the past 12 months from the same battery as *frequency of intoxication*, with identical response categories. We analysed *frequency of truancy* as a semi-continuous variable (range 0–15), and constructed *frequency of school misconduct* as a sum-score of the two items: (i) *having been in a strong verbal fight with a teacher*; and (ii) *been sent out of the classroom* (range 0–30).

Five items from Olweus' instrument on anti-social behaviour [26] were used to assess the past-year frequency of the following delinquent behaviours: (i) burglary; (ii) vandalism; (iii) avoiding paying for services (e.g. train ticket, cinema); (iv) police contact due to illegal activities; and (v) physical fight using a weapon (e.g. a knife). Response categories were identical to those for intoxication frequency, and we constructed a sum-score from the semi-continuous variables (range 0–75).

We obtained *perceived parental drinking frequency* separately for the mother and the father. We recoded the five response categories to reflect semi-continuous measures ranging from 0 to 350 times per year.

The past-year frequency of *cannabis use* was assessed on a five-point-scale ranging from 0 to 11+ times and recoded similarly to that of intoxication frequency.

Statistical analyses

The analytic strategy resembles that of some similar studies (e.g. [27]). First, we examined whether the candidate explanatory factors correlated with the outcome measure. Only factors that correlated with intoxication frequency ($r > 0.05$) were included in further analyses. Next, we examined whether these factors differed significantly from 2002 to 2013/2015 by

comparing the means on the semi-continuous measures, also in separate strata for those reporting no or any intoxication occasions. We tested differences using *F*-test. Finally, we examined to what extent the decline in intoxication prevalence was attributable to the various explanatory variables using logistic regression analyses. In the first model, the regression coefficient for the dichotomous variable survey year (2002 vs. 2013/2015), adjusting only for sample differences in age distribution, represented the change in intoxication prevalence over the study period. In the subsequent model, each explanatory variable was included. The relative change in the regression coefficient for the survey year can be interpreted as the extent to which the included variable contributed to change in intoxication prevalence over time. Finally, we estimated a logistic regression model including all identified covariates, and calculated the proportion of change in intoxication prevalence attributable to the sum of changes in all these explanatory variables.

The included variables had internal missing observations ranging from 1.4% to 7.3%. For the main analyses, we excluded respondents with missing observations for one or more variables (21.4%). We used the statistical software SPSS Statistics 26.

Sensitivity analysis

To check for robustness, we ran the analyses in various ways. In analyses of the semi-continuous measure of intoxication frequency, we applied different values for the upper-frequency category (11+ times) (i.e. 11, 15 and 25 times). We also regressed the semi-continuous measure of intoxication frequency on survey year in linear regression models, applying the same analytic strategy as described above. Moreover, we ran all the analyses with list-wise deletion of missing data and with down-weighted data from 2013/2015 (weight = 0.0383) to obtain similar sample sizes. Finally, because the delinquency sum-score included two items that could reflect possible consequences of intoxication (i.e. *been in contact with the police* and *been in a fight with a weapon*), we re-ran the analyses excluding these items from the measure.

Results

The average intoxication frequency decreased significantly from 2002 to 2013/2015 (Table 1). The decline was observed across genders and school grades. Moreover, the proportion who reported *any* intoxication decreased (from 41% to 22%), as did the proportions

Table 1. Mean annual intoxication frequency by survey year and F-test for difference, for all students and sub-strata by gender and age (grades) (standard deviation in parentheses)

Intoxication frequency					
Mean number of times/year (SD)	N2002/N2013/2015	2002	2013/2015	F-test	Relative change from 2002 to 2013/2015
All students	1204/31 441	3.3 (5.3)	1.3 (3.3)	427.5*	-60%
Girls	614/16 331	3.0 (5.0)	1.3 (3.4)	137.7*	-57%
Boys	590/15 110	3.7 (5.6)	1.2 (3.3)	319.2*	-68%
Grades 8 and 9	580/14 578	1.6 (3.7)	0.2 (1.4)	454.9*	-88%
Grades 10 and 11	624/16 863	4.9 (6.0)	2.2 (4.2)	260.4*	-55%

* $P < 0.001$.

reporting intoxication 2+ times (from 34% to 16%); 6+ times (from 22% to 8%) and 11+ times (from 14% to 4%).

We examined the correlations between the potential explanatory factors and the outcome measure. Positive and statistically significant ($P < 0.001$) correlations between intoxication frequency and the following variables were observed: school truancy ($r = 0.43$), cannabis use ($r = 0.40$), delinquency ($r = 0.26$), hanging out with friends in the evening ($r = 0.33$), school misconduct ($r = 0.30$) and mother's and father's drinking frequency ($r = 0.14$ and 0.17 , respectively). Moreover, intoxication frequency was statistically significantly ($P < 0.001$) negatively correlated with the following: time spent homework ($r = -0.25$), staying at home alone or with family ($r = -0.19$) and engaging in activities with parents ($r = -0.10$).

Between the two time points, there was no difference in gender distribution, but a substantial difference in age distribution and in mean values for most of the variables that correlated with intoxication frequency (Table 2). From 2002 to 2013/2015, the students were more often at home alone or with family, engaged in leisure-time activities with their parents more frequently, and spent more time on homework. Moreover, they were less often hanging out with friends, and reported less school misconduct and truancy, less frequent engagement in delinquency, and less use of cannabis in 2013/2015 compared to 2002. While the mean levels on these variables differed between those reporting no or any intoxication experience, the relative changes were similar in these two groups (Table 3). Perceived frequency of parents' drinking did not change.

Table 2. Demographic factors (proportion) and mean scores for explanatory factors (standard deviation in parentheses) by survey year

Demographic and explanatory factors	2002	2013/2015		
N	1204	31 441	χ^2/F -test	Relative change from 2002 to 2013/2015
Boys	49.0	49.3	0.05 NS	—
8th grade	26.8	20.5		
9th grade	23.5	25.6		
10th grade	26.7	27.3		
11th grade	23.0	26.6	34.6*	
Activities with parents	1.0 (1.7)	1.8 (2.0)	176.3*	+80%
At home with family or alone	2.7 (2.2)	3.6 (2.2)	195.0*	+41%
Hanging out with friends in the evening	3.2 (2.4)	1.9 (2.1)	411.9*	-41%
Delinquency behaviours score	4.8 (8.8)	2.6 (5.3)	184.1*	-46%
Hours on homework	1.2 (0.9)	1.4 (1.1)	70.9*	+17%
School truancy	2.1 (3.8)	1.1 (2.9)	133.6*	-48%
School misconduct	1.9 (4.3)	0.8 (2.8)	191.0*	-58%
Mother's drinking frequency	31.3 (50.7)	30.9 (52.6)	0.1 NS	-1%
Father's drinking frequency	41.8 (62.3)	40.2 (62.9)	0.8 NS	-4%
Cannabis use frequency	0.8 (2.9)	0.3 (1.7)	89.8*	-63%

χ^2 and F-test for difference and relative change from 2002 to 2013/2015. * $P < 0.001$. NS, not statistically significant ($P > 0.05$).

Table 3. Mean scores for explanatory factors (standard deviation in parentheses) by alcohol intoxication and survey year. χ^2 and *F*-test for difference and relative change from 2002 to 2013/2015

Explanatory factors	Not been intoxicated				Been intoxicated			
	2002	2013/2015	<i>F</i> -test	Relative change in %	2002	2013/2015	<i>F</i> -test	Relative change in %
<i>N</i>	763	29 264						
Activities with parents	1.1 (1.8)	1.9 (2.1)	115.3*	+75	0.9 (1.5)	1.4 (1.8)	40.2*	+57
At home with family or alone	3.0 (2.3)	3.7 (2.2)	79.5*	+14	2.3 (2.1)	3.1 (2.0)	81.7*	+36
Hanging out with friends	2.5 (2.3)	1.6 (2.0)	128.5*	-33	4.0 (2.2)	3.0 (2.2)	103.5*	-25
Delinquency behaviours score	2.3 (5.1)	2.0 (4.5)	4.0	-14	8.4 (11.6)	5.2 (7.4)	84.6*	-37
Hours on homework	1.4 (0.9)	1.5 (1.1)	18.0*	+12	0.9 (0.7)	1.1 (1.0)	9.9*	+15
School truancy	0.9 (2.0)	0.8 (2.3)	2.5	-15	3.9 (4.8)	2.9 (4.4)	27.4*	-26
School misconduct	0.9 (2.6)	0.7 (2.5)	6.0	-24	3.5 (5.7)	1.7 (4.5)	80.0*	-51

**P* < 0.01.

We modelled the decrease in intoxication prevalence in a series of logistic regression analyses. We entered the potential explanatory variables, as identified in the foregoing analyses, first one at a time and finally together. As displayed in Table 4, changes in the various potential explanatory factors could explain the decrease in intoxication prevalence to varying extent. In sum, they accounted for 43% of the decrease.

Sensitivity analyses

We re-ran all analyses of the semi-continuous measure of intoxication frequency, using 11 and 25 as values for the 11+ frequency category. While mean values,

Table 4. Any intoxication regressed on survey year, adjusted for covariates. Logistic regression models

Variables adjusted for	Period effect adjusted for variable(s) regression coefficients (standard error)	Proportion of change explained
Only age distribution	-0.094 (0.005)	-
Activities with parents	-0.089 (0.005)	5%
Home alone or with family	-0.085 (0.005)	10%
Hanging out with friends in the evening	-0.072 (0.005)	23%
Hours on homework	-0.088 (0.005)	6%
School truancy	-0.086 (0.005)	9%
School misconduct	-0.088 (0.005)	6%
Delinquency behaviours score	-0.087 (0.005)	7%
All included variables	-0.054 (0.006)	43%

All students (*N* = 32 645).

correlation coefficients and regression coefficients differed somewhat from those obtained in the initial analyses, the pattern of findings persisted. We also obtained similar results to those described in Table 4 when we applied the semi-continuous outcome measure to the linear regression models. Hanging out with friends in the evening was the single explanatory factor accounting for most of the decrease in intoxication frequency (20%), and all factors together accounted for 41% of the decline. Moreover, we obtained similar results when we used analyses with list-wise deletion of missing values and analyses with down-weighted data for 2013/2015. Finally, when we excluded 'been in contact with the police' and 'been in a fight with a weapon' from the delinquency sum-score measure, the correlation with intoxication frequency became somewhat weaker. However, the proportion of the decline that could be attributed to the change in this variable was barely affected.

Discussion

The intoxication frequency among urban adolescents in Norway decreased substantially from 2002 to 2013/2015. Concomitantly, adolescents' leisure-time activities, school commitment and delinquent behaviour also changed markedly. We found no empirical support for assumptions that parents had modified their own drinking practice, or that adolescents substituted alcohol with cannabis. However, substantial changes in leisure-time activities, school conscientiousness and delinquency could explain—in statistical terms—a large proportion of the decrease in drinking to intoxication.

The sizable temporal changes, both in adolescent drinking and in factors associated with drinking, corroborate the research findings from many countries [1]. Thus, concurrent with the downward drinking trend in the 2000s, substantial cross-national changes in adolescents' lifestyles, leisure-time activities and priorities have occurred. First, most studies indicate that hanging out with friends in the evenings occurs less frequently [14,17,18], and that a marked increase in time spent on screen activities has occurred [28]. Some studies have also found an increase in spending time with parents [17,29], as well as other changes that are indicative of closer ties to parents [30,31]. This fits a broader picture of improved parenting and family relationships. Parents' knowledge about their adolescent offspring's whereabouts has increased, and alcohol-specific parenting practices have become more restrictive [6,11–13]. At least in the Nordic countries, it seems that young people want to perform better at school than previously, with higher academic ambitions [8,32], which fits our findings of more school conscientiousness. Finally, and well in line with the above-mentioned changes in young people's lives, delinquency and other risk-taking behaviours have declined in several countries [8,10,30,31], as we also found.

The single most important factor to explain the decline in drinking in our study was the decrease in time hanging out with friends in the evening. Some previous studies [14,17–19] have also found that a decrease in hanging out with friends contributed to a decrease in drinking. The decrease in unsupervised socialising with peers probably implies fewer opportunities for drinking to intoxication. It has been suggested that the rise in time spent on using information and communication technologies is important in this regard, as adolescents have become too busy with their media pursuits at the expense of activities, such as substance use, that typically occur in face-to-face social interactions [7,10]. However, the extant body of research does not support this assumption [19,33], and a possible role of the use of digital media in this regard may be complex [1].

We also found that indicators of school conscientiousness accounted for a sizable part of the drop in intoxication prevalence. Truancy has also previously been shown to be of some importance in this regard [12,14]. We found that the time spent on homework increased and that school misconduct decreased, and that these changes also contributed to explain the drop in drinking to intoxication. This fits well with a recent finding that a stronger emphasis on academic performance is not compatible with heavy alcohol consumption and frequent drinking to intoxication [32]. Hegna et al. [34] noted that the 'educational explosion' over the past few

decades has left fewer options for those who do not complete senior high school, and it has been claimed that this has led to a more 'conformist' youth generation [35]. Our finding of a decrease in delinquency fits well into the picture of a more conformist lifestyle.

Several studies indicate that increased parental knowledge and stricter alcohol-specific parenting have contributed to the downward drinking trend [6,11–13]. Kraus *et al.* [7] suggested that parents have also become less likely to drink in front of their adolescent children. However, we found no empirical support for this suggestion, as perceived parental drinking frequency did not change. On the other hand, we observed an increase in time spent on activities with parents. This observation is in line with previous findings of changes in family dynamics and closer parent-child relationships [7,17,29–31], which are predictive of reduced drinking [16,36]. These changes could also account for some of the reduction in intoxication frequency, and may suggest that adolescents' leisure time to a lesser extent includes social situations compatible with drinking, but rather favours 'competing activities' [37].

Study limitations

The frequency of intoxication was our only outcome measure, and the perception of what it takes to feel 'intoxicated' may change in a population over time [38]. Moreover, the reporting of intoxication may also have been affected by changes in the social acceptance of getting drunk. Hence, the validity of this measure, not only the actual behaviour, may have changed over time.

We identified many factors that—in a statistical sense—could explain some of the decrease in intoxication prevalence, but whether these factors actually *caused* the reduction is open to question. The issue of potential reverse causation should also be kept in mind. For instance, the increase in time spent with parents may be indicative of improved parent-child relationships, and the quality of these relationships may deteriorate if adolescents start to drink heavily [39].

Due to lack of data, we were unable to take many potentially important factors into account. For instance, changes in the perception that alcohol is harmful and hard to obtain have been identified as potential drivers of the downward drinking trend [12,14], yet our study included no such measures. Another limitation is that we only estimated additive models. It is quite possible that factors of importance interact [7], yet it remains unclear how such interactions should be modelled.

There were few demographic variables available to test for possible sample differences, and no data to

identify clustering by class or school. Moreover, we examined only changes between two points in time, and a larger number of data collections would have strengthened the study and provided a better basis for assessment of the robustness of our findings.

A final issue pertains to the generalisability of this study of Norwegian urban youth. A recent report from Norway found that trends in adolescents' behaviours, including alcohol intoxication, and relationships with parents and peers were similar in rural and non-rural areas [40], which suggests that our findings may also be valid for non-urban youth. While a decline in alcohol use among 15–16 year-olds was observed in almost all European countries from 2003 to 2015, only some countries—including Norway—also witnessed a decline in heavy episodic drinking [1]. Moreover, the downward drinking trend has been particularly steep in Norway. On the other hand, many of our findings regarding potential drivers of the decline corroborated the results of studies from other countries and with other measures on adolescent drinking behaviour.

Conclusion

Changes in leisure-time activities, increased school commitment and a trend towards decreased involvement in truancy, school misconduct and delinquency could explain a substantial part of the reduction in intoxication prevalence among Norwegian youth from 2002 to 2013/2015. We observed a particularly large decline in the frequency of hanging out with friends in the evening. This was also the single most important factor to explain the reduction in intoxication prevalence.

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Conflicts of Interest

The authors have no conflicts of interest.

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