More Drinking, More Problems—Stable Association Between Alcohol Consumption and Harm Among Swedish Youth 1995–2012

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Abstract

Aims: Alcohol consumption among Swedish youth increased during the 1990s. In the following decade, levels declined coinciding with a reduction in the prevalence of self-reported alcohol-related harm. We examine how the trend in self-reported alcohol-related problems among young Swedish alcohol consumers has followed the trend in alcohol consumption during 1995–2012, and test whether the strength of the association between self-reported alcohol consumption and alcohol-related problems within individuals is inversely proportional to the overall level of consumption among youth.

Methods: The study was based on a representative survey on alcohol and drug habits among ninth-year students, consisting of current alcohol consumers (n = 68 863), 1995–2012. Negative binominal regression models were used to estimate the relationship between three consumption variables (average volume of consumption, binge drinking and heavy drinking) and self-reported alcohol-related problems.

Results: The prevalence of binge drinking showed a greater association with self-reported alcohol-related problems than did overall mean consumption. No noticeable variation in the strength of the individual-level alcohol and harm relationship was found over the study period. We found no significant interaction between the individual alcohol use measures and overall mean youth consumption.

Conclusion: We found no signs of normalization; on the contrary, young alcohol consumers suffer about the same number of self-reported negative consequences from their drinking, regardless of the level of overall youth consumption. The study also suggests that binge drinking rather than overall consumption is the main factor that influences the development of self-reported problems experienced among young alcohol consumers.

Short summary: Young alcohol consumers suffer about the same number of self-reported negative consequences from their drinking, regardless of the level of overall mean consumption in the youth population. Binge drinking consumption appears to be the main factor influencing the development of self-reported alcohol-related problems among young alcohol consumers.

INTRODUCTION

During the last two decades, youth alcohol consumption has varied substantially in several countries (Hibell et al., 2012; Johnston et al., 2014; Pedersen and von Soest, 2015). Most noticeable are the decreasing drinking participation rates in the 2000s in several European countries such as Ireland, Norway, Germany and Italy.
(Hibell et al., 2012; Pedersen and von Soest, 2015), and in the USA and Australia (Johnston et al., 2014; Livingston, 2014). In Sweden, the mean yearly volume consumed among 15- to 16-year-olds increased sharply during the 1990s. This trend ended at the turn of the century, and in the ensuing decade, consumption levels among youth gradually declined. During the same period, the proportion of non-drinkers more than doubled, from 21 to 56% (Leifman, 2015).

Alcohol consumption among youth is related to a wide range of adverse consequences, including unintentional injuries, violence, low educational attainment and alcohol-related disorders in adulthood (Hill et al., 2000; Odgers et al., 2008; Boden and Ferguson, 2011; Svensson and Landberg, 2013). It is therefore unsurprising that the declining trends in alcohol consumption are accompanied by an over 50% reduction in self-reported alcohol-related harm among Swedish youth in the 2000s (Thor, 2015). However, it is not clear whether the reduction in harm rates can be attributed solely to the large decrease in drinking participation rates (since youth who do not drink alcohol are not at risk of alcohol-related harm), or whether there is a similar development also among drinkers. Moreover, a considerable body of research demonstrates that drinking patterns, such as binge drinking/heavy episodic drinking (Wells et al., 2000; Rehm et al., 2003; Rossow and Romelsjo, 2006; Kraus et al., 2009; Danielsson et al., 2012; Rossow et al., 2013), are a crucial factor in the risk of adverse outcomes, which highlights the importance of including not only the average volume consumed, but also the pattern of drinking in analyses of the link between alcohol and harm among youth.

Several recent studies have shown that changes in alcohol consumption among youth are in line with the theory of collectivity of drinking cultures (Skog, 1985) in that consumption has declined as a collective shift across all levels of consumption, including among the heaviest drinkers (Brunborg et al., 2014; Norstrom and Svensson, 2014; Raninen et al., 2014). It would be reasonable to presume that the harm rates among consumers would fall in parallel with this collective decline in consumption. However, several other recent studies indicate that changes in consumption may not necessarily be accompanied by corresponding changes in alcohol-related harm (Bye, 2007; Hallgren et al., 2012; Landberg and Hubner, 2014; Raninen et al., 2014). According to findings from Norwegian and Swedish survey data, the strength of the relationship between alcohol consumption and associated problems may be relative to the overall level of consumption, such that it tends to be stronger in periods with low overall consumption and weaker in periods with high overall consumption (Bye and Rossow, 2008; Landberg and Hubner, 2014).

One explanation for these findings might be found in the substance use normalization thesis proposed by Parker et al. (1998). The normalization mechanism basically refers to the degree to which use of illicit drugs (originally cannabis) is socially accepted behaviour among youths; when drug use grows more widespread in the youth population, it becomes a more socially accepted, ‘normalized’ behaviour, and is more likely to be adopted also by well-adjusted youths who avoid risks. More recent studies have tested the normalization thesis empirically and found that the relationship between alcohol consumption and various risk factors/problem behaviours such as delinquency (Pape et al., 2008), low academic achievement, bullying/fighting (Sznitman et al., 2013) and alcohol-related violence (Bye and Rossow, 2008) tends to be weaker in countries or periods with higher prevalence of youth consumption. Translated into our conditions, the theory would imply that alcohol consumption is seen as ‘normalized’ behaviour during periods when the overall youth consumption is high. The group of heavy drinkers would therefore include a larger proportion of well-adjusted individuals, and would be less strongly associated with behaviours and traits that may increase the risk of alcohol-related negative consequences, e.g. impulsivity, risk-taking and delinquency. Conversely, in periods of low consumption among youth, alcohol use would become de-normalized and considered a more deviant behaviour. In that situation, the group of heavy drinkers would tend to be smaller and to a greater degree characterized by norm-violating and problem-prone behaviour that is potentially related to a greater risk of experiencing alcohol-related problems. Accordingly, we would expect the relationship between alcohol consumption and alcohol-related problems to be weaker in periods with relatively high overall youth consumption than in periods when youth consumption is low.

Against this background, the aim is to examine to what degree the trend in self-reported alcohol-related problems among alcohol consumers have followed the trend in mean consumption among 15-to-16-year-olds in Sweden from 1995 to 2012—a period that has seen large variations in both consumption levels and the proportion of non-drinkers. Because of the well-established relationship between intoxication and alcohol-related negative outcomes (Andersson and Hibell, 2007; Danielsson et al., 2012; Rossow et al., 2013), we will also investigate how well the rates of alcohol-related problems have followed the prevalence of binge drinking. Moreover, we will test whether the strength of the association between self-reported alcohol consumption and alcohol-related problems within individuals is inversely proportional to the overall level of consumption among youth.

MATERIALS AND METHODS

Study sample

Data were retrieved from a survey conducted annually by the Swedish Council for Information on Alcohol and Other Drugs (CAN). The survey is an anonymous paper and pen questionnaire that students 15–16 years old complete in the classroom. A stratified sampling procedure is used, to ensure that all regions in Sweden are represented, and school class, rather than pupil, is used as the sampling unit, i.e. if a class is drawn then all the students in that class fill out a questionnaire. Between 80 and 96% of the classes selected for the sample participate, and the response rate on the individual level (students who are present and choose to participate) is between 83 and 89% (Gripe, 2015). The years included in the study are 1995–2012, which corresponds to when these questions about alcohol-related problems were included in the survey.

The survey responses were processed so those that were incomplete or appeared exaggerated were excluded. For instance, forms where the respondent selected the highest possible frequency option on each of the problem-related questions were deemed unreliable and excluded. The total sample consisted of 98,780 15-16-year-old students. The analytical sample of current alcohol consumers consisted of 68,863, for the number of respondents per year, see Table 1. The sample was weighted by gender and region (Gripe 2015).

Measurements

We included three different measures of alcohol consumption as explanatory variables:

‘Average volume of consumption’ over the last 12 months was measured using a beverage-specific quantity and frequency scale, which was summed up in litres of 100% alcohol. This measure thus combines questions on how often spirits, wine, beer and cider have been consumed and the typical amount consumed per occasion. The frequency questions are formulated in the same way for all types of beverages, and are as follows: How often do you normally consume beer/wine/strong cider/spirits? The response categories
are a gradient with a range from ‘every day’, ‘every other day’, ‘2 times a week’, ‘once a week’, ‘2 times a month’, ‘once a month’, ‘2–6 times a year’, ‘once a year or less’ to ‘never’. The response alternatives for the quantity questions are specific for each beverage and are customized to the different standard containers in which the beverages are sold. The consumed quantity was multiplied by the alcoholic strength of each beverage (taken from registered sales); this gives a measure of the respondent’s total alcohol consumption in litres of pure alcohol per year.

‘Binge drinking’ was measured by a question regarding whether the student on one continuous occasion has drunk an amount of alcohol equivalent to at least a whole bottle of wine or four cans of strong beer/mixed drinks or six cans of medium strength beer (3.5%vol) or 18 cl spirits. Those who reported such consumption at least once a month were considered binge drinkers.

‘Heavy drinkers’ were defined as the 5% among the consumers who drink the most each year (see section ‘Sensitivity analysis’). The number of alcohol consumers, binge drinkers and heavy drinkers is shown for each year in Table 1.

The outcome variable, self-reported alcohol-related problems, was measured using 13 questions on how many times the respondents had experienced negative consequences from their drinking. The questions were as follows:

Have you ever experienced any of the following problems due to your drinking of alcohol?

- 1. Quarrel
- 2. Physical fight
- 3. Accident or injury
- 4. Lost money or valuables
- 5. Ruined clothes or other belongings
- 6. Problems with relations to friends
- 7. Problems with relations to parents
- 8. Problems with relations to teachers
- 9. Engaged in sex without a condom
- 10. Engaged in sex that you regretted
- 11. Poor school or work performance
- 12. Victim of robbery of theft
- 13. Trouble with the police

The response options ‘never’, ‘once’, ‘twice’ or ‘three times or more’ were coded as 0, 1, 2 and 3, respectively. The coded responses were then summed up to a variable ranging from 0 to 38. Since respondents who selected the highest value on each of these problem-related questions were excluded from the study, the maximum score of the index is 38. The internal consistency was found to be good (Cronbach’s alpha = 0.85).

**Table 1. Descriptive characteristics of the sample, 15–16 year olds**

<table>
<thead>
<tr>
<th>Year</th>
<th>Alcohol consumers</th>
<th>Binge drinkers</th>
<th>Heavy drinkers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>% of total sample</td>
<td>n</td>
</tr>
<tr>
<td>1995</td>
<td>4424</td>
<td>80</td>
<td>1462</td>
</tr>
<tr>
<td>1996</td>
<td>4737</td>
<td>79</td>
<td>1514</td>
</tr>
<tr>
<td>1997</td>
<td>4433</td>
<td>79</td>
<td>1456</td>
</tr>
<tr>
<td>1998</td>
<td>4357</td>
<td>81</td>
<td>1395</td>
</tr>
<tr>
<td>1999</td>
<td>4028</td>
<td>78</td>
<td>1345</td>
</tr>
<tr>
<td>2000</td>
<td>4305</td>
<td>81</td>
<td>1491</td>
</tr>
<tr>
<td>2001</td>
<td>4377</td>
<td>80</td>
<td>1532</td>
</tr>
<tr>
<td>2002</td>
<td>4228</td>
<td>78</td>
<td>1484</td>
</tr>
<tr>
<td>2003</td>
<td>3967</td>
<td>76</td>
<td>1291</td>
</tr>
<tr>
<td>2004</td>
<td>3941</td>
<td>73</td>
<td>1311</td>
</tr>
<tr>
<td>2005</td>
<td>3891</td>
<td>72</td>
<td>1306</td>
</tr>
<tr>
<td>2006</td>
<td>3417</td>
<td>69</td>
<td>1139</td>
</tr>
<tr>
<td>2007</td>
<td>3586</td>
<td>68</td>
<td>1220</td>
</tr>
<tr>
<td>2008</td>
<td>3340</td>
<td>69</td>
<td>1206</td>
</tr>
<tr>
<td>2009</td>
<td>3425</td>
<td>66</td>
<td>1207</td>
</tr>
<tr>
<td>2010</td>
<td>3098</td>
<td>65</td>
<td>979</td>
</tr>
<tr>
<td>2011</td>
<td>2788</td>
<td>61</td>
<td>881</td>
</tr>
<tr>
<td>2012</td>
<td>2521</td>
<td>56</td>
<td>741</td>
</tr>
</tbody>
</table>

*Proportion of alcohol consumers of total sample.

Gender. In order to fit the correct model for the association between volume of consumption and alcohol-related problems, we assessed the risk function of the relationship by plotting the number of harmful effects reported by 20 equal groups of respondents subdivided according to their total alcohol consumption. The risk function exhibited an increasing but downward concave relationship, which prompted us to use a log-log model.

Finally, to assess whether the association between the consumption measures and alcohol-related problems was modified by the overall level of youth consumption, we plotted the estimates against the mean level of consumption. We also estimated interaction models for each consumption measure that included the consumption measure at issue, mean overall youth consumption, as well as their interaction term, as explanatory variables.

**Sensitivity analysis**

As a test of robustness, three different measures of heavy drinkers were tested. One classified heavy drinkers as those who drink more than double the average mean per year, one included only those who drink >18.25 l of pure alcohol per year, a cutoff point used among adults (Skog, 1985; Rosswow et al., 2014), and finally, the 5% who drink the most every year among consumers, using the average volume of consumption measure. All three measures yielded similar estimates in the analyses, and we chose to use the 5% definition.

We also explored the alcohol-related problems stratified into three subgroups: one consisting of problems relating to social interactions, one with problems involving violence and lastly, a group of intoxication-related problems.

**RESULTS**

**Descriptive**

There have been changes in 15-year-old youth’s alcohol consumption in Sweden during the last two decades. Figure 1 shows similar
changes among those who have been classified as drinkers. There was an increase in consumption in the 1990s, from 3 l of pure alcohol per year and per consumer in 1995 to 5 l in 2000. This was followed by a decline mainly during the second half of the 2000s, from 5.1 l of pure alcohol in 2006 to 3.5 l in 2012.

The mean number of problems among consumers roughly follows the shifts in consumption except that the changes over time are less distinct. The increase in consumption between the years 1995 and 2000 coincides with a 12% increase in mean number of problems. The minor decline in consumption from 2000 to 2003 also coincides with an 11% reduction of the problems. The subsequent rise in consumption up to 2006 is not reflected in the mean number of problems. However, both consumption and harm rates start to decrease after 2009. Compared with the trends in mean consumption volume, the trends in both binge drinking and the mean number of problems are more stable, but the changes in binge drinking prevalence are clearly reflected in the shifts in mean number of problems.

### Individual level

The parameter estimates from the negative binominal regression models are shown for each year in Table 2. All models yielded estimates that were significant ($P < 0.001$). For all consumption measures, the estimates show a stable pattern without any apparent time trend over the study period. A 1% increase in volume of consumption is associated with an approximate 0.5–0.6% increase in the number of alcohol-related problems reported, whereas binge drinking at least once a month, or being a heavy consumer, is associated with four to five times as many problems.

In Fig. 2, the regression estimates are plotted against mean alcohol consumption (among consumers). For each alcohol consumption measure, the estimates are roughly equal across the scale of overall mean consumption. Hence, there is no sign that the relationship between drinking and alcohol-related problems weakens as overall mean consumption increases.

Finally, we tested for interactions between overall mean consumption and each alcohol measure. The estimates showed no significant interaction implying that the relationship between individual consumption volume, binge or heavy drinking and alcohol-related problems is not affected by the level of overall mean consumption in the youth population.

### Table 2. Regression estimates of the relationship between alcohol-related problems and alcohol consumption, binge drinking at least once a month and heavy drinking, among 15- to 16-year-old alcohol consumers.

<table>
<thead>
<tr>
<th>Year</th>
<th>Alcohol mean volume$^a$</th>
<th>Binge drinking</th>
<th>Heavy drinking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$rr^b$ 95% CI</td>
<td>$rr^b$ 95% CI</td>
<td>$rr^b$ 95% CI</td>
</tr>
<tr>
<td>1995</td>
<td>0.59 0.55 0.62</td>
<td>4.11 3.75 4.51</td>
<td>4.02 3.61 4.47</td>
</tr>
<tr>
<td>1996</td>
<td>0.52 0.49 0.56</td>
<td>3.80 3.49 4.14</td>
<td>3.84 3.48 4.24</td>
</tr>
<tr>
<td>1997</td>
<td>0.61 0.58 0.64</td>
<td>4.00 3.66 4.38</td>
<td>4.42 3.97 4.93</td>
</tr>
<tr>
<td>1998</td>
<td>0.57 0.54 0.60</td>
<td>3.74 3.42 4.09</td>
<td>3.43 3.09 3.82</td>
</tr>
<tr>
<td>1999</td>
<td>0.57 0.54 0.60</td>
<td>3.88 3.57 4.22</td>
<td>3.76 3.35 4.21</td>
</tr>
<tr>
<td>2000</td>
<td>0.56 0.52 0.59</td>
<td>3.61 3.28 3.97</td>
<td>3.39 3.01 3.81</td>
</tr>
<tr>
<td>2001</td>
<td>0.57 0.54 0.60</td>
<td>3.87 3.56 4.20</td>
<td>4.15 3.75 4.58</td>
</tr>
<tr>
<td>2002</td>
<td>0.55 0.52 0.58</td>
<td>4.04 3.72 4.39</td>
<td>4.10 3.71 4.53</td>
</tr>
<tr>
<td>2003</td>
<td>0.38 0.34 0.41</td>
<td>4.12 3.73 4.54</td>
<td>3.89 3.44 4.39</td>
</tr>
<tr>
<td>2004</td>
<td>0.53 0.50 0.57</td>
<td>4.29 3.89 4.72</td>
<td>4.74 4.23 5.32</td>
</tr>
<tr>
<td>2005</td>
<td>0.54 0.51 0.57</td>
<td>4.22 3.84 4.63</td>
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</tr>
<tr>
<td>2006</td>
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<td>4.76 4.22 5.37</td>
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<td>2007</td>
<td>0.54 0.50 0.58</td>
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<td>4.05 3.56 4.61</td>
</tr>
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<td>2008</td>
<td>0.52 0.49 0.56</td>
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<td>4.32 3.80 4.91</td>
</tr>
<tr>
<td>2009</td>
<td>0.55 0.52 0.59</td>
<td>4.37 3.93 4.85</td>
<td>4.00 3.50 4.58</td>
</tr>
<tr>
<td>2010</td>
<td>0.53 0.49 0.58</td>
<td>4.19 3.78 4.65</td>
<td>4.63 4.09 5.23</td>
</tr>
<tr>
<td>2011</td>
<td>0.53 0.50 0.56</td>
<td>3.99 3.56 4.47</td>
<td>3.77 3.22 4.42</td>
</tr>
<tr>
<td>2012</td>
<td>0.55 0.52 0.58</td>
<td>3.77 3.34 4.25</td>
<td>3.75 3.20 4.40</td>
</tr>
</tbody>
</table>

$^a$Log transform consumption.
$^b$Rate ratio.
CI, confidence interval. All models yielded significant estimates ($P < 0.001$).

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**Fig. 1.** Mean number of alcohol-related problems (left axis), alcohol consumption litre of pure alcohol (left axis) and percentage of binge drinkers (right axis), among 15- to 16-year-old alcohol consumers.
Sensitivity analyses
A lack of interactions was also found when we estimated models including the different measures of heavy drinkers and the three subgroups of alcohol-related problems (i.e. problems involving social interactions, violence or intoxication).

DISCUSSION
We have explored the development of alcohol-related harm among 15- to 16-year-old alcohol consumers in Sweden, during a period characterized by changes in consumption among youth. These shifts between high and low consumption along with the growing proportion of non-drinkers make for good conditions to test the substance use normalization thesis, which, interpreted for our conditions, would suggest that the alcohol–harm relationship is stronger in periods when consumption is low and weaker when it is high.

Results on the individual level among consumers showed that a 10 percentage point change in consumption was associated with an approximate 5% change in the number of self-reported alcohol-related problems. Binge drinking at least once a month, or being a heavy consumer, was associated with having roughly four times higher problem rates. Thus, the estimates of the individual level relationship between the consumption variables and alcohol-related problems revealed a stable pattern across the study period and did not vary in relation to the level of overall consumption among youth. In agreement with this, we found no stronger association between consumption and related consequences during periods of low consumption, nor any weaker association in periods of high consumption, i.e. we could see no signs of a normalization. This finding was also strengthened by the fact that we found no interaction between the consumption variables and the overall mean consumption.

Our descriptive trend analyses revealed that the mean number of problems has remained essentially unchanged in the consumer group. This finding suggests that the large decrease in alcohol-related problems found for the general youth population is driven mainly by the decrease in drinking participation. Moreover, while the changes in mean consumption volume among consumers were scarcely reflected in the development of mean number of problems, the changes in binge drinking were reflected rather well. This supports the notion of binge drinking having a bigger impact on alcohol-related problems than volume of consumption (Andersson and Hibell, 2007; Danielsson et al., 2012; Rossow et al., 2013).

In a sense, our findings appear to contradict the theory of collectivity of drinking presented by Skog (1985). According to this theory, drinking is a social behaviour where individuals are influenced by drinking patterns in their social network and where changes in consumption tend to occur as a collective shift among all consumers, including the heaviest drinkers. Consequently, changes in mean consumption tend to be followed by changes in alcohol-related harm. Indeed, two recent studies have found evidence for such collective shifts in consumption among youths in Sweden (Norstrom and Svensson, 2014; Raninen et al., 2014), which would lead us to expect a better match between the trends in mean volume and related problems in this group. One explanation for the divergence between the theory of collectivity and our findings may be the estimated elasticity of ~0.5 between consumption and related consequences, which implies that a relative change in consumption tends to be followed by a smaller relative change in alcohol-related problems.

In a Norwegian study (Bye and Rossow, 2008), the authors found support for a weakening in the relationship between alcohol-related violence and alcohol consumption in high consumption periods. As mentioned, we did not find any weakening in the relationship during periods of high consumption, or the inverse. Our sensitivity analyses tested the problem-related questions divided into three categories—one of which was a violence-related category—but did not yield any results that differed from our primary analyses. Another study on Swedish survey data (Landberg and Hubner, 2014) based on analysis of a wider range of problems in the general population supports the findings of Bye and Rossow. One explanation for the divergence between the results of the present study and previous ones is the fact that the relationship between alcohol-related problems and consumption in our data showed a functional form that prompted us to log transform the alcohol consumption measure. Additionally, the present analyses are based on a more limited age group, namely 15- to 16-year-olds.

To some extent, one could argue that the lack of support for a normalization in our results could be attributed to the fact that,

Fig. 2. Percentage change in number of problems given a 10% change in consumption (left axis). Rate ratio-estimates for binge drinking and heavy drinking (right axis) among 15- to 16-year-old alcohol consumers.
although large variations have occurred in youth drinking habits, alcohol is used by a large proportion of the youth population (e.g., 56% in the most recent year, 2012), making it a behaviour too widespread to display a de-normalization. There are no defined prevalence levels for when normalization or de-normalization occurs, although previous research has used population prevalences above 40% as an indicator of normalization (Parker et al., 2002; Sznitman et al., 2013, 2016).

Our results are, however, in line with those of another recent study on Norwegian youths (Pedersen and von Soest, 2015). In the present study, we measure a possible outcome (alcohol-related problems) of a normalization process. In the Norwegian study, the authors explored whether the characteristics of those who drink alcohol or binge drink changed in accordance with such a process. Or as they put it, they found no ‘hardening’ in the characteristics of alcohol users and binge drinkers when the consumption decreased in the 2000s.

Some limitations of our study should be noted. First, our finding that the rate of change in problems has been smaller than the rate of change in consumption may partly be explained by different scales being applied to the input and output variables: the self-reported volume of alcohol consumption is a continuous variable whereas our summed variable of alcohol-related problems is a discrete count variable with an upper limit. However, this is not the case for the other two explanatory variables—heavy drinkers and binge drinkers—which also are discrete count variables. Another possible limitation is that normalization (or de-normalization) of drinking among adolescents could in theory have impact both on the respondents’ willingness to report alcohol-related problems and on the extent to which they attribute their problems to their alcohol consumption. Differences in attributing problems to one’s own consumption have been shown between countries representing different alcohol cultures (Kuendig et al., 2008).

To our knowledge, this is the first study to use annual survey data to explore the temporal variations in the alcohol–harm relationship among youths, with enough data points not only to enable interaction tests, but also to capture two very different periods in youth drinking, one with high overall consumption and one with low consumption. An important strength of the study is the high consistency of the data. Data have been collected by the same organization, using the same methodology and the same questions across the entire study period. It is thus unlikely that the trends in consumption and alcohol-related problems are biased by factors related to the data collection procedure. Another strength of the study approach is that we have used three different measures of drinking, one that takes into account the amount consumed (annual consumption), one that is an expression of how the respondent drinks (binge drinking) and one (heavy drinkers) that focuses on those who drink the most. Moreover, we did not encounter any diverging results regardless of how we defined heavy drinkers or divided the self-reported problems into smaller subgroups.

Taken together, our findings suggest that young drinkers suffer about the same number of problems from their drinking, regardless of the level of overall mean consumption among youth. Moreover, the recent decrease in rates of alcohol-related problems in the general youth population appears foremost to be a reflection of the large decrease in drinking participation. Lastly, binge drinking rather than overall consumption appears to be the main factor that influences the development of self-reported problems experienced among young alcohol consumers.

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CONFLICT OF INTEREST STATEMENT
None declared.

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