Declining Trends in Alcohol Consumption Among Swedish Youth—Does the Theory of Collectivity of Drinking Cultures Apply?

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Abstract — Aims: To analyse trends in alcohol consumption among young people in Sweden between 2004 and 2012, to test whether the theory of collectivity of drinking cultures is valid for a population of young people and to investigate the impact of an increasing proportion of abstainers on the overall per capita trends. **Methods:** Data were drawn from an annual survey of a nationally representative sample of students in year 11 (17–18 years old). The data covered 9 years and the total sample comprised 36,141 students. Changes in the overall per capita consumption were tested using linear regression on log-transformed data, and changes in abstention rates were tested using logistic regression. The analyses were then continued by calculating average consumption in deciles. **Results:** Alcohol consumption among year 11 students declined significantly among both boys and girls between 2004 and 2012. These changes were reflected at all levels of consumption, and the same results were found when abstainers were excluded from the analyses. The increasing proportion of abstainers had a minimal effect on the overall decline in consumption; rather, this was driven by a decline in consumption among the heaviest drinkers. **Conclusion:** The theory of collectivity of drinking cultures seems valid for understanding changes in alcohol consumption among Swedish year 11 students. No support was found for a polarization of alcohol consumption in this nationally representative sample.

INTRODUCTION

Alcohol policy in Sweden and other Nordic countries has largely been based on the total consumption model and the theory of collectivity of drinking cultures (Skog, 1985). A central assumption of this model is that a lowering of average per capita consumption results in fewer consumers drinking at harmful levels and thus also lowers rates of alcohol-related harm (Skog, 1985; Kreitman, 1986). When Sweden joined the European Union in 1995, the average consumption was predicted to rise (Holder *et al.*, 1995; Kühlhorn *et al.*, 1998). Consumption rose in the predicted way until 2004 (Andreasson *et al.*, 2006), but has subsequently declined (Raninen *et al.*, 2013). The decline in average consumption since the mid-2000s is even more apparent among young people (Leifman, 2013).

Skog (2001) has argued that there is a strong social component driving alcohol consumption, meaning that the entire population's consumption will 'move as one'; if the overall per capita consumption is changed, the same changes will happen at all levels of consumption. Support for this argument has been found in several recent studies (Raninen *et al.*, 2013; Norstrom and Svensson, 2014; Rossow *et al.*, 2014). Raninen *et al.* (2013), who analysed changes in consumption in the Swedish adult population between 2004 and 2011 by dividing the population into 20 equally large groups ranging from low to high consumption, found that consumption had significantly declined in all groups.

It is plausible that the drinking habits of young people also move in concert, which would imply that changes in average consumption among young people would be reflected at all levels of consumption. On the other hand, alcohol is not readily available to this group, and it is thus not clear if the same principles apply as for adults. Barriers in the diffusion processes, such as differences in the availability of alcohol, could hinder collective shifts in drinking behaviours. A further potential barrier pointed out by Skog is differences in informal social control, for example, between the sexes (Skog, 2001).

A recent Swedish study of changes in alcohol consumption among different percentiles of young people from the Stockholm city area revealed that drinking trends among the heaviest drinkers were at odds with those in the broader population (Hallgren *et al.*, 2012). This 'polarization' of consumption contradicts the central notion in the theory of collectivity of drinking cultures, because changes in consumption were not collective across all levels of consumption.

Exceptions to these collective shifts have been observed previously in studies of the general adult population (Caetano *et al.*, 1983; Norstrom, 1987; Gustafsson, 2010; Landberg and Hubner, 2013), and a number of recent studies have identified diverging trends between measures of alcohol consumption and rates of alcohol-related problems (Livingston *et al.*, 2010; Meier, 2010; Hallgren *et al.*, 2012). The validity and testability of the theory of collectivity of drinking cultures have also been debated and questioned previously in the literature (Gmel and Rehm, 2000; Skog, 2001; Skog and Rossow, 2006). The aim of this study was not to further this particular debate, but simply to focus on whether the entire youth population change their drinking in broadly consistent ways.

Thus, the overall aim of this study was to analyse trends in alcohol consumption among young people in Sweden, and to test whether or not the theory of collectivity of drinking cultures is valid for the youth population. The study also extends previous work finding some evidence of polarization among young people based on a Stockholm city sample (Hallgren *et al.*, 2012), by making use of 9 years of comparable survey data from a nationally representative Swedish sample.

A polarization of alcohol consumption is defined here as a decline in average consumption among the entire population and among the majority of the population, in parallel with an increase among a group of drinkers. This builds on the polarization identified by Hallgren *et al.* (2012). Because the idea

of polarization challenges one of the cornerstones in alcohol epidemiology, it is of great importance that the results of Hallgren *et al* (2012) are tested on several data sets and on several populations so that the conclusions can be verified.

Furthermore, because there has been a major increase in the proportion of the population that do not consume alcohol in Sweden in recent years, not only in the adult population (Raninen *et al.*, 2013) but even more so among young people (Leifman, 2013), this study also aimed to analyse the impact of the increasing rate of abstainers on average alcohol consumption and the dispersion of consumption within the population.

DATA AND METHODS

Data on youth alcohol consumption was retrieved from a database collected by the Swedish Council for Information on Alcohol and Other Drugs (CAN). CAN have conducted school surveys of alcohol consumption among year 11 students (aged 17–18 years) annually since 2004. The survey is an anonymous paper and pen questionnaire that is completed in the classroom. The sample is a nationally representative sample of students in year 11, produced by Statistics Sweden using a stratified sampling procedure to ensure that all regions in Sweden are represented. School class rather than pupil is used as the unit when drawing the sample; that is, if a class is drawn then all students in that class fill out a questionnaire. Response rates vary from 81 to 86% (Leifman, 2013).

The alcohol questions consist of the quantity and frequency scale for the last 12 months (Feunekes *et al.*, 1999). This measure combines questions on how often spirits, wine, beer and cider have been consumed during the last 12 months and the typical amount consumed on an occasion. The frequency questions are formulated in the same way for all types of beverages: 'How often have you consumed beer/wine/fortified wine/spirits during the last twelve months?' The response categories are arranged on a gradient: 'every day', 'every other day', 'twice a week', 'once a week', 'twice a month', 'once a month', '2–6 times a year', 'about once' and 'never'. The response alternatives for the quantity questions are specific to each beverage and are customized to the different standard containers in which the beverages are sold. The questions are asked separately for each beverage type, and the answers are summarized into a measure of overall drinking during the last 12 months. To obtain a measure in litres of pure alcohol, this measure is then multiplied by the average alcohol strength of the beverages using information derived from sales data provided by the Swedish alcohol monopoly. Possible effects from the use of self-reported information, for example under-reporting of consumption, should be the same for each year because the questions were not altered during the study period.

We first examined the aggregate level of consumption to see if the overall decline in consumption was statistically significant. Because alcohol consumption is heavily skewed, we log-transformed this variable before testing the trends in consumption using linear regression. In the analyses where abstainers were included, we added 0.01 to every respondent's measure of alcohol consumption before log-transforming, allowing us to test the mean consumption including abstainers. To test the trends in abstention prevalence estimates, we

conducted a logistic regression with abstention as the outcome variable and survey year as the independent variable. The year of reference when testing mean consumption was 2006, as this was the year in which alcohol consumption peaked. For the abstention analyses, 2004 was used as year of reference because this was the year in which the prevalence of abstinence was the lowest.

We then continued the analyses by calculating average consumption in deciles. The respondents were ranked by their level of alcohol consumption, from lowest to highest, and then the sample was divided into 10 equally large groups each representing 10% of the population. Calculating the change in average consumption between 2004 and 2012 in each of these groups allowed us to calculate how much consumption had changed in each decile and how much these changes contributed to the overall change, using the formula

$$\frac{C_{i2012} - C_{i2004}}{C_{2012} - C_{2004}},$$

where C_{i2012} (C_{i2004}) denotes mean alcohol consumption in decile i in 2012 (2004) and C_{2012} (C_{2004}) is the sum of the deciles' mean alcohol consumption in 2012 (2004).

To analyse the dispersion of consumption we calculated the coefficient of variance (CV), which is a relative measure of the standard deviation. This allowed comparisons of the relative change in dispersion between the years; a higher coefficient of variance means a greater dispersion of alcohol consumption.

To examine the impact of the increasing rate of abstention in the population, we performed the analyses for the entire sample and for alcohol consumers only. The analyses where abstainers were excluded are more closely related to the theory of collectivity of drinking cultures, as Skog specifically excluded abstainers from his analyses. The analyses of the impact of increasing rates of abstainers are important here, as there were major changes in abstention rates over the study period, influencing the overall decline in consumption.

We also performed separate analyses for boys and girls. The reasons for this were 2-fold. First, the studies by Hallgren *et al.* (2012) and Raninen *et al.* (2013) both reported differences in the trends between males and females. Second, as Skog (2001) has pointed out, changes in consumption do not need to be collective between the sexes, and consumption among boys and girls may develop differently due to differences in factors such as social control. Thus, we felt that it was important not to overlook the possibility of diverging trends between the sexes.

This study was approved by the regional ethics committee in Stockholm (Protocol: 2014/155-31/5).

RESULTS

As shown in Table 1, the reported average consumption rose between 2004 and 2006, but this increase was not significant. Following this, there was a steady and significant decline in consumption. The dispersion became somewhat greater over this period, with the coefficient of variance increasing from 1.45 in 2006 to 1.65 in in 2012. This pattern was also found for boys and girls separately (see Supplementary data, Appendix Tables S5 and S6). Again as shown in Table 1, there was a steady increase in the percentage of young people

Table 1. Average self-reported alcohol consumption in litres 100% alcohol per year and per cent abstainers

	Mean (SD, CV)	t-value	P	Per cent abstainers	P
2004 (n = 4503)	5.62 (8.64, 1.54)	−1.89	0.0591	10.51% (9.62–11.41%)	Ref.
2005 (n = 4573)	5.86 (8.77, 1.50)	−1.43	0.1520	11.06% (10.15–11.96%)	0.4229
2006 (n = 3775)	6.20 (8.98, 1.45)	Ref.		10.75% (9.77–11.74%)	0.7342
2007 (n = 4324)	5.80 (8.73, 1.51)	−2.00	0.0451	11.46% (10.51–12.41%)	0.1747
2008 (n = 3987)	5.28 (8.25, 1.56)	−4.96	<0.0001	12.77% (11.73–13.80%)	0.0021
2009 (n = 4073)	5.40 (8.40, 1.55)	−4.78	<0.0001	13.10% (12.06–14.13%)	0.0003
2010 (n = 3941)	5.26 (8.30, 1.58)	−5.79	<0.0001	15.06% (13.94–16.18%)	<0.0001
2011 (n = 3608)	4.76 (7.58, 1.59)	−7.41	<0.0001	14.38% (13.24–15.53%)	<0.0001
2012 (n = 3357)	4.58 (7.58, 1.65)	−10.00	<0.0001	17.88% (16.59–19.18%)	<0.0001

Overall population, 2004–2012.

Table 2. Average self-reported alcohol consumption in litres 100% alcohol per year

	Mean (SD, CV)	t-value	P
2004 (n = 4026)	6.28 (8.91, 1.42)	−3.07	0.0021
2005 (n = 4056)	6.59 (9.05, 1.37)	−1.64	0.1017
2006 (n = 3364)	6.94 (9.24, 1.33)	Ref.	
2007 (n = 3829)	6.55 (9.01, 1.38)	−1.91	0.0564
2008 (n = 3498)	6.06 (8.54, 1.41)	−4.48	<0.0001
2009 (n = 3529)	6.22 (8.72, 1.40)	−3.70	0.0002
2010 (n = 3342)	6.20 (8.69, 1.40)	−2.64	0.0082
2011 (n = 3084)	5.55 (7.92, 1.43)	−6.04	<0.0001
2012 (n = 2752)	5.58 (8.03, 1.44)	−5.71	<0.0001

Abstainers excluded, 2004–2012.

who had been abstainers over the past 12 months. This was the case even during the beginning of the study period, when average consumption was increasing.

The overall trend when abstainers were excluded from the analyses showed roughly the same picture (see Table 2). The per drinker average consumption rose significantly between 2004 and 2006 and then declined from 6.94 l of pure alcohol in 2006 to 5.58 l in 2012. The dispersion also changed among drinkers, but less than in the entire sample. The trends were the same for boys and girls; a significant increase at the beginning of the study period, followed by a decline (from 5.18 l in 2006 to 4.18 l in 2012 for girls, and from 8.63 l in 2004 to 6.93 in 2012 for boys). Boys, but not girls, showed an increased dispersion of consumption (see Supplementary data, Appendix Table S7).

Table 3 presents the analyses of how consumption changed in the different decile groups. Consumption declined at all levels of consumption. In relative terms, however, the decline was greatest in the lower decile groups; that is, those with the lowest levels of alcohol consumption. For example, the decline in decile group 2 was almost 98%, as a result of the heavy increase in abstention rates. In absolute figures, the opposite pattern was found; the higher decile groups lowered their consumption considerably more, with the top 10% of consumers in 2012 consuming on average 3.82 l of pure alcohol less per year than the top 10% did in 2004. Even though this change in relative terms is very small in comparison (14.11%), the decline in this group accounted for a massive 37.54% of the overall decline in youth drinking in Sweden, while the heavy increase in rates of abstention only contributed to 0.69% of the overall decline. Roughly, the same results were found when we analysed the data for boys and girls separately (see Supplementary data, Appendix Tables S8 and S9).

When we excluded abstainers from the analyses the same picture emerged; significant declines in consumption at all levels of consumption, large relative changes at the bottom end of the consumption scale and large absolute changes at the top end. The contribution of the heaviest drinkers to the overall decline in consumption was even more apparent, with the decrease in consumption among the top 10% of drinkers contributing to 44.6% of the overall consumption decrease between 2004 and 2012 (see Table 4).

The analyses performed separately for the sexes showed some interesting differences. For boys, the same general pattern was found; significant declines in consumption at all levels with large relative reductions in consumption at the lower end of the consumption scale and small relative reductions at the top end. The decline in consumption at the top end was, however, much larger in absolute terms, and thus the contribution to the overall decline was also larger (see Supplementary data, Appendix Table S10). For girls, although there were again a decline in consumption at all levels, the results were not as clear-cut. The decline was significant among the majority of consumers, but not in deciles 4 and 5 nor in the top 10% of consumers. The contribution to the decline was, however, the most noticeable of all in this top 10%, with the girls in this group accounting for over two-thirds of the consumption decline among girls (see Supplementary data, Appendix Table S11).

In general, for all groups studied we found that although the changes in consumption had been large in absolute terms, there had been only small declines in consumption in relative terms among the heaviest drinkers. Thus, while drinking overall declined, the heaviest drinkers in 2012 consumed a larger proportion of all alcohol consumed by Swedish youth than they did in 2004.

The decile groups used for the analyses could have obscured important changes that would have appeared if smaller units were analysed. Separate analyses were thus conducted in which average consumption was calculated in percentiles (data not shown). These did not show any diverging trends in consumption; that is, consumption did not increase in any percentile.

DISCUSSION

The average alcohol consumption among year 11 students in Sweden declined significantly between 2004 and 2012. The heavy increase in the proportion of abstainers in the population

Table 3. Average alcohol consumption in litres 100% alcohol per year, absolute and relative within group change and each group's contribution to the overall change

Decile	Mean 2004	Mean 2012	Absolute change 2004–2012	Relative change 2004–2012 (%)	t-value	P	Contribution to overall consumption decrease (%)
1	0.00	0.00	n.a.	0.00	n.a.	n.a.	0.00
2	0.07	0.00	−0.07	97.66	−22.21	<0.0001	0.69
3	0.43	0.12	−0.31	72.50	−41.90	<0.0001	3.07
4	1.02	0.55	−0.46	45.53	−35.63	<0.0001	4.55
5	1.83	1.24	−0.59	32.23	−32.50	<0.0001	5.80
6	3.04	2.24	−0.80	26.29	−28.91	<0.0001	7.86
7	4.69	3.70	−0.98	20.99	−26.04	<0.0001	9.66
8	7.00	5.72	−1.28	18.31	−23.57	<0.0001	12.59
9	11.18	9.32	−1.86	16.61	−16.12	<0.0001	18.24
10	27.08	23.26	−3.82	14.11	−4.38	<0.0001	37.54

Decile groups (10%) based on the entire population.

Table 4. Average alcohol consumption in litres 100% alcohol per year, absolute and relative within group change and each group's contribution to the overall change

Decile	Mean 2004	Mean 2012	Absolute change 2004–2012	Relative change 2004–2012 (%)	t-value	P	Contribution to overall consumption decrease (%)
1	0.07	0.05	−0.02	22.2	−4.06	<0.0001	0.2
2	0.39	0.31	−0.08	20.2	−8.98	<0.0001	1.2
3	0.87	0.76	−0.11	13.2	−9.30	<0.0001	1.7
4	1.54	1.39	−0.15	9.7	−9.77	<0.0001	2.3
5	2.47	2.22	−0.25	10.0	−10.52	<0.0001	3.7
6	3.75	3.40	−0.35	9.4	−11.81	<0.0001	5.3
7	5.44	4.89	−0.55	10.2	−13.43	<0.0001	8.4
8	7.83	6.94	−0.89	11.4	−13.32	<0.0001	13.5
9	12.15	10.90	−1.24	10.2	−9.54	<0.0001	18.9
10	28.38	25.44	−2.94	10.4	−3.10	0.0019	44.6

Decile groups (10%), abstainers excluded.

seems at first glance to be one of the key factors in explaining the decline in alcohol consumption among Swedish year 11 students during the last decade. However, the results presented here paint a different picture, showing that those found at the lower end of the consumption scale made only a minimal contribution to the overall decline. If we allow ourselves to borrow an analogy from Skog, who described the way changes in alcohol consumption spread through populations as 'waves in the water' (Skog, 2001), the change brought about by the increased abstention rate is so small that it would not cause even a ripple on the surface. This is simply because the level of consumption is so low at the lower end of the consumption spectrum that the removal of this consumption has only a minimal effect on the average consumption. The increasing proportion of abstainers could, however, have influenced the trends observed in another way; if we consider *not drinking* as a form of consumption, then according to the collectivity theory the social influence of abstainers would affect the consumption of drinkers in a negative direction. The impact of the increasing proportion of abstainers would in this sense be greater than that implied by the pure numbers.

The decline in consumption was still present when we excluded abstainers from the analyses and instead studied the per drinker average consumption. There was also a decline in consumption at all levels of consumption. These results lend support to the idea that the collectivity theory is also valid for a population of young people. One thing worth pointing out here is that when we excluded abstainers from the girls-only

analysis, the decline was not statistically significant in all decile groups.

The results from this study are remarkably similar to the patterns found in a recent study of changes in alcohol consumption in a nationally representative sample of the Swedish adult population (Raninen *et al.*, 2013). However, they do differ somewhat from those found in a study of young people from the Stockholm area. Hallgren *et al.* (2012) reported that average consumption increased among year 11 girls between 2000 and 2010, with consumption dropping up until the 50th percentile but increasing in the rest of the sample. For boys, there was a decline in average consumption and a decline up until the 91st percentile, with increased consumption among the top 8%. These different findings are puzzling but could possibly, at least to some extent, be explained by the differences in study period (2000–2010 vs. 2004–2012) and geographical region (Stockholm vs. the whole of Sweden). We also saw an increase in consumption between 2004 and 2010 among year 11 girls, as reported in the Stockholm city study, but after that we saw two further years with lower consumption levels, resulting in an overall declining trend.

A separate analysis of those in our sample from Stockholm city and Stockholm County revealed no indications of a polarization, but the number of respondents became so small that no conclusions could be drawn from this. It has, however, previously been shown in studies of the general population that trends in drinking differ between regions in Sweden (Gustafsson, 2010), so it is plausible that there are regional

differences in young people's drinking habits and trends that could explain the difference between our findings and those of Hallgren *et al.* (2012). Future studies should examine if the temporal trends in youth drinking differ between regions of Sweden, and if so, how this can be explained. Nevertheless, our national study does not support the diverging consumption patterns identified in the earlier Stockholm-based analyses; and this is further supported by the findings in a recent study that changes in consumption among year 9 students in Sweden have also been collective (Norstrom and Svensson, 2014).

The analyses of the distribution of consumption indicate that a small group accounts for the majority of consumption— broadly speaking, around 10% of young people consume about half the alcohol consumed by their entire cohort, a pattern that is valid for all groups studied and has also been found in studies of the general population (Mustonen *et al.*, 2007). Because of the smaller declines (in relative terms) found for the top end of consumers, in 2012 this group consumed a bigger proportion of all alcohol consumed, even though their consumption had fallen.

Future studies should focus on whether or not these changes in the dispersion of consumption match with changes in self-reported problems in these groups. In other words, do those that now consume proportionally more of all alcohol consumed also report proportionally more problems or has the rate of problems dropped for all young people? It is possible that those at the top end of the consumption distribution have not lowered their consumption to the extent where alcohol-related harms are mitigated and thus may continue to experience harm at roughly the same rate over the entire period. Because a decline in youth consumption has also been reported for other countries, for example Finland and Iceland (Hibell *et al.*, 2012), future studies should examine if these changes have been collective among young people.

One weakness of this study is that we relied on self-reported data for our analyses, and self-reported alcohol consumption is typically underestimated (Stockwell *et al.*, 2004). However, this should not have affected the trends observed, because there is no reason to believe that the rate of under-reporting would differ over time.

The sampling process could also have had an effect on the results, because the respondents were not single units isolated from each other but rather were part of a bigger group. Peer influence has been shown to have an impact on alcohol consumption among young people (Danielsson *et al.*, 2011). In addition, the results should only be seen as representative for year 11 students, not for all young people aged 17–18 years. In Sweden, compulsory schooling ends after year 9, and around 15% do not continue in school past this point. It is highly likely that the group that does not continue studying differs from the rest. Studies of high-risk youth populations have shown that these are more likely to only have lower levels of education (Townsend *et al.*, 2007).

One of the biggest strengths of this study is the consistency of the data. The data were collected by the same organization, using the same methodology and the same questions for the entire study period. The gradual changes indicate that this is a stable trend and not just an artefact of other factors (e.g. sampling, response rates) and the stability of the changes means that the trends observed are hard to ignore.

CONCLUSION

The theory of collectivity of drinking cultures seems to be applicable to this nationally representative sample of Swedish youth, because changes in the overall per capita estimates were reflected at all levels of consumption. We found no support for a polarization of consumption in our sample in the sense in which the term was applied in the Stockholm city sample (Hallgren *et al.*, 2012), because there was no increase of consumption in the top categories of drinkers. However, the decline was proportionally smaller at the highest end of the consumption distribution.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Alcohol and Alcoholism* online.

REFERENCES

Andreasson S, Holder HD, Norstrom T *et al.* (2006) Estimates of harm associated with changes in Swedish alcohol policy: results from past and present estimates. *Addiction* **101**:1096–105.

Caetano R, Suzman RM, Rosen DH *et al.* (1983) The Shetland Islands: longitudinal changes in alcohol consumption in a changing environment. *Br J Addiction* **78**:21–36.

Danielsson AK, Romelsjo A, Tengstrom A. (2011) Heavy episodic drinking in early adolescence: gender-specific risk and protective factors. *Subst Use Misuse* **46**:633–43.

Feunekes GI, van't Veer P, van Staveren WA *et al.* (1999) Alcohol intake assessment: the sober facts. *Am J Epidemiol* **150**:105–12.

Gmel G, Rehm J. (2000) The empirical testability of Skog's theory of collective drinking behaviour. *Drug and Alcohol Review* **19**:391–9.

Gustafsson NK. (2010) Changes in alcohol availability, price and alcohol-related problems and the collectivity of drinking cultures: what happened in southern and northern Sweden? *Alcohol Alcohol* **45**:456–67.

Hallgren M, Leifman H, Andreasson S. (2012) Drinking less but greater harm: could polarized drinking habits explain the divergence between alcohol consumption and harms among youth? *Alcohol Alcohol* **47**:581–90.

Hibell B, Guttormsson U, Ahlström S *et al.* (2012) The 2011 ESPAD report. Substance use among students in 36 European countries.

Holder H, Giesbrecht N, Horverak Ø *et al.* (1995) Potential consequences from possible changes to Nordic retail alcohol monopolies resulting from European Union membership. *Addiction* **90**:1603–18.

Kreitman N. (1986) Alcohol Consumption and the Preventive Paradox. *Br J Addiction* **81**:353–63.

Kühlhorn E, Björ J, Hradilova Selin K *et al.* (1998) *Svenska Alkoholvanor I Förändring—Om Utvecklingen fram till EU-Medlemskapet [Swedish Alcohol Habits in Transition—on the Development up until the Swedish EU-Membership]*. Kristianstad: Sober Förlag AB.

Landberg J, Hubner L. (2013) Changes in the relationship between volume of consumption and alcohol-related problems in Sweden during 1979–2003. *Alcohol Alcohol* **49**:308–16.

Leifman H. (2013) *Skolelevers Drogvanor 2012 [Alcohol and Illicit Drug Use Among Students 2012]*. Stockholm, Sweden: Swedish council for information on alcohol and other drugs (CAN).

Livingston M, Matthews S, Barratt MJ *et al*. (2010) Diverging trends in alcohol consumption and alcohol-related harm in Victoria. *Aust N Z J Public Health* **34**:368–73.

Meier P. (2010) Polarized drinking patterns and alcohol deregulation —Trends in alcohol consumption, harms and policy: United Kingdom 1990–2010. *Nordic Stud Alcohol Drugs* **27**:383–408.

Mustonen H, Mäkelä P, Huhtanen P. (2007) People are buying and importing more alcohol than ever before. Where is it all going? *Drugs Educ Prev Policy* **14**:513–27.

Norstrom T. (1987) The abolition of the Swedish alcohol rationing system: effects on consumption distribution and cirrhosis mortality. *Br J Addiction* **82**:633–41.

Norstrom T, Svensson J. (2014) The declining trend in Swedish youth drinking: collectivity or polarization? *Addiction*. doi:10.1111/add.12510.

Raninen J, Leifman H, Ramstedt M. (2013) Who is not drinking less in Sweden? An analysis of the decline in consumption for the period 2004–2011. *Alcohol Alcohol* **48**:592–7.

Rossow I, Makela P, Kerr W. (2014) The collectivity of changes in alcohol consumption revisited. *Addiction*. doi:10.1111/add.12520.

Skog O-J. (1985) The collectivity of drinking cultures: a theory of the distribution of alcohol consumption. *Br J Addiction* **80**:83–99.

Skog O-J. (2001) Commentary on Gmel & Rehm's interpretation of the theory of collectivity of drinking culture. *Drug Alcohol Rev* **20**:325–31.

Skog O-J, Rossow I. (2006) Flux and stability: individual fluctuations, regression towards the mean and collective changes in alcohol consumption. *Addiction* **101**:959–70.

Stockwell T, Donath S, Cooper-Stanbury M *et al*. (2004) Under-reporting of alcohol consumption in household surveys: a comparison of quantity-frequency, graduated-frequency and recent recall. *Addiction* **99**:1024–33.

Townsend L, Flisher AJ, King G. (2007) A systematic review of the relationship between high school dropout and substance use. *Clinical Child and Family Psychology Review* **10**:295–317.