
Article

What Role Do Changes in the Demographic Composition Play in the Declining Trends in Alcohol Consumption and the Increase of Non-drinkers Among Swedish Youth? A Time-series Analysis of Trends in Non-drinking and Region of Origin 1971–2012

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Abstract

Aim: Non-drinkers among youth in Sweden have increased markedly during the last 15 years. The aim of this study is to investigate the temporal association between region of origin among Swedish youth and rates of non-drinking.

Data and method: Data on non-drinkers were obtained from The Swedish Council on Information and Other drugs (CAN) yearly school surveys among Swedish ninth-grade students over the period 1971–2013. Annual data of region of origin for 1968–2012 has been compiled from Statistics Sweden (SCB) and consists of all 15-year-olds in Sweden and their region of birth; Sweden, The Nordic Countries, Europe, The Middle East and the rest of the world. Autoregressive Integrated Moving Average (ARIMA) modelling was applied in order to estimate these associations.

Results: Descriptive results revealed a change in the demography of Swedish 15- to 16-year-olds. In the early 1990s 1% of Swedish 15- to 16-year-olds were born in a Middle East country, this proportion increased to 6% in 2012. Furthermore, those born in the rest of the world (non-European or non-Nordic countries) increased from 1% to almost 4%. Similarly, the trend of non-drinkers increased from about 20% to more than 40% among Swedish 15- to 16-year-olds during the same period. However, a more thorough analysis using ARIMA modelling revealed no significant association between rates of region of origin and non-drinking.

Conclusion: The marked increase in non-drinkers during the last 15 years is not associated to changes in the demographic composition, in terms of region of origin, among Swedish youth.

INTRODUCTION

Several European countries have reported declining trends of youth alcohol consumption. The ESPAD report (Hibell *et al.*, 2012) shows

that the reported use of any alcohol during the past month remained stable between 2007 and 2011 in most of the 26 studied countries, increased significantly in 4 countries, and decreased significantly in

9 countries, including Sweden. The outcome for other drinking indicators, heavy episodic drinking included, was similar. A decline in alcohol use and drinking to intoxication has also been observed among US adolescents during recent years (Johnston, 2013).

Most indicators on alcohol consumption among youth in Sweden are declining since around the turn of the millennium. According to school surveys conducted by CAN (The Swedish Council for Information on Alcohol and Other Drugs), alcohol consumption among 15-year-olds fell from 5.5 to 1.8 l for boys and from 2.9 to 1.3 l for girls between 2000 and 2013. Abstinence rates among boys increased from 33 to 56%, among girls from 32 to 51%, while heavy episodic drinking (at least on one occasion a month), decreased from 34 to 18% among boys and from 24 to 20% among girls (Gripe, 2013; Engdahl, 2014).

These declining trends among Swedish youth are unexpected, largely because no new restrictive policy changes have been implemented during or immediately prior to this period. On the contrary, implemented policy changes have pointed in a more liberal direction. When Sweden joined the European Union (EU) in 1995, all state monopolies but one, the alcohol retail sales system, were abolished (Norström and Ramstedt, 2006). However, the abolition of quotas for private import of alcohol is probably the most important policy change in the present context. The quotas were gradually increased and in practice abolished in 2004. This could have affected youth consumption, because private persons were now allowed to bring in large quantities of alcohol (for private use), which may have opened up an illegal alcohol market (Svensson, 2012). Given these policy changes around the turn of the millennium, which presumably led to more available and affordable alcohol for youth, the expected scenario would rather have been an increase in alcohol consumption after the year 2000.

The decline in consumption among Swedish youth has been analysed from a polarization of drinking perspective (Hallgren *et al.*, 2012; Norström and Svensson, 2014a) This is highly justifiable from a harm perspective since it is not given that a decline in average consumption is reflected in all drinking groups. The case may be that heavy drinkers increase their consumption at the same time as overall average consumption decreased. In Sweden there were reasons to suspect such a development since harms, in terms of hospitalizations, increased among the younger population at the same time as estimates of the average volume of consumption was decreasing. Hallgren *et al.* (2012) found support for the polarization hypothesis, e.g. that the heaviest drinkers increased their consumption at the same time as the overall average consumption was decreasing on biannual data between 2000 until 2010 in the Stockholm area. However, Norström and Svensson (2014a) did not find support for a polarization of drinking; rather they found support for The Collectivity of Drinking Behaviour as proposed by Skog (1985), which is a decline in all consumer groups, heaviest drinkers included, when analysing annual data for the whole of Sweden from 2000 to 2013. Even though these results are not in line with each other, one thing is apparent and that is the decline in alcohol consumption among Swedish youths since around the turn of the millennium (Norström and Svensson, 2014b). From the Swedish perspective as well as from findings from the ESPAD report a justifiable question to be raised is: what is the possible mechanism behind the decline in consumption?

The literature on mechanisms behind the trends of declining consumption and increasing proportions of non-drinkers among youths is limited. Two possible explanations for this lack of research are the fact that research on young people and alcohol tends to focus on the harmful risks of alcohol consumption, and for that reason, existing research is also predominately focussed at the individual level as opposed

to the aggregated level (Svensson, 2013). Still, some hypotheses have been formulated to explain the recent developments in Sweden. One idea is that more restrictive attitudes among parents is a possible explanation, which is supported by reports showing that the trend of stricter parental attitudes and higher rates of alcohol abstinence among youth coincide (Engdahl, 2014). However, whether these coinciding trends reflect a causal link is not evident. A plausible explanation may very well be a decrease in demand of alcohol related to other factors. Similar trends in adult provision of alcohol have also been found by Hallgren and Andréasson (2013), in a study comparing regions with a relatively high number of prevention activities (trial communities) with ordinary regions (controls) between 2003 and 2007. The findings suggested that the decrease of parental provision of alcohol was more apparent in trial communities compared with control areas but they found no significant difference between the control areas and the trial communities on the outcome measurement (binge drinking and alcohol consumption).

It has also been suggested that a change in leisure time activities among youth, such as the increasing popularity of computer games, has contributed to the recent trends. This explanation seems plausible for several reasons. It is obvious that alcohol consumption impair the attention that computer gaming requires. Another mechanism may be that computer gaming frequently takes place in domestic environments which parents are able to monitor. Some support for this explanation was presented by Svensson *et al.* (2013) who found that frequent computer gaming was associated with non-drinking in Sweden, Spain and Portugal in a bivariate analysis. Still, it must be acknowledged that others have found results pointing in the opposite direction [e.g. Epstein (2011)].

In the Swedish context, another explanation for falling youth consumption is changes in the demographic composition of Swedish youth, specifically the change in the ethnic composition of Swedish youth which might have increasing numbers of non-drinkers. This hypothesis, however, has not been empirically tested. Nonetheless, individual level analysis in the adult population supports this idea. Previous studies among the adult Swedish population showed that country of origin was associated with risk for hospital admission for alcohol-related disorders (Hjern and Allebeck, 2004). Immigrants born in southern Europe, the Middle East and other non-European countries were found to have a lower risk compared with the majority of the Swedish population. From a youth perspective it is relevant to note that second generation immigrants also had a lower risk of hospitalization compared with the Swedish population but that these differences becomes weaker over time. In a Norwegian study among adolescents it was found that immigrant students were, to a lesser degree, current drinkers, frequent drinkers or those who drank to intoxication, compared with adolescents with a Norwegian background (Amundsen *et al.*, 2005). Moreover, in the same study, it was also found that drinking behaviour tended to reflect a bi-directional acculturation in that the majority population was inclined to adapt to immigrant behaviour, which in turn adapted to that of the majority population.

One major cause of low or non-alcohol consumption among individuals from Middle Eastern countries is most likely the restrictive drinking cultures within these countries, largely related to Islam's restrictions on the use of alcohol. However, even though Islam is strongly restrictive towards alcohol this does not necessarily imply that all Muslims are non-drinkers (Cochrane and Bal, 1990).

Changes in the demographic composition of Sweden

Sweden, like the rest of Europe, has seen an increase in immigration since the early 1960s. In 1968, around 5% of the Swedish population

(7.9 million) was born outside Sweden. In 2013 this proportion had increased to 16% of the population (9.6 million). Roughly 50% of these individuals were born in other countries within the EU (Statistics Sweden). However, Sweden also has a relatively large number of people born in countries outside the EU. The average for the EU is 6.3% and in Sweden the proportion is 9.2%. The number of individuals from countries with Muslim majority populations is estimated to be between 450,000 and 500,000. Since alcohol consumption is expected to be lower among these individuals one could expect it to influence alcohol behaviours among Swedish youth. It is, however, not permitted to register individuals on basis of their ethnicity and/or religious affiliation in Sweden. Therefore the number of Muslims among individuals born in the Middle East is uncertain. Within the group of possibly 500,000 there are, among others, Christians, atheists, Alawites and so on. Still, given the individual level associations between ethnicity and drinking and also from the perspective that Sweden has a relatively high number of immigrants from outside of Europe, it seems warranted to test if there is an association on aggregate level between region of origin and rates of non-drinkers among 15- to 16-year-olds in Sweden over time.

AIM

The main aim of this article is thus to analyse the recent development in Sweden in more detail in order to test the hypothesis that a change in the demographic composition of Swedish youth aged 15–16 (i.e. born in: the Nordic countries, other European countries, Middle Eastern countries or the rest of the world) is associated with changes in rates of non-drinking from 1971 to 2012.

METHODS

Data on non-drinkers and average consumption was obtained from the CAN yearly school surveys. This school survey has been conducted since 1971, with the number of respondents varying; for most years

the number has been around 5000. The response rate has been fairly consistent around 85% throughout the period 1971–2012 (Gripe, 2013). Annual data focussing on region of birth for all 15-year-olds between the years of 1968–2012 has been compiled from Statistics Sweden’s records (SCB). This data set consists of 15-year-olds in Sweden and birth country classified as the Nordic countries, Europe, the Middle East and the rest of the world. The analysis was conducted using a time-series analysis, more specifically ARIMA (Autoregressive Integrated Moving Average) analysis. This is a widely used methodological approach for assessing aggregate alcohol-harm relationships. It has been used for comparative purposes (Norström, 2002; Landberg, 2009) and in assessing the alcohol harm association within populations (Bye and Rossow, 2008; Ramstedt, 2008). The starting point of ARIMA modelling is the obvious fact that analysis of time-series data entails a large risk of spurious associations. For instance, two variables, say aggregate per capita consumption and rates of violence, may develop in the same direction over time without being causally related to each other. A simple calculation of the correlation would thus only reflect a spurious relationship. To reduce this risk, a differencing procedure is therefore applied in ARIMA modelling, implying that changes in the data are instead correlated. Another advantage of using an aggregated time-series analysis is that the problem of self-selection does not apply and furthermore, an aggregated analysis also provides policy-relevant information such as: if any effect does in fact exist, then to what degree on a societal level? Thus, for the purpose of this study we will test if there is an association between rates of non-drinkers and different regions of origin and also, if there is an association, we will be able to estimate how large this effect is on an aggregate level.

RESULTS

Descriptive analysis

In Fig. 1 trends in the proportion of 15-year-olds living in Sweden, and born in other parts of the world, as well as trends in non-drinkers are

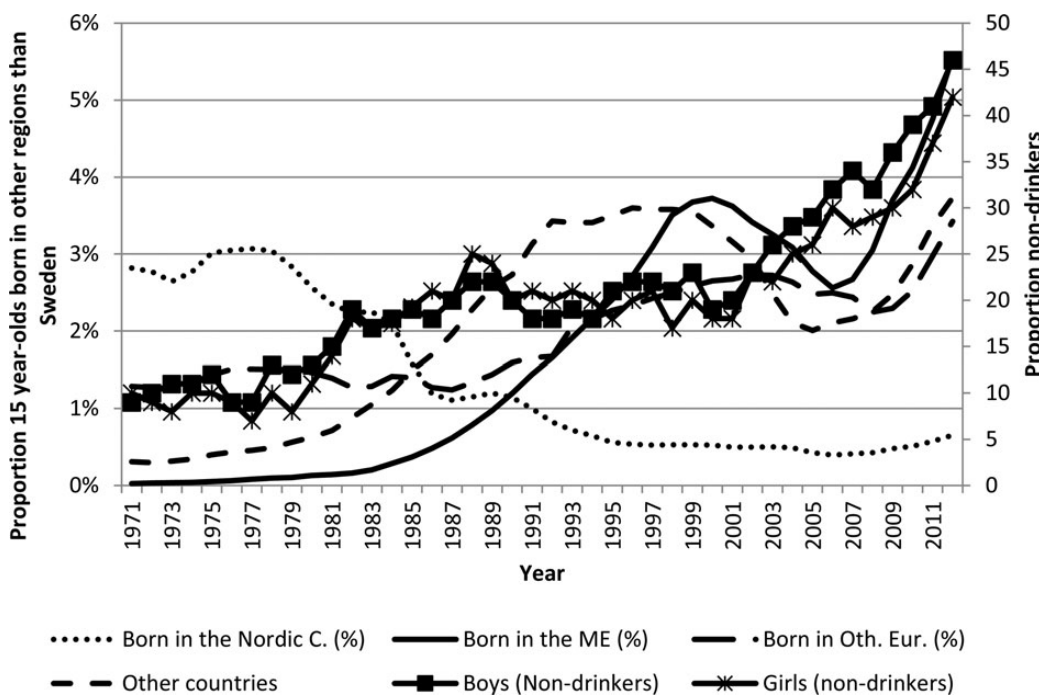


Fig. 1. Proportion of non-drinkers in Sweden and proportion born in other countries than Sweden, 15-year-old, during the period 1968–2012.

shown for the period 1971 to 2012. The percentage of non-drinkers is fairly stable from the beginning of the observation period to the late 1970s. The proportion of non-drinkers during this period is ~10% among both boys and girls. From the late 1970s to the late 1980s an increase in the percentage of non-drinkers can be observed. A stable period during the 1990s then follows, with rates of non-drinkers around 20% among both boys and girls. After the 1990s a rapid increase in non-drinkers may be observed, from around 20 to 40%. Summarizing the whole observation period, non-drinking among both boys and girls increased from around 10% in the 1970s to more than 40% among both boys and girls in the first decade of the 21st century.

The proportion of 15- to 16-year-olds born in the Nordic countries and living in Sweden is stable during the 1970s, around 3%. However, in the late 1970s this proportion declines and is below 1% from the 1990s until the end of the observation period. With regards to the proportion of 15- to 16-year-olds born in other European countries, this trend is stable until the late 1980s, when the proportion falls between 1 and 2%. However, during the 1990s this proportion increases and reaches a peak at the end of the observation period with more than 3%. The proportion of those born in the Middle East is below 1% of the entire population until 1990. However, this proportion begins to increase in the early 1980s, and continues to increase up until the turn of the millennium. After a decline in the early years of 2000s, the proportion of youth born in the Middle East increases again until the end of the observation period, where they are more than 5% of the population. The proportion of those born in other parts of the world (Other countries) follow a similar pattern; increasing in the late 1970s until the beginning of the 1990s, when it flattens out at more than 3%. In the early years of the new millennium a decline of this proportion can be observed, however since 2005 this proportion once again increases to almost 4%.

Based on the visual analysis of raw data on non-drinkers and the proportion of 15- to 16-year-olds born in countries other than Sweden, we may expect to find an association between non-drinkers and the proportion born in the Middle East, since these trends have a similar pattern through the mid-1980s, the early 1990s and especially during the late 1990s and from the mid-2000s. During these periods of time these trends are increasing. However, the trends are also moving in opposite directions during the beginning of the millennium to 2005, and hence speak against an association. Moreover, we may also find an association between those born in other countries for similar reasons. From this descriptive data we may not expect to find any association between non-drinkers and the proportion born in other countries since these trends are moving in an opposite direction during late 1980s and the increase in non-drinkers from the late 1990s is not reflected in the trend of youth born in the Nordic countries, which is stable during the same period. Still, to fully examine these associations and to reduce the risk of spurious relationships due to common trends a more thorough analysis using ARIMA modelling is required.

Estimation of time-series analysis

The result of the ARIMA modelling on the relationship between non-drinkers and the proportion of 15- to 16-year-olds born in regions other than Sweden is presented in Table 1. No significant estimates were found either among males or females, between the proportion of 15- to 16-year-olds born in other countries than Sweden and rates of non-drinkers. It may furthermore be added that this analysis was also conducted for a shorter time period, since the visual inspections suggested that an association between the proportion born in the

Table 1. Estimated effects (log-log models) of proportion of from middle East, nordic countries, other European countries and the rest of the world on proportion reporting non-drinking, 15- to 16-year-old boys and girls. Estimated on data for the period 1972–2012

	Estimate	SE	Model ^a	Q ^b	P ^c
Boys					
Nordic countries	0.201 ^{NS}	0.264	0.1.0	6.684	0.245
Middle east	-0.148 ^{NS}	0.206	0.1.0	3.807	0.577
European Countries	0.061 ^{NS}	0.385	0.1.0	3.620	0.605
World (other parts)	-0.024 ^{NS}	0.206	0.1.0	3.560	0.614
Girls					
Nordic countries	0.360 ^{NS}	0.428	0.1.0	7.046	0.217
Middle east	-0.215 ^{NS}	0.212	0.1.0	8.059	0.153
European Countries	0.200 ^{NS}	0.514	0.1.0	7.492	0.186
World (other parts)	0.087 ^{NS}	0–267	0.1.0	7.329	0.197

^aAutoregressive integrated moving-average models are indicated by, in turns of order, order of autoregressive parameters (AR), order of differentiating and order of moving-average parameters (MA).

^bBox-Ljung test for residual autocorrelation at lag 5.

^cP values for the Box-Ljung test.

Middle East and the proportion born in a non-European country, increased during the latter part of the study period. However, the results of this analysis presented similar results as above and are therefore not displayed.

DISCUSSION

In this paper we have tested one possible explanation regarding the increase in rates of non-drinkers among Swedish adolescents, a trend which follows a general decline in total alcohol consumption. The hypothesis asserts that rates on adolescents born outside Sweden and in particular from Middle Eastern countries had increased to the extent that it had an effect on the aggregate level of non-drinkers among all Swedish youth 15- to 16-year-olds. The descriptive results indicated that the demography of Swedish 15- to 16-year-olds changed dramatically during the last 20 years in terms of region of birth. At the beginning of the 1990s the proportion of 15- to 16-year-olds born in Middle Eastern countries was about 1%. This proportion increased to almost 6% in 2012. Furthermore, those born in other parts of the world (non-Nordic or non-European) increased from about 1% to almost 4%. Similarly, the proportion of non-drinkers increased from about 20% to more than 40% among Swedish 15- to 16-year-olds. However, a more thorough analysis using ARIMA modelling revealed no significant association between rates of young people being born in the Middle East and overall rates of non-drinking among youth. Nor did we find any significant association between any region of origin and trends of non-drinking among Swedish adolescents. Hence, the conclusion to be drawn on the basis of the results in this study is that changes in the demographic composition of Swedish youth is not related to increasing rates of non-drinkers and decreasing alcohol consumption.

It is likely that these changes do have an impact on Swedish society, however not in terms of the aggregate level of non-drinkers. This may be due to the fact that the level of 15- to 16-year-olds from the Middle East is not high enough to influence aggregate levels of non-drinkers. It also needs to be pointed out that Middle East is a highly heterogenic region when it comes to culture and religious beliefs and therefore our notion when it comes to drinking cultures from this region and how

these drinking cultures are transformed when placed in another context, needs further development. Individual level analysis has shown that there is support for an association between region and country of origin and levels of consumption (Amundsen *et al.*, 2005) and alcohol-related hospitalizations (Hjern and Allebeck, 2004).

Concerning limitations of this study, we would like to add that we have no knowledge of time spent in Sweden among those born in other regions. This is crucial, since we may expect that those who have spent more time in Sweden to be more affected by the Swedish drinking culture than those who have spent less time in the country. Furthermore an estimate of religious affiliation and the degree of this affiliation would have been preferable to further increase our knowledge on this association.

In the context of understanding the increasing trends of non-drinking and decreasing overall consumption among Swedish youth, the findings of this paper show that changes in the demographic composition of Swedish youth is not associated with aggregated changes in non-drinking. These findings highlight the need for further research on why there has been a decline in consumption and an increasing rate of non-drinkers among Swedish youth.

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CONFLICT OF INTEREST STATEMENT

None declared.

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