

# Drinking patterns at the sub-national level: What do they tell us about drinking cultures in European countries?

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## Abstract

**Aim:** A drinking pattern is not only a major drinking variable, but is also one indicator of a country's drinking culture. In the present study, we examine drinking patterns within and across the neighbouring countries of Denmark and Germany. The aim of the research is to determine to what extent drinking patterns differ or are shared at the sub-national level in the two countries.

**Method:** Data came from the German 2012 Epidemiological Survey of Substance Use ( $n = 9084$ ) 18–64 years (response rate 54%), and the Centre for Alcohol and Drug Research's 2011 Danish national survey ( $n = 5133$ ) 15–79 years (response rate 64%), which was reduced to a common age

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range, producing a final  $n = 4016$ . The drinking pattern variable included abstinence, moderate drinking, heavy drinking, risky single occasion drinking (RSOD), and was investigated with bivariate statistics and gender-specific hierarchical cluster analysis. **Results:** For men three clusters emerged: one highlighting abstinence and RSOD, moderate/heavy drinking, RSOD and RSOD + heavy drinking. For women, two clusters appeared: one highlighting abstinence and moderate/heavy drinking and the other highlighting RSOD and RSOD + heavy drinking. The clusters revealed different geographical patterning: for men, a west vs. east divide; for women, a north–south gradient. **Conclusions:** The analysis could identify for each gender clusters representing both separate and shared drinking patterns as well as distinctive geographical placements. This new knowledge can contribute to a new understanding of the dynamics of drinking cultures and could indicate new approaches to prevention efforts and policy initiatives.

### Keywords

drinking culture, drinking patterns, geography, Denmark, Germany, regions

The use of the concept of drinking culture in social research on alcohol has increased in popularity (Bloomfield, Karlsson, & Grittner, 2016; Savic, Room, Mugavin, Pennay, & Livingston, 2016; SPSS, 2003). However, trying to define the concept and subsequently attempting to study drinking cultures is a highly complex and unwieldy task. Often, drinking cultures are not studied as a whole, but rather one or a select number of agreed-upon indicators of drinking cultures is examined in comparative research. A major indicator used for comparison across countries or societies is a country's prevailing drinking pattern. For example, Nordic countries are typified by a regular occurrence of binge drinking, while the southern European countries are known for a modest yet steady alcohol intake (Room & Mäkelä, 2000).

Comparing countries based on the prevailing drinking indicator could lead to a loss of information regarding what is actually going on within a country or across countries at the local or regional level. That is to say, looking that at the sub-national level, drinking patterns might no longer be homogenous within countries. However, there is little research documenting such variation, especially in Europe, when, at the same time, there are now numerous comparative studies of alcohol consumption and alcohol problems. Such studies that focus only

on drinking patterns at the national level may be misleading as to how a country's inhabitants are actually drinking. Moreover, to focus only on the national level may obscure useful and more specific information relevant to alcohol policy that could be more effectively aimed at the local level. For example, in Denmark, alcohol prevention and alcohol treatment are now determined at the municipal level, yet alcohol policy largely remains determined at the national level.

The purpose of the present article is, thus, to examine drinking patterns at the sub-national level (i.e., regional level) in two neighbouring northern European countries: Denmark and Germany. The study attempts to ascertain the level of homogeneity or heterogeneity in drinking patterns within and across these two countries. We have chosen to focus on two neighbouring countries for the obvious reason that we could presume that a politically determined national border could bisect areas of shared drinking patterns. Furthermore, the focus on regions is of growing importance within Europe and within the European Union. Many financial support programmes for various initiatives exist at the regional level. Moreover, with respect to alcohol, it may be more useful to develop legislation or interventions at the regional level if indeed drinking habits and drinking problems also vary at the same level.

## **Background**

There already exists a large and growing body of cross-country comparative studies (Ahlström, Bloomfield, & Knibbe, 2001; Mäkelä et al., 2006; Müller, Piontek, Pabst, & Kraus, 2011; Norström, 2002; Wilsnack et al., 2000). These studies mainly aim to examine differences in drinking behaviour in both the adult and youth general national populations. They describe and compare, for instance, the prevalence of drinking, heavy drinking or risky single occasion drinking (RSOD; also known as binge drinking or heavy episodic drinking). Based on a country's drinking pattern and other indicators, authors often attempt to classify the drinking culture of a particular country as, for example, a wet or dry culture.

But a growing group of studies has focused on selected characteristics of drinking style and/or drinking norms, and compares these aspects either within or across countries, thus introducing the concept of regional level into their research (Braeker & Soellner, 2016; Fjaer, Pedersen, von Soest, & Gray, 2016). For example, some studies have focused on comparing aspects of drinking behaviour or drinking problems with respect to: regions of a single country (Duncan, Jones, & Moon, 1993; Karvonen, 1995; Kraus, Augustin, Bloomfield, & Reese, 2001); regions near to or far from the border with a neighbouring country (Caetano, Mills, & Vaeth, 2012; Vaeth, Caetano, Mills, & Rodriguez, 2012); or regions spanning a shared border of two countries (Zimmerman, Junge, Niemann, Wong, & Preuss, 2010). We find the last group of studies to be the most relevant for our present purposes.

Within this group is a study by Kraus et al. (2001), which was designed to identify a north–south gradient in hazardous drinking in Germany in terms of drinking patterns. The authors were unable to detect a continuous north–south gradient; instead, they identified regional differences in drinking style with regard to rates of abstention and risky (or heavy) drinking. More specifically, using

a combination of abstinence and risky drinking indicators the results suggested that more southern federal states had lower rates of abstinence and higher rates of heavy drinking, whereas the more northern states displayed higher abstinence and less prevalent heavy drinking.

Caetano et al. (2012) investigated alcohol consumption among Mexican Americans living at various distances from the Mexican border in near-border regions of four US states, and compared this with Mexican Americans living farther away in the cities of Houston, Texas and Los Angeles, California. The authors found a “border” effect for both US men and women in which those living close to the border consumed more alcohol than those living farther away. Furthermore, an interaction term indicated that young women living close to the border consumed even more alcohol. Using the same data material as Caetano et al. (2012), Vaeth et al. (2012) investigated alcohol-related social problems amongst Mexican Americans living in areas close to or far from the US–Mexican border in four US states (California, Arizona, New Mexico and Texas), but found no residence effect on the prevalence of problems. Finally, Zimmerman et al. (2010) studied the drinking behaviour of Polish and German teenagers living in the cross-border region of Pomerania (Pomerania was originally held by Germany but was divided after the Second World War) and found that despite a national border dividing the region, these young respondents held common attitudes towards drinking and shared a number of drinking practices.

Very little research into regional differences in drinking patterns has been conducted in Denmark or Germany, although they represent two of the higher alcohol consuming countries in northern central Europe. Moreover, we are not aware that there has been a study examining regional variations in drinking styles in Denmark, which is a small country of 5.6 million inhabitants (Statistics-Denmark, 2016) that contains five politically defined regions

introduced in 2007 for the purpose of facilitating healthcare system administration.

Thus, this article is the first to include regional information on drinking style variation in these two countries. Given the growing focus on regional commonalities and differences in drinking, the present study examines whether drinking styles differ or remain the same across their borders. The study seeks to answer the following main research question:

Do variations in drinking patterns exist within the countries of Germany and Denmark? If so, do Germany and Denmark also share drinking patterns, and do such shared patterns bridge national borders?

We pursue this question by conducting our analyses stratified by sex. Because of the overwhelming evidence of strong gender differences in all aspects of drinking (Bloomfield, Gmel, & Wilsnack, 2006; Wilsnack et al., 2000), we believe our results will be more relevant and applicable if this variable is taken into consideration.

## Methods

### Data

The data we used for the present study come from two national surveys. The Danish data come from a survey conducted by Statistics Denmark in September/October 2011 for the Centre for Alcohol and Drug Research. Sampling was based on a random selection of residents via the Danish central person registration number. Mode of administration was split: first internet, then telephone. Potential respondents first received a postal letter inviting them to complete the questionnaire online. If respondents had not answered within approximately 10 days, they were contacted by telephone and interviewed. The final sample consisted of 5133 respondents, aged 16 to 79 years, representing a response rate of 64%. Because the age range of the German survey is 18–64 years, we limited the Danish survey accordingly, resulting in a

sample for present analytical purposes of 3979 respondents.

The German survey, the Epidemiological Survey of Substance Abuse (ESA), was conducted in 2012 (Kraus, Piontek, Pabst, & Gomes de Matos, 2013). The ESA examines substance use and misuse in the German general population, and consists of a representative sample of non-institutionalised adults aged 18–64 years. The survey was administered by one of three modes: a self-administered paper-and-pencil questionnaire, telephone interviews, and an online self-administered questionnaire. The final sample size was 9084 cases representing a response rate of 54%. Both surveys were ethically approved by their respective national agencies. Data from both countries were weighted, mainly according to age, sex, education and regional variables.

### Variables

As basic drinking variables, we used: (1) current drinking (drinking at least some alcohol in the last 12 months); (2) heavy drinking (>12/24 grams of pure alcohol on average per day for women/men, respectively, according to Danish national drinking guidelines; <https://sundhedsstyrelsen.dk/en/health-and-lifestyle/alcohol>); and (3) frequency of risky single occasion drinking (RSOD) of 5+ drinks per occasion (dichotomised; at least once a month vs. less often). From these, we constructed a new drinking pattern variable with the following five mutually exclusive categories. This variable was then used as the main outcome variable to describe the groupings resulting from the subsequent cluster analysis:

1. Current abstainers (no alcohol consumption within last 12 months)
2. Moderate drinkers (12/24 grams of pure alcohol or less per day on average for women/men respectively and less than monthly RSOD)
3. Heavy drinking, but not regular RSOD (more than 12/24 grams of pure alcohol

**Table 1.** Sample descriptive statistics (percentages, except mean age; weighted data).

Drinking pattern	Germany			Denmark		
	Total N = 9081	Men n = 3908	Women n = 5166	Total N = 3979	Men n = 1853	Women n = 2126
Current abstainers (no alcohol consumption within last 12 months)	13.2	12.0	14.6	7.6	5.6	9.6
Moderate drinkers ( $\leq$ 12/24 grams of pure alcohol/day on average for women/men and <monthly RSOD)	54.6	47.7	61.7	54.7	48.5	60.9
Heavy drinking but not regular RSOD (>12/24 grams of pure alcohol/day on average for women/men, <monthly RSOD)	5.9	3.3	8.6	4.2	2.5	5.9
Regular RSOD (at least monthly RSOD)	16.5	24.8	7.9	19.1	28.5	9.8
Both heavy drinking and regular RSOD	9.8	12.2	7.3	14.3	14.9	13.8
Age – mean (SD)	42 (13)			41 (13)		
Age (years, %)						
18–29	22			24		
30–49	44			44		
50+	34			32		

- per day on average for women/men, but less than monthly RSOD)
- Regular RSOD (at least monthly RSOD) but moderate drinking (12/24 grams of pure alcohol or less per day on average for women/men respectively)
  - Both heavy drinking (more than 12/24 grams of pure alcohol per day on average for women/men) and regular RSOD (at least monthly)

In addition to gender we used as control variables: three age groups of 18–29 years, 30–49 years and 50+ years. “Regions” consisted of the 16 federal states of Germany and the five regions of Denmark: Hovedstaden (capital and surrounding area), Sjælland (Zealand), Syddanmark (Southern Denmark) and Midtjylland (Central Denmark), Nordjylland (North Denmark).

*Statistical analysis*

We first examined basic drinking pattern distributions by sex and region. Because of their small sample sizes, we decided to merge the city-state of Hamburg with Schleswig-

Holstein and the city-state of Bremen with Lower Saxony for the cluster analyses. We then conducted hierarchical cluster analysis using the Ward method to identify clusters with similar drinking patterns, based on region, and age-group specific prevalence of drinking pattern items (abstention, moderate drinking, heavy drinking, regular RSOD, and both regular RSOD and heavy drinking). Cluster analysis was conducted for men and women separately.

**Results**

Table 1 displays the distribution of the main drinking variable by country and sex as well as the basic descriptive demographic characteristics of the two samples. Germany has almost twice as many current abstainers as Denmark, although the proportion of moderate drinkers is the same in the two countries, comprising more than half of total respondents. Germany has a slightly higher rate of regular heavy drinking. On the other hand, Denmark has slightly higher rates of regular risky (RSOD) drinking as well as heavy and risky drinking. Non-binge heavy drinking is more common among German

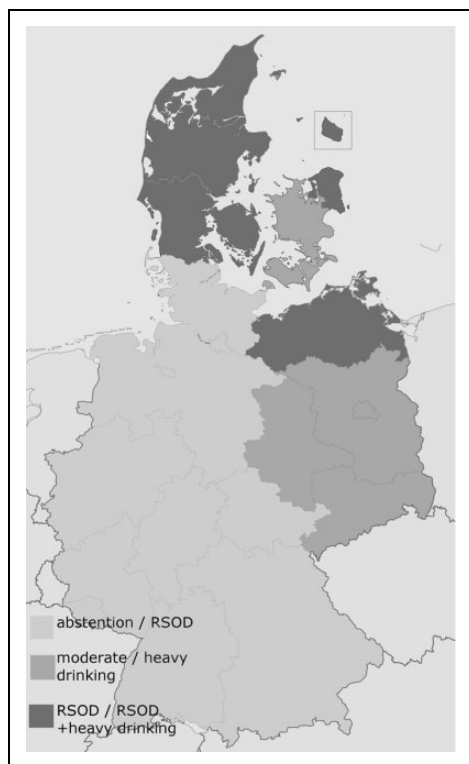
**Table 2.** Overview of distribution of drinking pattern variable by clusters, men (%).

	Age group	n	Abstainers (%)	Moderate, no heavy drinkers (%)	Heavy drinkers, less than monthly RSOD (%)	At least monthly RSOD (%)	Both monthly RSOD and heavy drinking (%)
<b>Cluster 1</b>	18–29	1123	9.4	38.9	0.6	37.3	13.8
Schleswig-Holstein/Hamburg,	30–49	1035	12.7	48.9	2.3	25.6	10.6
Lower Saxony/Bremen,	50+	1073	14.1	50.8	4.7	19.9	10.5
North Rhine-Westphalia,	Total	3231	12.4	47.3	2.7	26.2	11.2
Hesse, Rhineland-Palatinate, Baden-Wuerttemberg, Bavaria, Saarland, Thuringia							
<b>Cluster 2</b>	18–29	264	10.1	40.7	2.0	29.8	17.3
Berlin, Brandenburg, Saxony,	30–49	293	8.3	55.1	5.1	19.9	11.5
Saxony-Anhalt, Zealand (Denmark)	50+	303	6.8	57.3	8.5	12.7	14.7
	Total	860	8.3	52.1	5.4	20.1	14.0
<b>Cluster 3</b>	18–29	386	4.3	28.0	1.3	37.2	29.1
Capital region of Denmark,	30–49	682	6.1	54.2	2.2	26.8	10.7
Southern Denmark,	50+	539	6.3	52.9	4.5	23.1	13.2
Central Denmark, North Denmark, Mecklenburg-West Pomerania	Total	1607	5.7	47.0	2.6	28.4	16.2

women than among Danish women, but Danish women (and men) are almost twice as likely to be both heavy and RSO drinkers as their German counterparts. Regarding the data in general, the German sample is over twice as large as the Danish sample, but half of the respondents were women in both countries (data not shown) and mean age as well as age distribution are very similar.

Results of the cluster analysis for men are presented by age categories and with respect to the main drinking variable in Table 2 and geographically in Figure 1. Three clusters were identified: one large cluster and two smaller. The first cluster contains, surprisingly, all of the states of the former Federal Republic of Germany and one former East German state of Thuringia (named “Abstention/RSOD”; light grey on map in Figure 1). In these states the abstinence rate is higher (12%), yet monthly RSOD is also relatively high (26%). The second cluster (called “Moderate/Heavy Drinking”;

medium grey on map) can be seen as the “moderate drinking” cluster, which includes the four former East German states and one Danish region, Zealand. This cluster is typified by its low abstinence rates (8%), higher proportions of moderate drinking (52%) and relatively lower rates of RSOD (20%). The final cluster (called “RSOD/RSOD+Heavy Drinking”; dark grey) includes all regions of Denmark except Zealand and the north-eastern former East German state of Mecklenburg-West Pomerania. This cluster could be considered the heavy drinking cluster among men: low rates of abstinence (ca. 6%), lower rates of moderate drinking (47%) compared to the other clusters, and relatively high rates for RSOD (28%) and RSOD plus heavy drinking (16%), especially in the youngest age group. Except for the men’s first cluster of higher abstinence and some RSOD (light grey), the others crossed national borders to display regional proximities in drinking styles.



**Figure 1.** Map of results of cluster analysis, men.

The results for women are displayed in Table 3 and Figure 2. Here only two clusters were identified. The larger cluster (“Abstention/moderate/heavy drinking”; shown in medium grey in Figure 2) consists of German states that can be seen as having a more moderate drinking profile: there are more abstainers in all age categories (15% overall), roughly two-thirds are moderate drinkers, and low prevalence of regular RSOD (7%) and the combination with heavy drinking (ca. 7%). The second cluster (“RSOD/RSOD+”; in dark grey) consists of only two German states in the north, and all regions of Denmark, and can be regarded as the heavy drinking cluster. Cluster 2 also has noticeably high percentages of young women especially engaging in RSOD (21% in the youngest age group) and in combined RSOD + heavy drinking (28% in the youngest age group).

Among women there seems to be a simple north–south gradient in drinking patterns, in which, with the exception of Schleswig-Holstein, it appears as if the national border had shifted southwards. Furthermore, a clear age gradient is also present: binge drinking is less prevalent in older age groups, while abstention and moderate drinking are more prevalent. With respect to drinking, a main characteristic that distinguishes men from women is the lingering “shadow” of the old East German drinking style, embodied by a third cluster in the eastern German states and extending to Danish Zealand. Age differences among men tend to be similar to those for women.

## Discussion

The purpose of the present study was to investigate the shared and differing drinking patterns at the sub-national level in two neighbouring northern European countries. We have done so in order to decouple the idea of nationally bounded concepts of drinking cultures from the actual drinking practices themselves. This exercise also demonstrates that the components of drinking cultures, such as drinking patterns, are indeed fluid and can permeate national borders.

Through the cluster analyses, we could clearly demonstrate that, for both men and women, drinking styles indeed cross national borders. For men, this was seen with clusters 2 and 3, which straddled the Baltic Sea. These were the heavier drinking clusters, with cluster 3 containing fewer abstainers and higher percentages of either regular RSO drinkers or combination RSOD and heavy drinking. Cluster 2, on the other hand, represents a style reminiscent of the former GDR with steadier, heavy drinkers.

The cluster analysis of Danish and German women’s drinking offered a different and rather surprising picture. Here, cluster 2, the female version of the men’s cluster 3 (i.e., heavy and binge drinking), covered all of Denmark and two northern German federal states. Cluster 1, on the other hand, consisting of a higher

**Table 3.** Overview of distribution of drinking pattern variable by clusters, women (%).

	Age group	<i>n</i>	Abstainers (%)	Moderate, no heavy drinkers (%)	Heavy drinkers, less than monthly RSOD (%)	At least monthly RSOD (%)	Both monthly RSOD and heavy drinking (%)
<b>Cluster 1</b>	18–29	1456	12.3	56.6	4.5	13.8	12.8
Schleswig-Holstein /Hamburg,	30–49	1536	14.7	64.2	9.7	5.8	5.6
Hesse, Rhineland-Palatinate,	50+	1402	16.9	62.6	11.6	4.8	4.1
Baden-Wuerttemberg,	Total	4394	14.9	62.0	9.1	7.1	6.8
Bavaria, Saarland, Berlin,							
Brandenburg, Saxony,							
Saxony-Anhalt, Thuringia							
<b>Cluster 2</b>	18–29	603	10.9	39.3	0.9	20.9	28.0
Capital Region of Denmark,	30–49	1182	9.4	70.1	4.1	8.4	8.0
Zealand (Denmark),	50+	967	10.6	61.8	10.6	6.4	10.6
Southern Denmark, Central	Total	2752	10.2	60.6	5.6	10.4	13.2
Denmark, North Denmark,							
Lower Saxony/Bremen,							
Mecklenburg-West							
Pomerania							

abstinence rate and more moderate drinking, was predominant throughout middle and southern Germany. Thus for women, there exists an observable north–south gradient in which the typical Nordic binge-type of drinking style is more evident in the northern states of Germany and in Denmark.

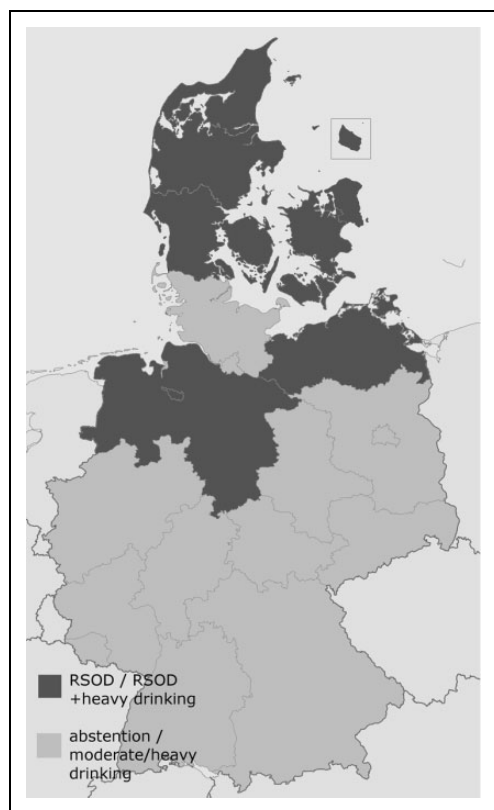
Even though Denmark and Germany have external ties that pull them from each other (e.g., the alliances to Scandinavia and the Nordic countries for Denmark; stronger ties to the EU and other German-speaking countries for Germany), these two countries are nonetheless neighbours and share roots in their drinking cultures. This is most clear when considering the former East Germany and Denmark. The former German Democratic Republic (GDR) was a heavy-, and predominately spirits-drinking, country which some have claimed to have been “alcohol-preoccupied” (Kochan, 2011). Although we have not taken specific beverages into consideration, the drinking pattern cluster most similar to a “GDR”-style of drinking (cluster 3 for women; cluster 2 for men) is found on the “shoulders” (i.e., northern region) of

Germany, including Mecklenburg-Vorpommern which, during the GDR, had a reputation as a heavy-drinking region (Barsch, 2009).

Denmark had been a spirits-consuming drinking culture until around 1917 when a heavy tax on distilled alcohol was levied (Eriksen, 1993), forcing the country to become a predominately beer-drinking culture. This earlier historical spirits-drinking reputation of Denmark was part of the traditional drinking culture of Eastern Europe (Popova, Patra, & Zatonski, 2007). In the present research we see this style of drinking appearing both in Denmark as well as the north-eastern part of Germany, which, along with other recent research into local drinking styles, testifies to its GDR heritage (Barsch, 2009; Kochan, 2011).

In terms of our original research aims, we may say that for both men and women we have found drinking patterns that vary within Denmark and Germany, respectively, but have also seen that the two countries share patterns. For example, among women, Danes and most northern Germans share a pattern of Nordic-style heavier binge drinking, thus implying that





**Figure 2.** Map of results of cluster analysis, women.

these German women share stronger bonds in drinking culture with Scandinavia than with their southern compatriots. In fact, the shared patterns for both genders are the heavier drinking patterns dominating Denmark, while the more moderate patterns are exclusive to Germany, making for a north–south gradient for women and a north–east gradient for men.

These regionally based drinking styles can offer new ways to think about how to examine drinking cultures: not just as nationally based, but as varying within and spanning across national borders. So far, we have only considered drinking patterns as one of several components of a drinking culture (Bloomfield et al., 2016). Future research could enlarge its scope by adding other indicators (e.g., attitudes, drinking legislation) to the construction of clusters. Including new factors as well as examining

such trends over larger geographical areas could help to reveal more about how drinking cultures might operate independently of political borders. For example, an important and relevant discovery would be to delve further into the Scandinavian-Baltic area in order to identify border regions as was done in the case of the Pomeranian study (Zimmerman et al., 2010) and in other research at the Mexican–American border (Vaeth et al., 2012). Such studies may inform more bi-national or multi-national cooperation, which in turn might be most effective in developing policy initiatives to address alcohol-related problems in such “naturally” occurring geographically-based drinking cultures.

The present study also possesses a number of limitations that are characteristic of alcohol survey research (e.g., cross-sectional design, under-reporting, self-selection). Another is the fact that we have merged two separate surveys, yet were able to construct an identical drinking pattern variable for both countries. This variable could suffer from slight measurement bias across the countries, but we believe this to be minimal.

Furthermore, many of the data and information used in alcohol research are considered in terms of politically defined entities, such as counties, states, countries, and global regions. But little research has attempted to ignore such borders in order to identify smaller areas which might constitute more “natural” boundaries of drinking styles and habits within “national” drinking cultures. Although the current study attempts to accomplish this, we still, of necessity, must use already-established political boundaries, as currently they are the only basis upon which to treat alcohol variables geographically. Perhaps future research will be able to draw new, alcohol-defined regions (e.g., with the help of geocoding) which might be better able to inform more specific alcohol policies at the local level.

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