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The Harms That Drinkers Cause: Regional Variations Within Countries

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Abstract

Aims: Multinational studies of drinking and the harms it may cause typically treat countries as homogeneous. Neglecting variation within countries may lead to inaccurate conclusions about drinking behavior, particularly regarding the harms drinking causes for people other than the drinkers. This study is the first to examine whether drinkers' self-reported harms to others from drinking vary regionally within multiple countries.

Design, Setting, and Participants: Analyses draw on survey data from 12,356 drinkers in 46 regions (governmental subunits) within 10 countries, collected as part of the GENACIS project (Wilsnack, Wilsnack, Kristjanson, Vogeltanz-Holm, & Gmel, 2009).

Measures: Drinkers reported on eight harms they may have caused others in the past 12 months because of their drinking. The likelihood of reporting one or more of these eight harms was evaluated by multilevel modeling (respondents nested within regions nested within countries), estimating random effects of country and region, and fixed effects of gender, age, and regional prevalence of drinking.

Findings: Reports of causing one or more drinking-related harms to others differed significantly by gender and age, and also differed significantly by regions within countries. Reports did not differ significantly by regional prevalence of drinking.

Conclusions: National and multinational evaluations of adverse effects of drinking on persons other than the drinkers should give more attention to how those effects may vary regionally within countries.

In recent years, multinational research on alcohol consumption and its consequences has become common, with one major limitation. Countries are usually treated as homogeneous units, with no attention to variations within countries. This may seem justified if (a) research is based on only one or two sites in each country (Borges et al., 2010); (b) alcohol consumption is not prevalent enough for regional analyses (Clausen, Rossow, Naidoo, & Kowal, 2009); (c) other key variables may not occur often enough for regional analyses (Bloomfield, Wicki, Wilsnack, Hughes, & Gmel, 2011; Bye, 2008); (d) characteristics of regions within countries have not been measured or are difficult to measure (French, Sargent-Cox, Kim, & Anstey, 2014; Monzavi, Afshari, & Rehman, 2015); or (e) variables of interest, such as alcohol policies, are conceptualized as national (Kyskan & Moore, 2005; Stewart, Silcock, & Wegman, 2012) or as differences between countries (Pomerleau et al., 2005; Rehm et al., 2009). Analyses of multiple "regions" have typically studied world regions as combinations of homogeneous countries (Lim et al., 2012; Shield et al., 2013; World Health Organization, 2014).

However, if societal patterns of drinking and its effects vary within countries, analyses that treat such patterns as homogeneous within countries may be incomplete and/or biased, and may give false impressions of drinking and its consequences in large populations. Many studies of individual countries have shown that people in different within-country regions often do not drink alike. Regional differences occur not only in drinking patterns (Bloomfield,

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Grittner, Kraus, & Piontek, 2017; Dwyer-Lindgren et al., 2015; Kyu, Georgiades, MacMillan, & Boyle, 2015; Millwood et al., 2013; Shelton & Savell, 2011), but also in antecedents and contexts of drinking (Giesbrecht et al., 2015; Roberts, 2012; Sanchez, Locatelli, Noto, & Martins, 2013), in consequences of drinking (Jewett, Shults, Banerjee, & Bergen, 2015; Kerr, Karriker-Jaffe, Subbaraman, & Ye, 2011; Popova, Lange, Burd, & Rehm, 2014; Robinson, Shipton, Walsh, Whyte, & McCartney, 2015), and in policies intended to control drinking and the enforcement of those policies (Erickson, Lenk, Toomey, Nelson, & Jones-Webb, 2016; Giesbrecht et al., 2013; Grönqvist & Niknami, 2011; Kolosnitsyna, Sitdikov, & Khorkina, 2014). Furthermore, an analysis of data from 23 countries and 132 regions, to examine country and regional variation in annual volume of alcohol consumed and in risky drinking, found that regional differences accounted for as much of the variance as country differences (Grittner et al., 2017).

National research on harmful effects of alcohol for people other than the drinker has thus far described patterns mainly in whole countries, without analyses of subareas—for example, in Australia (Laslett et al., 2010), Chile (Florenzano et al., 2015), Denmark (Seid, Grittner, Greenfield, & Bloomfield, 2015), Finland (Huhtanen & Tigerstedt, 2012), Laos (Jankhotkaew et al., 2017), New Zealand (Connor & Casswell, 2012), Norway (Rossow, 2007), Thailand (Jankhotkaew et al., 2017), and the United States of America (Greenfield, Karriker-Jaffe, Kaplan, Kerr, & Wilsnack, 2015). A few studies have looked at regional differences in harms to others within individual countries: Australia (Wilkinson & Livingston, 2012); Canada (Lewis-Laietmark et al., 2017); India (Esser et al., 2016); and the United Kingdom (Gell, Ally, Buykk, Hope, & Meier, 2015). One study (Ramstedt et al., 2015) evaluated urban versus nonurban patterns of harms experienced from heavy drinking of family and friends in six northern European countries (Denmark, Finland, Iceland, Norway, Scotland, and Sweden).

Data from European countries and from Australia found little evidence for simple urban – nonurban differences in harms to others from drinking (Ramstedt et al., 2015; Wilkinson & Livingston, 2012), but data from five states in India showed greater harms to children in rural than in urban locations (Esser et al., 2016). Otherwise, little is known about whether within-country regional differences should be a regular part of multinational research on consequences of alcohol consumption. The purpose of this brief report is to learn whether multinational within-country regional data can improve our knowledge of differences in drinkers' self-reported drinking-related harm to persons other than the drinkers.

Method

Data for analyzing within-country variation in harm to others from drinking come from the multinational GENACIS project, now part of the larger multinational GENAHTO collaboration (Gender and Alcohol's Harm to Others; http://genahto.org/). GENACIS combined large general-population surveys in 35 countries in Africa, Asia, Europe, North and South America, and Oceania. The cross-sectional surveys obtained comparable data from individuals on their patterns, problems, and contexts of alcohol consumption; social roles; intimacy and sexuality; violence and victimization; health and lifestyle; and demographic characteristics. More detailed information about the GENACIS surveys and questionnaires is summarized in Bloomfield, Gmel, and Wilsnack (2006), Graham, Bernards, Munné, and Wilsnack (2008), Obot and Room (2005), and Wilsnack et al. (2009). Individual country surveys were reviewed according to ethical principles and procedures created to protect research participants in each country. The overall GENACIS project was approved by the Institutional Review Board of the University of North Dakota.

The standardized GENACIS questionnaire asked individuals to report on up to eight ways that their drinking could have harmed other people in the past 12 months. Four questions asked respondents whether their drinking had a harmful effect on their intimate relationships, on relationships with their other family members (including children), on their friendships or social life, and on their finances. Four other questions asked individuals whether they had trouble with the law about their drinking and driving; whether a spouse or someone they lived with had left them or threatened to leave because of their drinking; whether they had lost a friendship because of their drinking; and whether they had gotten into fights while drinking.

The analyses here were limited to individuals aged 18–65 (for comparable age ranges) who consumed alcohol in the past 12 months (since 12-month abstainers would not have caused alcohol-related harms to others in that period). The data came from surveys that had asked about at least seven of the eight harms to others, and from regions (governmental subunits) in each country where at least 5% of the surveyed drinkers lived. The surveys and regions that satisfied these criteria were from Australia (2 regions), Costa Rica (4 regions), India (3 regions), New Zealand (5 regions), Nicaragua (5 regions), Nigeria (6 regions), Peru (2 regions), Spain (6 regions), Uganda (4 regions), and the United States of America (9 regions).

All the surveys analyzed had multistage random samples of the general adult population in the countries and regions surveyed. The samples were national or multi-regional within countries, with subregions surveyed in Costa Rica (urban and rural areas in and near San José) and India (sub-regions of Karnataka). Some surveys adjusted responses with weights (e.g., to adjust for household size in sampling), but we did not use their weights in the present analyses.

Initial analyses determined the prevalence of each of the eight alcohol-related harms reported by drinking respondents in each survey. Because the prevalence rates for each harm were generally low (see below), subsequent analyses of country and within-country regional differences examined only whether an individual reported causing one or more of the eight harms. To evaluate country and regional effects on this dichotomous outcome, we used SPSS

multilevel modeling (Heck, Thomas, & Tabata, 2012) for three-level models, with respondents (Level 1) nested within regions (Level 2) nested within countries (Level 3). The models were used to evaluate random effects of country and region, as well as fixed effects of variables that might account for any apparent country and regional differences in reported harms: gender, age, and the regional population prevalence of drinking. Size of variance explained by differences between countries and differences between regions is indicated by intraclass correlation coefficients (ICC).

Results

Table 1 shows the percentages of drinkers who reported causing each of the eight harms in the countries surveyed. Generally, less than 20% of drinkers in each survey reported causing each type of harm in the past year, although more than 35% of drinkers in India, Nicaragua, and Uganda reported that their drinking caused financial problems. Because of the relatively low rates of reporting most of the specific harms in most countries, and the smaller numbers of drinkers in the regions of each country, we limited further analyses to the likelihood of reporting causing one or more of the eight harms in the preceding year.

Table 1

Self-Reported Harm Prevalence in Last 12 Months by Country (Drinkers Only) (Age Range: 18–65)

Country	Intimate Relationship	Family and Children	Problems with Friends	Financial Problems	Trouble with Law	Spouse Left/ Threatened	Lost Friend	Got into Fight	Any of 8 Harms	Sample Size (All Drinkers)
Australia	2.0%	1.6%	1.6%	4.0%	0.6%	0.4%	0.6%	4.0%	8.6%	**1797**
Costa Rica	8.8%	9.0%	4.3%	13.2%	2.9%	5.5%	1.9%	14.8%	28.3%	**623**
India	13.8%	11.2%	13.4%	36.2%	4.7%	9.9%	9.9%	15.9%	43.4%	**516**
New Zealand	12.8%	6.8%	6.3%	12.7%	0.9%	1.1%	1.2%	7.5%	24.7%	**1594**
Nicaragua	20.0%	17.8%	12.7%	38.2%	7.5%	10.0%	7.1%	16.3%	53.5%	**411**
Nigeria	9.7%	6.6%	9.4%	18.6%	1.5%	3.0%	3.9%	3.7%	25.1%	**668**
Peru	4.2%	4.5%	3.3%	12.7%	7.5%	1.9%	2.4%	3.4%	18.3%	**1045**
Spain	2.8%	1.5%	1.6%	6.4%	1.5%	0.8%	0.8%	2.6%	10.6%	**871**
Uganda	18.2%	17.0%	15.1%	43.5%	7.0%	9.8%	9.3%	12.9%	55.7%	**681**
USA	2.8%	--	3.7%	2.3%	0.6%	0.7%	1.2%	2.8%	8.1%	**4150**

Table 2 shows the percentages of drinkers who reported causing at least one of the eight harms in the past year. More than 42% of the drinkers surveyed in India, Nicaragua, and Uganda reported causing at least one of the alcohol-related harms, as did roughly 25% of the drinkers in New Zealand, Nigeria, and Costa Rica, whereas harms were reported by less than 10% of the drinkers in Australia and the United States. Rates also varied greatly among the 46 regions within countries [data not shown]. In Nicaragua, for example, at least one harm was reported by 54% of women drinkers in Bluefields, but by only 12% of women drinkers in Juigalpa. In Nigeria, 45% of male drinkers in the Plateau region but only 8% of male drinkers in the Federal Capital Territory (Abuja) reported causing at least one harm. Consistent with known gender differences in levels of alcohol consumption, a higher percentage of men than women reported causing harms in all countries except Nigeria. This gender difference occurred also in all regions (44 of 46) except for the Plateau and Rivers regions of Nigeria.

Table 2

Prevalence of One or More of Eight Harms by Country and Gender

	All Drinkers			**Male Drinkers**			**Female Drinkers**		
Country	Count	% of Sample	Sample Size	Count	% of Sub-Sample	Sub-Sample Size	Count	% of Sub-Sample	Sub-Sample Size
Australia	154	8.6%	1797	78	10.4%	751	76	7.3%	1046
Costa Rica	176	28.3%	623	116	43.1%	269	60	16.9%	354
India	224	43.4%	516	217	45.2%	480	7	19.4%	36
New Zealand	393	24.7%	1594	210	30.3%	693	183	20.3%	901
Nicaragua	220	53.5%	411	166	63.4%	262	54	36.2%	149
Nigeria	168	25.1%	668	114	24.9%	457	54	25.6%	211
Peru	191	18.3%	1045	135	31.8%	425	56	9.0%	620
Spain	92	10.6%	871	71	14.0%	506	21	5.8%	365
Uganda	379	55.7%	681	261	68.0%	384	118	39.7%	297
USA	335	8.1%	4150	240	11.3%	2119	95	4.7%	2031

Because of the observed gender differences, gender was included as a fixed effect in the multilevel analyses of country and regional differences in reports of causing alcohol-related harms. Two other variables were included as fixed-effect variables: (1) age and (2) regional-level prevalence of drinking. Age is associated with drinking patterns (Keyes, Li, & Hasin, 2011; White et al., 2015; Wilsnack et al., 2009) and might also be associated with reporting having caused harms to other people. We included regional-level drinking prevalence because drinkers hypothetically might be more likely to report causing harms to other people in regions where few other people drink.

Table 3

Harm Prevalence Fixed and Random Effects, Odds Ratios, and 95% CI from 3-Level Mixed Logistic Models for 1 or More of 8 Harm Items (10 Countries/46 Regions/12,356 Individuals)

Fixed Effects							
						95% Confidence Interval	
Model Term	Coefficient	Std. Error	*t*	Sign.	Odds Ratio	Lower	Upper
Intercept	.90	.43	2.07	.039	2.45	1.05	5.74
Gender[a]	-.90	.13	-6.81	.000	.41	.31	.53
Age	-.03	.01	-3.14	.002	.97	.95	.99
% Drinkers/region	-.97	.69	-1.40	.161	.38	.10	1.47

Random Effects							
					95% Confidence Interval		
Random Effect Covariance	Estimate	Std. Error	*z*	Sign.	Lower	Upper	ICC
Country Variance (Intercept)	.65	.35	1.88	.060	.23	1.85	.16
Region Variance (Intercept)	.19	.06	3.22	.001	.10	.35	.05

[a] Male = 1, Female = 2

Table 3 shows the results of testing a three-level model for drinkers' reports of causing one or more of eight harms to others because of drinking. For 10 countries and 46 regions, the table shows fixed effects of gender, age, and regional prevalence of drinking, and random effects of countries and of regions within countries. Harms caused to others were significantly less likely to be reported by women and relatively older drinkers, and more likely to be reported by men and relatively younger drinkers. The prevalence of 12-month drinking (versus abstention) in the regions surveyed was not significantly associated with the likelihood of reporting causing harms. Approximately 16% of the variance in self-reported harms was explained by variation between countries, as indicated by the ICC, but having only ten countries reduced the power for significance tests (p=.06). Variance explained by differences between regions was somewhat smaller (ICC: 5.0%) but remained statistically significant after taking into account country, gender, age, and the regional prevalence of drinking.

Discussion

For the fixed-effect variables, multilevel analysis confirmed the bivariate finding that female drinkers were less likely than male drinkers to report that their drinking harmed other people. This gender difference may result in part from lower levels of drinking by women, but could also reflect gender-role differences in what is considered tolerable or appropriate behavior when drinking or intoxicated (Ahlström, 1995; de Visser & McDonnell, 2012; Iwamoto, Cheng, Lee, Takamaatsu, & Gordon, 2011). For the total sample, younger drinkers were more likely to report that their drinking harmed others. One reason for this could be that younger drinkers have more contact with other drinkers than do older drinkers (Bond et al., 2010; Wells, Graham, Speechley, & Koval, 2005). The prevalence of drinking in the regions surveyed did not have a significant relationship with drinkers' reports of causing harms to others.

After taking into account gender, age, survey country, and the regional prevalence of drinking, drinkers' reports of causing alcohol-related harms to other people showed significant within-country variability across regions. Intraclass correlation coefficients suggested that self-reported harm varied more strongly across countries than across regions, but the limited number of countries (10) weakened the power for detecting statistical significance. The within-country regional variation confirmed here may be particularly important in certain countries, such as in the regions of Nicaragua and Nigeria noted above. Such regional differences have potentially important implications for alcohol policies: the formulation and enforcement of national alcohol policies may need to be modified regionally to improve prevention of harmful effects of drinking.

Limitations

Interpretations of this study's findings are limited in several important ways. The data are cross-sectional and report only what drinkers perceived as harms caused by their drinking. Causal inferences about regional effects on drinkers' harmfulness will need to be supported by future studies with longitudinal data and with measures of harms that are independent of drinkers' perceptions. A further limitation of the data is that the measure of reporting one or more of the eight harms may obscure how the specific harms are related and whether certain harms are stronger indicators than others of self-reported harmful drinking. Future sensitivity analyses and attempts at scale construction may reduce this obscurity, although the low prevalence rates of specific harms may impede such efforts.

One other limitation of the data is that some GENACIS surveys were based on regions within countries or subdivisions within such regions, and did not sample the entire populations of their countries. The survey data thus may not provide accurate estimates of the country levels of harms. However, these survey limitations may provide a conservative test for regional effects. If harm rates were homogeneous within countries, then surveys of some but not all regions should still give accurate estimates of the country prevalence of harms, and limiting the regions studied within some countries should make it more difficult to detect regional differences that are distinct from country differences.

Several planned further analyses of data now available can improve interpretation of the results presented here. First, we hope to learn which characteristics of subnational regions may be associated with higher rates of drinker-reported harms (e.g., economic conditions, urbanization, and drinking patterns and norms other than abstention rates). Second, we hope to learn how regional patterns associated with self-reports of *causing* alcohol-related harm compare with regional patterns associated with self-reports of *experiencing* harm from others' drinking. Regional analyses of experienced harms will now be enabled by multinational data from the GENAHTO project. Third, we intend to examine possible interaction effects—for example, if associations of individual characteristics such as age and gender with self-reports of causing alcohol-related harms are contingent on regional differences in drinking patterns and drinking norms, economic conditions, and urbanization.

It is clear that the analyses here stimulate more questions than answers. However, the data here at least show that it is no longer satisfactory to conclude simply that "drinkers in country X report more harms caused by their drinking, compared to country Y."

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