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Times to drink: cross-cultural variations in drinking in the rhythm of the week

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Abstract
Objectives The time of drinking in terms of daytime versus evening and weekday versus weekend is charted for regular drinkers in 14 countries in Europe, Asia, Latin America, Africa and Oceania.
Methods National or regional adult population surveys from the GENACIS project.
Results The weekly rhythm of drinking varies greatly between societies. Drinking was generally more likely after 5 p.m. and on weekends. To this extent, alcohol consumption is now regulated by a universal clock. The relation of time of day and of the week of drinking to problems from drinking varied between societies. Drinking at specific times was more likely to predict problems among men than women, though for men the particular time varied, while weekday evenings were the most problematic time for women. The relation of drinking at a particular time to problems in part reflected that heavy drinkers were more likely to be drinking at that time.
Conclusions There are commonalities across cultures in drinking by time of day and day of the week, but the implications of the timing for alcohol-related problems are fairly culture-specific.

Keywords Cross-cultural · Alcohol consumption · Drinking times · Temporal rhythm · Alcohol problems · Gender · Time of day · Weekend

Introduction

The rhythm of the day and the week

Human life is organized in recurrent temporal patterns. Those determined by nature—like the day and the year—

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have a cross-cultural significance as natural units within which human life is organized. The 7-day week, however, is a manmade unit of time, which has not always been as universal as it currently is (Zerubavel 1989).

The original significance of the week was mainly religious, but with the industrial revolution it became used to distinguish work time from leisure time (Gusfield 1991). The "weekend" grew out from Sunday to embrace also Saturday and Friday night. Meanwhile, a normative worktime of 8–9 h during daylight weekday hours became established. The splits between the weekend and the rest of the week, and between worktime during the weekday and recreation time in the evening, became widely accepted.

There are two big exceptions to this rhythm of work and play. In largely agricultural environments, the demarcation of weekend from weekday continues to have less meaning, while the demarcation of night from day matters more than in urban life. On the other hand, in advanced industrial cities, weekly and daily rhythms are under pressure in recent decades from demands for 7-day-a-week shopping and for "24-hour cities" with a vibrant "night-time economy" (Brabazon and Mallinder 2007).

Drinking in the rhythm of the day and week

In traditional cultures where alcohol consumption is common, drinking—and particularly heavy drinking—is often associated with certain festivals, holidays and seasons in the year (e.g. Silm and Ahas 2005). Between these holidays, drinking has often been part of worktime and worklife, at least for men. In Britain before 1830s, much of the drinking of tradesmen occurred in the workplace (Stivers 1976). French survey respondents in 1950s felt that alcohol was needed in heavy labour (Sadoun et al. 1965).

The most lasting achievement of the strong temperance movements a century ago in northern Europe and English-speaking countries was the removal of alcohol from the workplace (e.g. Greenfield and Room 1997); drinking became largely confined to a few hours after work each day, and to the weekend. This rhythm of the drinking week has since spread to many other societies, enforced by decree, for instance, in Uganda during Idi Amin's dictatorship (Mazrui 1978).

On the other hand, alcohol as a food was traditionally more prominent in southern European wine cultures, and drinking wine at midday, the main meal of the day, remained fairly frequent among men over 50 in Italy and France in survey data from 2000 (Leifman 2002), although French 18- to 29-year-olds in the same surveys were not much more likely to drink at lunchtime than the same age group in the UK, Germany, Sweden and Finland.

The rhythm of the drinking week, with drinking focused away from the daytime and away from the workday, continues in many industrial societies, although the size of the weekday/weekend difference varies considerably by country, gender and age. Surveys in Finland and among the German, Italian and French speakers in Switzerland reported a ratio between Saturday and Monday drinking from 2 to 5—higher in Finland and among those aged 15–29 in Switzerland (Jula et al. 1999; Heeb et al. 2008). A comparative study of ten European countries found that women in Nordic countries (Denmark, Sweden, and Norway) drank more than twice as much on weekends as on weekdays, but the ratios were generally not as high among Nordic men, and not as high elsewhere in Europe except in two samples of Spanish women (San Sebastian and Asturias). In some samples in the rest of Spain, Greece and Italy, weekday amounts hardly differed from weekend amounts at all (Sieri et al. 2002).

Less work has been done on drinking and time of day. In a US sample, Dawson (1996) analyzed patterns in terms of the earliest period of day at which the respondent reported usually drinking. A majority of current drinkers (60.3%) reported drinking only after 6 p.m., and only 8.5% reported drinking before 3 p.m. In his study of "typical autumn week's drinking occasions", Simpura (1987, pp. 85–89) showed that the most common drinking times of Finns in 1976 and 1984 were Fridays after 5 p.m. and Saturdays after 3 p.m., with Saturday evening between 8 and 9 p.m. as the peak drinking time.

Trouble from drinking in the rhythm of the day and the week

Studies of alcohol-related problems have paid attention to both the day of the week and the time of day. Attention to drinking at night has been justified by evidence of greater hazards and social costs from night time drinking. In many locales, alcohol-impaired driving has been detected more often at night (e.g. Chongsuvivatwong et al. 1999; Miller et al. 1999), and night time automotive crashes and fatalities have been more likely to involve alcohol use (e.g. Fabbri et al. 2002; Hijar et al. 1998; Keall et al. 2005). Night time, especially on weekends, is also when alcohol use is most likely to be involved in injuries and physical aggression (Wells and Graham 2003; Young et al. 2004). In a US general population sample, Dawson (1996) found those who drank after midnight were at least three times as likely as other drinkers to report adverse consequences. However, apparent hazards of night time drinking may have multiple causes: people do more of their drinking then (Assanangkornchai et al. 2000; Dawson 1996); cumulative effects of drinking plus fatigue may be more evident later at night (Arfken 1988; Corfitsen 1996; Philip et al. 2001); and night time drinking may be more likely to involve hazardous encounters with

other people (Briscoe and Donnelly 2003; Wells and Graham 2003).

While drinking at night has been linked to acute hazards, daytime drinking, particularly in the morning, has been associated with chronic alcohol problems. Morning drinking is more prevalent in episodic heavy drinkers (Luo et al. 2006) and in drinkers with serious alcohol problems (Dawson 2000; Sharma and Khandelwal 2000). In a US general-population sample, those drinking in the morning were several times more likely to report adverse social consequences than those drinking only after 6 p.m. (Dawson 1996). Morning drinking is also included in screening measures for alcohol-related problems (Dhalla and Kopec 2007; Reinert and Allen 2002). However, it is unclear how useful morning drinking is as a warning sign (Bischof et al. 2007; Gmel et al. 2001), in part because it is rare in non-clinical samples.

Like night time drinking, weekend drinking has been associated with increased accidents (Fabbri et al. 2002; Kasantikul et al. 2005; McDermott and Hughes 1983), hospital emergency cases (Young et al. 2004), violence (Wells and Graham 2003), and fatal alcohol intoxication (Mäkelä et al. 2005).

Increased alcohol-related casualties on the weekend and on holidays (Mäkelä et al. 2005; Vegega and Klein 1991) in some societies reflect that drinking in these societies is concentrated on these times of reduced role obligations (Lopes et al. 2008; Sieri et al. 2002). However, it is unclear to what extent the meanings of weekends and holidays for drinking behaviour vary cross-culturally and between genders, and to what extent weekend/holiday influences on consequences of drinking are mediated through drinking or through settings where drinkers are in close contact (Grekin et al. 2007).

Aims of the present paper

In the present paper, we greatly expand the cultural range of temporal data on drinking behaviour, to examine variation in drinking by time of day and days of the week in societies on five continents. One aim is to learn how widespread the patterns of drinking more at night and on weekends are. Our second aim is to learn how widely drinking at certain times of day or of the week predicts greater or lesser rates of alcohol-related problems.

Methods

Data

Data for this paper are drawn from regional or national general population surveys in 14 countries in 5 continents (listed in Table 1), conducted as part of the GENACIS project (see Wilsnack et al. 2009).

Table 1 GENACIS survey characteristics

Area and country	Survey year	Age range	Women (*N*)	Men (*N*)	Sampling frame	Survey mode
Africa						
Nigeria	2003	18+	956	1,114	Regional	Face-to-face
Uganda	2003	18+	758	721	Regional	Face-to-face
South and Central America						
Brazil	2001/2	18+	331	194	Regional	Face-to-face
Costa Rica	2003	18+	857	416	Regional	Face-to-face
Nicaragua	2005	18+	1,416	614	Regional	Face-to-face
Peru	2005	18–65	1,015	516	Regional	Face-to-face
Asia						
India (Karnataka)	2003	16+	1,471	1,508	Regional	Face-to-face
Sri Lanka	2002	18+	603	590	Regional	Face-to-face
Kazakhstan	2002	18+	631	539	Regional	Face-to-face
Japan	2001	20–70	1,138	1,116	National	Self-admin. q're.
Oceania						
New Zealand	2007	18–70	820	1,055	National	Postal
Europe						
Hungary	2001	19–65	1,198	1,094	National	Face-to-face
Great Britain	2000	18+	1,038	963	National	Face-to-face
Isle of Man	2005	18+	547	453	National	Tel./face-to-face

Adapted from Table 1 in Wilsnack et al. 2009

Table 1 summarizes characteristics of the surveys analyzed. The age range here is restricted to 18–69 years. The surveys differ in sampling frame, sampling method, age limits, and modes of administration. Because of variations in sampling and fieldwork methods, response rates are not always available, but ranged from 53 to 96% for surveys with probability sampling. GENACIS surveys use a common core questionnaire and generally include: (1) a sample size of at least 1,000; (2) both women and men; (3) multistage random sampling, with clusters (e.g. a village or a defined district); (4) either a national sample or, in large countries such as India, sampling of an entire province or region with population statistics, and both urban and rural areas. Strenuous efforts were expended to attain a completion rate of 70% or higher.

From a larger number of Genacis countries, 13 surveys asked the needed questions from the common questionnaire and the UK survey questions were closely similar. These 14 were used in the current analyses. Questions were composed initially in English, translated into the main language of the site and then back-translated to check for accuracy and cultural appropriateness; guidelines for question translation were adapted from WHO strategies (Alcser et al. 2008; see the GENACIS website: http://www.med.und.nodak.edu/depts/irgga and Wilsnack et al. 2009). Addiction Info Switzerland in Lausanne serves as the centralized data management site.

Measurement and methods

Drinking at given times of the day

Respondents were asked "about how often did you drink during the following time periods: (a) during the day on a weekday (before 5 p.m.), (b) during the evening on a weekday (after 5 p.m.), (c) during the day on a weekend (before 5 p.m.), (d) during the evening on a weekend (after 5 p.m.)?" The eight response categories ranged from "never in the last 12 months" to "every day or nearly every day".

Alcohol problems

Alcohol problems were measured by asking about problems due to drinking in different life areas: "During the last 12 months, has your drinking had a harmful effect on your… (a) work, studies or employment opportunities, (b) housework or chores around the house, (c) marriage/intimate relationships, (d) relationships with other family members, including your children, (e) friendships or social life, (f) physical health, (g) finances?" A life area problem index was calculated by counting the number of areas in which the respondent reported having problems (see Rehm et al. 1999; Bondy and Lange 2000).

Alcohol volume

Volume of drinking was derived from, if available beverage-specific, quantity–frequency instruments for the last 12 months. For the UK, volume came from last week's consumption.

High-volume drinking

Besides the continuous volume measure, a high volume of drinking dichotomy was used, set at 20+ grams per day for women and 40+ grams per day for men.

Weekly heavier drinking

Current drinkers were asked their frequency of drinking approximately 60+ grams of alcohol in a day, ascertained by considering the local drinking units. Doing this at least once a week was defined as weekly heavier drinking. No such variable was available for the UK.

To estimate prevalences, samples were weighted to population characteristics, typically by age, sex and region, depending on the sampling frame and data availability for the country. Connections between time of drinking and life area problems were modelled using negative binomial models—which are similar to Poisson models but take into account overdispersion—with drinking at the four different time periods as the explanatory variable. In the second set of models, volume of drinking, the indicator for high-volume drinking, and weekly heavier drinking were included as control variables. The results were reported as relative rates, with those not drinking in the given time quadrant as the reference group.

Results

The frame for the analysis: drinking at least once a month

The study sites varied greatly in the proportions who drink at all (Wilsnack et al. 2009). Current drinkers were in a strong majority in the three study sites in Europe and in Japan, Kazakhstan, New Zealand, and Peru (Table 2). In these sites more men than women were drinkers, but at least 60% of the women drank. In all other sites, only a minority of women were current drinkers—a very small minority in India, Sri Lanka and Nicaragua. The prevalence of men's drinking at these other sites ranged from

Table 2 Number of respondents aged 18–69 and the proportion of drinkers and monthly drinkers (all respondents as the base), and percentage of monthly respondents who ever drink in the given quadrant of the week, with 95% confidence intervals, by gender; selected GENACIS countries, 2000–2007

	Respondents aged 18–69 (*N*)	Drinkers (%)	Monthly drinkers (%)	Monthly drinkers (*N*)	% of monthly drinkers that ever drink at this time							
					Weekday				Weekend			
					<5 p.m.	95% CI	>5 p.m.	95% CI	<5 p.m.	95% CI	>5 p.m.	95% CI
Women												
Africa												
Nigeria	949	22	16	138	57	49–66	72	64–79	75	67–82	81	73–87
Uganda	751	39	24	180	45	38–52	86	80–91	62	54–69	91	86–95
South and Central America												
Brazil	306	25	13	41	32	18–48	68	52–82	93	80–98	83	68–93
Costa Rica	800	44	19	153	20	12–27	48	38–57	51	42–60	91	86–96
Nicaragua	1,402	11	4	50	26	15–40	68	53–80	44	30–59	92	81–98
Peru	1,015	60	11	93	9	4–15	45	36–55	26	17–34	91	86–97
Asia												
India (Karnataka)	1,233	3	2	20	15	3–38	80	56–94	30	12–54	100	83–100
Sri Lanka	572	7	0.7	4	–		–		–		–	
Kazakhstan	581	66	31	179	23	17–30	67	60–74	87	81–92	95	91–98
Japan	1,128	77	44	480	24	20–28	90	87–92	33	29–37	93	91–95
Oceania												
New Zealand	1,049	88	66	582	58	53–62	95	94–97	77	74–81	99	98–100
Europe												
Hungary	1,157	75	26	277	39	33–46	71	65–76	57	51–63	85	80–89
UK	896	84	64	571	22	19–26	80	76–83	47	43–51	96	95–98
Isle of Man	462	88	72	316	16	13–21	78	73–83	32	27–37	98	95–99
Men												
Africa												
Nigeria	1,096	42	35	368	57	52–62	77	72–81	73	69–78	78	74–82
Uganda	708	51	44	323	41	36–47	89	86–93	63	58–69	96	94–99
South and Central America												
Brazil	176	63	49	87	48	37–59	74	63–82	90	81–95	85	76–92
Costa Rica	393	68	42	173	32	27–38	70	64–76	63	57–69	91	87–94
Nicaragua	597	44	24	146	32	24–40	50	42–58	64	56–72	90	84–95
Peru	516	82	40	176	9	5–13	39	32–45	29	23–35	93	90–97
Asia												
India (Karnataka)	1,333	37	31	413	29	24–33	82	78–85	36	31–41	94	91–96
Sri Lanka	569	56	32	181	35	28–43	88	82–92	49	42–57	93	89–97
Kazakhstan	512	76	56	286	42	37–48	76	70–81	88	84–92	97	95–99
Japan	1,111	91	74	802	43	40–47	96	94–97	55	51–58	93	91–95
Oceania												
New Zealand	813	89	75	528	70	66–74	98	96–99	87	84–90	100	100–100
Europe												
Hungary	1,086	91	66	620	61	58–65	85	83–88	76	73–80	90	88–92
UK	852	91	81	688	36	33–40	85	82–87	65	61–69	96	94–97
Isle of Man	393	95	84	307	27	22–32	90	86–93	48	42–53	98	96–99

% of monthly drinkers is calculated with weights, and including all monthly drinkers. *N* of monthly drinkers is calculated without weights and excluding those who have missing data for timing of drinking. Hence the seeming mismatch between % and *N* of monthly drinkers in some cases

two-thirds of men in Brazil and Costa Rica to one-third of men in India.

Our subsequent analyses are limited to women and men who drank at least once a month; for those drinking less frequently, the timing of drinking in the week or day would not have much meaning. A majority of men drank at least monthly in Japan, Kazakhstan, New Zealand, and the European sites, but only a minority drank this often elsewhere (Table 2). Only in the two UK samples and New Zealand did a majority of women drink at least monthly. In Japan, 44% of women drank this often, and the figures elsewhere ranged down from 31% in Kazakhstan to under 1% in Sri Lanka. The gender ratios (M/F) for prevalence of monthly drinking varied from over 10:1 in India and Sri Lanka, to 4:1–6:1 in Nicaragua, Peru, and Brazil, and down to approximately 2:1 elsewhere, except lower than that for the UK, the Isle of Man, and New Zealand.

Ever drinking at different times of the week

Table 2 also shows the percentages of monthly drinkers who reported at least sometimes drinking at each of four times: on weekdays before 5 p.m., on weekdays after 5 p.m., on weekends before 5 p.m., and on weekends after 5 p.m.

Nearly everywhere, for both men and women, the most widely reported time for sometimes drinking was on weekends after 5 p.m. Conversely, the time at which the smallest proportions of both men and women reported any drinking was on weekdays before 5 p.m. Drinking at this time was significantly less common than all other times in 12 sites for men and 10 sites for women. Of the two remaining times, drinking on a weekday after 5 p.m. was more prevalent than drinking before 5 p.m. on a weekend in 11 sites (8 significant) for men and 9 (8 significant) for women. The greatest differentiation between societies occurred for drinking on weekends before 5 p.m.

Often, more male than female monthly drinkers reported drinking at each of the times, with some exceptions. Drinking on weekends after 5 p.m. was so commonplace that there was a little variation in it across genders or across countries. Also, in some countries there were very little differences between men and women, e.g. in Nigeria and Uganda. However, it should be remembered that monthly drinkers are everywhere a smaller proportion of women than of men, and in some sites a much smaller proportion.

Drinking at least weekly at different times of the week

Table 3 shows the proportions drinking at least once a week in each of the four time periods. Half or more of the male regular drinkers reported drinking at least weekly after 5 p.m. on both weekdays and weekends in Uganda, Japan, the UK and the Isle of Man, and on weekends in India and New Zealand. Half or more of the female regular drinkers reported drinking at least weekly after 5 p.m. on both weekdays and weekends in India and New Zealand, and on weekends in the UK and the Isle of Man. Few men or women report drinking weekly at any time in Nicaragua and Peru, and few women drink weekly at any time in Kazakhstan and in Sri Lanka (where few women drink at all). Thus in Nicaragua 50% and in Peru 60% of drinkers report drinking on weekend evenings "3–6 times in the last 12 months" (results not shown).

Although there is more time available to drink on weekdays than on weekends, in most sites both men and women were more likely to drink weekly on weekends than on weekdays. As with drinking at all, drinking weekly was usually most common on weekends after 5 p.m. and least common on weekdays before 5 p.m.. Weekly drinking was least influenced by the day or hour among Nigerian men and women and among men in Hungary.

The relation between drinking at different times of the week and life-area alcohol problems

The left half of Table 4 shows the extent to which drinking weekly in a particular time period was related to experiencing alcohol-related life-area problems. The table shows the ratios of problem rates among those drinking at a particular time to the problem rates among those not doing so. The analyses exclude Hungary (life-area problem data unavailable) and Nicaragua and Peru (too few reported life-area alcohol problems).

Among women, drinking on weekdays before 5 p.m. significantly predicted problems only in English-speaking sites (the UK, the Isle of Man, and New Zealand). Drinking on weekend evenings also predicted problems among women in the UK, and New Zealand, and as well among women in Brazil, Costa Rica and Kazakhstan. In Nigeria, on the other hand, women's alcohol-related life area problems were associated with weekend drinking before 5 p.m., and in Japan and the UK with weekday drinking after 5 p.m.

Among men, drinking on weekdays before 5 p.m. is most clearly associated with problems in the UK, the Isle of Man, Costa Rica, and Uganda. Men's alcohol-related problems are also associated with drinking on weekdays after 5 p.m., in Nigeria, India, Kazakhstan and the UK; on weekends before 5 p.m., in Nigeria, India, Japan and the UK; and on weekends after 5 p.m., in Costa Rica, India, Kazakhstan, New Zealand, and the UK. Looking across all sites, drinking at a particular time had significant or near-significant ($p < 0.1$) associations with problems at a majority of the drinking times for men, but at only a minority of the drinking times for women.

Table 3 Percent of monthly drinkers aged 18–69 drinking at least weekly in a given quadrant of the week, with 95% confidence intervals, by gender; selected GENACIS countries, 2000–2007

	Weekday				Weekend			
	<5 p.m. (%)	95% CI	>5 p.m. (%)	95% CI	<5 p.m. (%)	95% CI	>5 p.m. (%)	95% CI
Women								
Africa								
Nigeria	16	10–23	26	19–34	30	23–39	26	19–35
Uganda	13	8–18	35	28–43	18	12–24	41	34–49
South and Central America								
Brazil	5	1–17	29	16–46	22	11–38	32	18–48
Costa Rica	3	0–6	13	6–19	5	1–10	32	24–41
Nicaragua	4	0–14	8	2–19	4	0–14	4	0–14
Peru	1	0–3	0	0–0	0	0–0	0	0–0
Asia								
India (Karnataka)	15	3–38	55	32–77	20	6–44	65	41–85
Sri Lanka	–		–		–		–	
Kazakhstan	2	1–6	4	2–8	3	1–7	5	2–9
Japan	3	1–5	51	47–56	4	3–6	46	41–50
Oceania								
New Zealand	7	4–9	54	50–58	8	5–10	55	51–59
Europe								
Hungary	7	4–10	16	11–21	11	7–15	14	10–18
UK	5	3–7	44	40–48	14	11–17	59	54–63
Isle of Man	3	2–6	46	40–52	5	3–8	62	57–68
Men								
Africa								
Nigeria	23	19–27	38	33–43	34	29–39	41	36–46
Uganda	16	12–20	59	54–65	28	23–33	66	61–72
South and Central America								
Brazil	21	13–31	40	30–51	43	32–53	47	36–58
Costa Rica	7	4–10	17	13–22	14	10–19	42	36–48
Nicaragua	1	0–5	1	0–5	2	0–6	3	1–8
Peru	1	0–2	0	0–1	0	0–0	0	0–0
Asia								
India (Karnataka)	16	13–20	63	58–67	22	18–26	71	66–75
Sri Lanka	3	1–7	37	30–44	4	2–9	30	24–37
Kazakhstan	7	4–10	13	10–18	12	8–16	21	16–26
Japan	6	4–8	71	68–74	9	7–11	64	60–67
Oceania								
New Zealand	9	7–12	49	45–54	19	16–22	56	52–60
Europe								
Hungary	26	22–29	42	38–46	29	25–33	34	31–38
UK	11	9–14	54	50–58	26	23–29	64	61–68
Isle of Man	7	4–10	63	58–69	16	12–20	74	69–78

– Too few observations for the analysis

Controlling for amount and pattern of drinking

Some associations between drinking regularly at certain times and alcohol-related problems might occur only because people who drink at those times are more likely to be heavy drinkers. To test this possibility, associations of regular drinking at certain times with drinking problems were reassessed, controlling for drinking volume and

Table 4 Relative rates among monthly drinkers for the number of alcohol-related problems in different life areas, selected GENACIS countries, 2000–2007 (ratio of problems among those drinking at the given time quadrant to problems among those not drinking in that quadrant; all four time quadrants are in the models simultaneously)

	Model 1				Model 2			
	Without control for drinking variables				With drinking variables controlled[a]			
	Weekday (<5 p.m.)	Weekday (>5 p.m.)	Weekend (<5 p.m.)	Weekend (>5 p.m.)	Weekday (<5 p.m.)	Weekday (>5 p.m.)	Weekend (<5 p.m.)	Weekend (>5 p.m.)
Women								
Africa								
Nigeria	0.64	1.15	3.56*	0.79	0.51′	1.00	2.25*	0.99
Uganda	1.26	1.01	1.60′	1.39	1.11	0.84	1.67′	1.43
South and Central America								
Brazil	1.52	0.46	0.86	5.53*	0.16	0.00	1,261.43	1.40
Costa Rica	2.77′	1.97′	0.55	2.25*	2.41	1.40	0.17*	1.22
Asia								
India (Karnataka)	–	–	–	–	–	–	–	–
Sri Lanka	–	–	–	–	–	–	–	–
Kazakhstan	0.53	1.86	0.89	5.05*	0.84	3.42	0.12*	2.56
Japan	0.51	1.65*	1.49	1.23	0.45	1.48′	1.35	1.02
Oceania								
New Zealand	2.10*	0.81	1.34	1.54*	1.49′	0.84	0.70	1.12
Europe								
UK	3.32*	1.72*	1.36	1.58*	1.97*	1.36	1.15	1.21
Isle of Man	4.18*	0.97	1.22	0.94	4.48*	0.76	1.06	0.82
Men								
Africa								
Nigeria	0.90	1.63*	1.52*	0.99	0.75	0.99	1.28	1.06
Uganda	1.40*	0.98	1.22	1.31′	1.28′	0.89	1.22	1.22
South and Central America								
Brazil	2.05′	0.83	3.13′	1.13	1.99	0.54	4.71*	0.84
Costa Rica	2.03*	1.42	0.84	1.79*	1.46	0.91	0.72	1.54*
Asia								
India (Karnataka)	1.40′	2.03*	1.80*	1.72*	1.17	1.75*	1.62*	1.52′
Sri Lanka	1.19	1.49′	1.84	1.11	1.14	1.16	1.92′	0.77
Kazakhstan	1.17	1.62*	1.01	1.55*	1.06	1.16	0.97	1.23
Japan	1.21	1.20	1.51*	1.03	1.14	1.06	1.35′	0.96
Oceania								
New Zealand	1.48′	0.91	1.15	1.40*	0.99	0.93	0.71′	1.09
Europe								
UK	1.52*	1.58*	1.84*	1.52*	1.19	1.23	1.57*	1.22
Isle of Man	3.53*	1.72′	1.09	1.60	3.16*	1.52	0.95	1.32

– Too few problems reported for the analysis; problems questions not asked in Hungary

′ $P<0.1$, * $P<0.05$

[a] In UK: controlled for volume of drinking and indicator for heavy drinking; in other countries controlled additionally for drinking 5+ drinks weekly or more often

patterns, as shown in the right half of Table 4. These analyses control for drinking volume, high-volume drinking, and (except in Great Britain) weekly heavy drinking.

Controlling for these drinking variables, women's alcohol-related problems are significantly associated with weekday drinking before 5 p.m. only in the UK and the Isle of Man, and with weekend drinking before 5 p.m. in Nigeria. Drinking problems are no longer significantly greater at certain drinking times elsewhere, but women's weekend drinking before 5 p.m. is associated with

significantly reduced drinking problems in Costa Rica and Kazakhstan.

Among men, six positive associations between drinking times and drinking problems remain significant: for weekend drinking before 5 p.m. in Brazil, India and the UK, for weekend drinking after 5 p.m. in Costa Rica, for weekday drinking before 5 p.m. in the Isle of Man, and for weekday drinking after 5 p.m. in India. There were no times at which regular drinking by men led to reduced drinking problems.

Study limitations

Despite strong efforts to maintain comparability, there are differences between the GENACIS surveys in sample design, survey mode, questionnaires, and season of data collection. These differences may influence the results. The small number of female drinkers in some samples make results on these groups more subjected to random variation. Also, sufficient data were not available to allow us to separate the results by problem type as would be desirable.

Discussion

In the sites surveyed in this study, the weekly rhythm of drinking varied greatly. In a few sites very few respondents drank at least weekly at any time of the week; at other sites, regular drinking was common at all four time periods studied; at still others, drinking was clearly concentrated on weekends and/or in the evening. This variation suggests that we should be cautious about assuming that what is symptomatic or indicative about time of drinking in one society—the "eye-opener" item in the CAGE screening questions (Shields and Caruso 2004), for instance—will have the same meaning and indication in other societies.

However, several temporal patterns of drinking recurred in almost every survey: (1) Individuals who drank at least monthly were more likely to drink after 5 p.m. than before 5 p.m. (on weekdays or on weekends). (2) They were also more likely to drink on weekends than on weekdays (either before or after 5 p.m.). (3) They were less likely to drink before 5 p.m. on weekdays than in any other time quadrant. And (4) they were more likely to drink on weekends after 5 p.m. than in any other time quadrant. These patterns were fairly consistent for both men and women, and they were consistent not only for (a) reports of when at-least-monthly drinkers ever drink, but also for (b) reports of their weekly drinking times. Although temporal differences in drinking prevalence were sometimes small, it appears that norms that make it more acceptable or appropriate to drink at night and on weekends are widespread. Alcohol consumption to some degree is now regulated by a universal clock.

Drinking at least once a week in any time period was often associated with reporting problems with drinking, particularly among men. However, unexpectedly, no one time period stood out as a predictor of problems across sites, and relationships between drinking times and risks of alcohol-related problems were inconsistent across sites. From past studies in Europe and North America, one might have expected higher rates of problems for those who often drank on weekends after 5 p.m. or on weekdays before 5 p.m. Neither of these time periods had a consistent excess of alcohol-related problems for either men or women (although for women only seven surveys had enough weekly drinkers reporting problems for reliable analysis).

Among weekly drinkers, men were more likely to report significantly increased risks of problems related to drinking at particular times (17 significantly elevated problem rates for men vs. 10 for women; Table 4, model 1). Increased problem risks were spread across time-periods for men, while among women drinking on weekend evenings was particularly likely to be associated with problems. The reasons for this difference are not clear. But neither gender's pattern fits the expectation that problems will be greater for those drinking when others are not. These findings remind us that many drinking problems are social in nature, often arising from interaction with other drinkers, so that the drinking of others may also be contributing to the problem.

Nearly every significant increase in problems associated with weekly drinking at a particular time was reduced when analyses controlled for levels and patterns of drinking (Table 4, model 2). This finding suggests that at least some apparent risks that drinking at a certain time will lead to problems result simply because heavier drinkers are more likely to be drinking at those times.

The irregular relationships between the timing of drinking and alcohol-related life area problems is inconsistent with the emphasis in past research on hazards of night-time weekend drinking and on the deviance of daytime weekday drinking. Our findings raise the possibility that other contextual factors in drinking—where the drinking takes place and with whom one drinks—may affect problems more than the timing of the drinking, and that these other contextual characteristics may not be closely tied to the timing. There may be a near-universal "clock" for drinking, but the impact of that "clock" on alcohol problems cannot be generalized cross-culturally.

This first cross-cultural study of variation in drinking by time of day and of the week found some expected commonalities, but also a number of unexpected patterns calling for further research. How the individual's drinking is distributed around the week—whether in daytime or evening, whether on weekdays or on weekends—does not seem to have a clear implication across cultures for the

occurrence of drinking problems. Caution is thus advised in projecting findings about the implications of drinking at a particular time of the week from one society to another. There are some cross-cultural commonalities in the timing of drinking in the week, but the implications of timing for problem rates seem to be fairly culturally specific.

Future work might well look at a finer division of time periods to study the influence of time and day of the week on the relation between drinking patterns and the occurrence of problems. "After 5 p.m." covers quite a wide range of times, and there is reason to believe, say, that drinking between 5 and 7 p.m. and between 1 and 3 a.m. on the same night will often carry quite different implications.

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Conflict of interest The authors declare that they have no competing interests.

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