

Examination of the daily drinking patterns and their relationships with alcohol dependence symptoms among adult users in Burkina Faso

Jeoffray Diendéré (✉ jeoffray.diendere@gmail.com)

Public Health Department / Research Institute for Health Sciences (IRSS)/ Bobo-Dioulasso, Burkina Faso

Ahmed Kaboré

Centre Muraz

Hervé Hien

Centre Muraz

Jean Kaboré

Research Institute for Health Sciences

Serge Somda

Nazi Boni University, UFR/ST

Augustin Zeba

Research Institute for Health Sciences

Laurent T. Ouédraogo

Department of Public Health, Joseph Ki-Zerbo University

Jean Testa

Centre de Recherche Médicale et Sanitaire CERMES

Arouna Ouédraogo

Department of Psychiatry, Yalgado Ouédraogo University Hospital

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Abstract

Background: The alcohol consumption level is rising in Burkina Faso, which has the highest prevalence of heavy drinking in West Africa. This study used daily alcohol intake levels to explore drinking behaviors in regard to the days of the week and associations with dependence signs.

Methods: We operated variables from the past 12-month drinkers reported by the 2013 Stepwise survey, which provided information on daily drinking and symptoms of alcohol dependence. We performed student tests, principal component analyses and logistic regression.

Results: Data from 1,139 past 12-month drinkers was analyzed, and 15.9% (95% CI: 13.8–18.1) of users had at least one sign of alcohol dependence. Both drinkers without and with dependence symptoms had a common behavior for higher intake on Thursday, Saturday and Sunday, while lower intake behavior was observed on Tuesday. Only drinkers with dependence signs had high intake behavior, especially on Monday and Friday. In multivariate analysis, alcohol dependence signs were associated with increased drinking only on Monday [adjusted odds ratio (aOR) =1.24, p=0.0001] or Friday (aOR=1.15, p=0.003).

Conclusion: For drinkers without any dependence symptoms, behaviors for higher intake were limited to Thursday, Saturday and Sunday in accordance with the “social events schedule” and the “weekly administrative time-off”, but those with dependence signs extended this kind of behavior to Monday or Friday, likely due to the increased and persistent craving triggered by the high intake the previous day.

Background

In Burkina Faso, a low-income country in West Africa, an increase of industrial alcohol production has been reported since 1985 [1]. Between 2002 and 2004, among 20 African countries, including seven West African countries, the prevalence of daily alcohol use was higher in Burkina Faso (28% vs. 24% in Côte d'Ivoire, 20% in Ghana, and 2% in Mali), with a higher prevalence of heavy drinking (37% vs. 21% in Côte d'Ivoire, 10% in Ghana or in Mali) [2]. While in the six neighboring countries' consumption levels were said to be stable between 2001 and 2005, the consumption level was rising in Burkina Faso [3]. Among vulnerable subjects, more than 18% of women used alcohol during pregnancy [4], and alcohol was the first addictive substance experienced by 33% of students at an average age of 15 years in Ouagadougou [5], and more than 45% of high school students in Bobo-Dioulasso were lifetime users [6]. In a hospital setting in Ouagadougou, alcohol was one of the psychoactive substances responsible for acute intoxication [7]. Sociocultural determinants may shape alcohol-drinking behaviors [8]. Culturally, individuals' interactions with alcohol can be affected by the symbolic significance of the day of the week and drinking could be considered as symbolism [9,10]. For many ethnic groups in Burkina Faso, alcohol is closely related to some social events [11] held on specific days and approved by traditional and/or modern societies. In the alcohol misuse/addiction process, dependence is the ultimate state, with craving as the main feature [12]. It has been suggested that alcohol cravings are triggered by peer pressure in social environments [13,14], that alcohol cravings are context-dependent [15,16] and that the time of the

day [17] and day of the week [18,19] may modulate alcohol cravings. The relationships between weekdays and weekend drinking and alcohol misuse have not been explored in Burkina Faso. The overview of alcohol drinking behaviors according to the days of the week including knowledge of associations with warning dependence signs may be useful to initiate and adjust preventive messages or measures in accordance with a risk reduction approach in Burkinabe society. This study used daily alcohol intake level to explore drinking behaviors in regards to the weekdays and weekend and to assess relationships with dependence signs in adult Burkinabe users.

Methods

We used alcohol consumption records from the first national survey conducted in Burkina Faso in 2013 (performed from September 3 to October 24, 2013) based on the WHO Stepwise approach to Surveillance (STEPS) [20] in the secondary analysis. Authors also described this methodology in two previous papers using the same database [21,22]. Initially, STEPS design surveyed 4800 individuals, and our secondary analyses only included the 1139 past-month alcohol users with complete data with regard to the sociodemographic, intake volume parameters and the interesting dependence symptoms.

Variables of interest

A self-reported method of alcohol consumption during the past 7-days was used to record the number of all standard drinks consumed each day of the week before the survey. A standardized drink was defined as the amount of alcohol in a small beer, one glass of wine, or one shot of spirits. The database contained two of six criteria involved in the definition of alcohol dependence in the International Classification of Diseases, 10th edition (ICD-10), which considered that having three of the six criteria confirms substance use dependence [23]. We considered having at least one or two provided criteria as a warning sign for alcohol dependence. These criteria were: 1) loss of control of alcohol drinking and 2) an urgent need to drink alcohol in the morning. Signs could occur daily, weekly, or monthly in the past 12 months. The other ICD-10 criteria that we did not take into account were not or clearly reported during the Stepwise survey.

Statistical analyses

We used STATA version 12 (Statacorp, Texas) to analyze the data. Sociodemographic characteristics and levels of alcohol consumed were described according to weekdays and weekend. We compared daily intake levels between drinkers without and with signs of alcohol dependence by using the student test. Alcohol intake behaviors were explored by principal component analysis (PCA). PCA was performed on numbers of standard drinks for each day of the week in overall drinkers and in subgroups of drinkers without or with dependence signs. We only retained the first principal components (PC), which explained at least 80% of the total variance to describe the potential drinking behaviors according to the day of the week. We mainly focused on the interpretable adherences of daily drinking behavior to the PC axis. In all drinkers, multivariate analysis by the logistic regression model was performed to estimate the odds ratio of alcohol dependence signs in relation to the level of daily consumption with adjustment on

sociodemographic variables. All independent variables with a p-value under 0.25 in univariate analyses were included in the final model. The final model proceeded by backward elimination, i.e., the progressive elimination of non-significant factors by decreasing order of significance. For all analyses, a p-value under 0.05 was considered significant.

Ethical considerations

The protocol of the STEPS survey was approved by the Ethics Committee for Health Research of the Ministry of Health (deliberation No: 2012-12092; December 05, 2012). Informed consent was systematically sought from all participants. The “Centre Muraz” (to which authors are affiliated), a Research Institute of the Ministry of Health has a clearance to use the database.

Results

Females represented 46.0%, mean age was 40.6 (95% CI: 39.9-41.3) years and other sociodemographic characteristics as well as daily volume drunk were resumed in the Table 1. Prevalence (among all alcohol users) of drinkers with at least one sign of dependence was 15.9% (95% CI: 13.8-18.1) and daily volume they consumed was significantly higher each day, compared to drinkers free from dependence signs (comparison was performed in the and Figure 1 and Table 1). The first three PC were retained in overall drinkers and in the subgroup of drinkers without dependence signs using PCA, and only the first two among drinkers with at least one sign of dependence. Interpretable adherences of daily intake behaviors could be observed through PC-1 and PC-2 in overall and in any subgroup (Figure 2, 3). In both subgroups of drinkers without and with dependence signs, a common behavior for higher intake was observed on Thursday, Saturday and Sunday with similar adherence to PC-1 and PC-2. However, a common behavior for lowest intake with a similar adherence to PC-1 and PC-2 was observed on Tuesday. Only in drinkers with dependence signs, the attitude for high intake covered both the common days (Thursday, Saturday and Sunday) and the following days (i.e. Friday and Monday) (Figures 2 and 3). In Table 2, via the logistic regression using daily intake volumes as explicative variables of dependence signs' occurrence, only increased intake volume on Monday (aOR=1.24; 95% CI:1.12-1.36) or Friday (aOR=1.15; 95% CI :1.05-1.27) were significantly associated. Sociodemographic features significantly associated were male gender (aOR=2.24; 95% CI: 1.54-3.26) and no-education (aOR=1.50; 95% CI: 1.00-2.25; p=0.049).

Discussion

Common attitude for a high intake on Thursday, Saturday, Sunday

For both drinkers without and with alcohol dependence signs, behaviors for high intake were observed on Thursday, Saturday and Sunday: These three days are devoted to the planning of important social events

and meetings, such as religious and/or civil wedding events, in different localities in Burkina Faso. Saturdays and Sundays are the administrative weekend. Funeral celebrations are usually planned on Saturday and/or Sunday. These two days of the week generally match the pattern's time availability for the employees in formal economy. Alcohol use is widespread on market days in Burkina Faso. In traditions of the main ethnic group (Mossi, 60% of the population), from Yatenga villages (in the northern part of the country), Zahan reported that since 1954, markets have been held every three days, thus every market takes place nine or 11 times each month, occurring every 21 days on the same day of the week. Culturally these numbers all have symbolic significance and represent man, creation, and the correspondence between God and the universe [24]. Sunday is the favorite day; each village is surrounded by others, and villagers can move from one village to another to participate in the market during the same day. Thursday was an administrative break period in the Burkinabe educational system, and Thursday afternoon has been devoted to mass sports for the entire nation and seems to be a period of time-off or relaxation favorable to social encounters. Thursday afternoon alcohol consumption among the general population in Burkina Faso would have mimicked drinking practice during "third half-time" in sports [25,26].

Common practice for a light drinking on Tuesday

Both drinkers without and with dependence signs (Figure 1 and Table 1) had lower intake level on Tuesday: this day (with Monday and Wednesday) is one of the quietest or "socially colorless" for Burkinabe societies because there are generally fewer social events scheduled on that day, providing a context for more sobriety in practices (Figure 2b, Figure 3).

Surprising drinking behaviors in those without or with dependence signs on Wednesday

Even Wednesdays do not have the same significance or relevance as Thursdays, Saturdays, or Sundays in Burkinabe sociocultural context, individuals free from alcohol dependence signs tended to have similar attitude on these days (Figure 2b, 3b). This attitude on Wednesdays looked to be a behavior of individuals who still maintained self-control of alcohol consumption and were conscious of higher intake during the "social events schedule" two days successively (Saturday, Sunday), with the decision to stop or remain moderate after Sunday consumption. But failure to take a firm decision or psycho-social support, they returned to the same behavior three days later. That attitude suggests individuals would be losing control of or suffered from their consumption [27]. Conversely, individuals with dependence signs displayed an exceptionally admirable attitude on Wednesdays: away from their last highest dose of alcohol and in a social environment less filled with events, their consumption would appear to be less stimulated. This behavior could refer to the influence of the pressure due to the social environment on triggering and enhancement of the desire for alcohol [13].

Addictive attitude in drinkers with dependence signs on Monday or Friday

During weekdays, especially on Monday and Friday, drinkers without dependence signs were more sober because Monday is also a quieter or “socially colorless” day on the one hand, and on the other hand these individuals would decide to preserve themselves on Friday by consuming minimum alcohol to prepare for higher intake on the next two successive days (Saturdays and Sundays). That behavior on Friday was consistent with the temporal self-regulation theory which significantly predicted heavy episodic drinking among Australian adults [28]. Lower drinking behaviors (on Mondays and Fridays) in those without dependence signs also reflected the decision-making capacity this subgroup conserved. On the opposite, behaviors among drinkers with dependence signs were atypical on these days (Monday and Friday), with similarity to the behavior held on Thursday, Saturday and Sunday. In addition to the increased alcohol consumption during “social events schedule” and “weekly administrative time-off”, individuals with dependence signs also extended the same behavior to the following days (Monday and Friday). This particular behavior on Mondays and Fridays might be attributed to the increased level of craving generated by the higher intake during days before, with the impairment of the decision-making capacity.

Associations between dependence signs and increased drinking on Monday or Friday

Multivariate analysis showed that increased intake only on Monday (aOR=1.24; 95% CI: 1.12-1.36) or on Friday (aOR=1.15; 95% CI: 1.05-1.27) was associated with dependence signs (Table 2). Neighbors et al. concluded that time-specific calendar events [29] and event-specific drinking [30] were associated with increased levels of bingeing. However, neurobiological changes may occur with repetitive binge-drinking conditions [31,32], and may increase cravings [33]. Ghiță et al reported a variability of the levels of alcohol craving in relation to the day of the week, and drinking during weekends in Spain (Friday, Saturday, or Sunday) was associated with greater craving levels in patients with alcohol use disorder [17]. These findings may support the high intake on Monday and Friday in the Burkinabe context. Unfortunately, the WHO reported in 2014 as in 2018, the absence of a national monitoring system regarding alcohol consumption, alcohol-related health disorders, social consequences, and alcohol policy response in Burkina Faso. There were no restrictions for on- or off-premise sales concerning the hours, days, density, specific events and intoxicated persons [34,35]. A national initiative would be beneficial to prevent alcohol-related consequences in Burkina Faso. The effective intervention policies should consider the “social events schedule” and “weekly administrative time-off”. The individuals who extend their high intake to Monday and Friday should be particularly targeted for dependence risk reduction.

Gender and education level as risk factors for dependence signs

Concerning sociodemographic factors tested (age, gender, education level, residence environment and marital status), two (gender, education level) were associated with dependence signs. Men had a high risk of dependence (aOR=2.24; 95% CI: 1.54-3.26) (Table 2), similar to the findings of Wiener et al [36] in Brazil (OR=2.97; 95% CI: 2.17–4.06) concerning alcohol abuse/dependence. In individuals who drank a comparable volume, cravings were more intense in men [37] due to impulsivity, the kind of alcohol-related expectancy more specific to men [38]. Moreover, in reference to Burkinabe sociology, women with social disturbances due to alcohol are blamed more for their behavior, which, along with exposure to stigma, may moderate their behavior, thus reducing alcohol misuse or issues in them. There was a high risk for not formally educated (aOR=1.50; 95% CI: 1.00-2.25; p=0.049) (Table 2), which may be compared to the results of Chloe et al [39] who linked low education level to harmful alcohol use (OR=1.77; 95% CI: 1.49–2.11 for men and OR=4.10; 95% CI: 3.03–5.56 for women). The appropriate public health education program should also target male gender, as well as non-schooled drinkers.

Conclusion

For both drinkers without and with alcohol dependence signs, behaviors for high intake were observed on Thursday, Saturday and Sunday in alignment with the “social events schedule” and “weekly administrative time-off” held on these three days in Burkina Faso. Behavior of high intake by drinkers with dependence signs was not limited to Saturday, Sunday, and Thursday but extended to Friday or Monday, likely because of the increased and persistent craving triggered by the high intake the day before. Alcohol-related risk reduction approaches should consider Burkinabe behavior during “social events schedule” and “weekly administrative time-off,” and drinkers who extend high intake to Monday and Friday should be particularly targeted for dependence risk prevention.

Highlights

What is known about this topic

- The alcohol consumption level is rising in Burkina Faso.
- Alcohol use is determined by social environment and for many ethnic groups in Burkina Faso, alcohol is closely related to some social events with symbolic days.
- The World Health Organization reported the absence of a national monitoring system regarding alcohol policy response in Burkina Faso.

What this study adds

- The increased drinking by all users was common on Thursday, Saturday, Sunday in alignment with the “social events schedule” and “weekly administrative time-off” in Burkina Faso.
- The users with dependence sign extended increased drinking behavior to Monday or Friday, likely because of the increased and persistent craving triggered by the high intake the day before i.e. on Thursday and Saturday.

- National Public Health interventions should consider Burkinabé social events schedule with the administrative break hold on a weekday and the efficiency restrictions for on- or off-premise sales concerning the days, specific events and intoxicated persons is required.

Declarations

Acknowledgments

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Competing interests

The authors declare that they have no competing interests.

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Tables

Table 1: Demographic characteristics in % (95% confident interval) and the daily mean (standard deviation) volume drunk among alcohol users' population (n=1,139)

Characteristics	N	Overall drinkers n=1,139	Drinkers without dependence sign n=958	Drinkers with at least one dependence sign n=181	p
Gender					0.0001
- Female	524	46.0 (43.1-48.9)	49.8 (46.6-53.0)	26.0 (19.75-33.0)	
- Male	615	54.0 (51.05-56.9)	50.2 (47.0-53.4)	74.0 (67.0-80.2)	
Age mean \pm standard deviation* in years	1, 139	40.6 (39.9-41.3) $\pm 11.5^*$	40.1 (39.4-40.9) $\pm 11.5^*$	42.9 (41.2- 44.6) $\pm 11.5^*$	0.0028
Marital status					0.285
- Married/cohabiting	941	82.6 (80.3-84.8)	82.1 (79.5-84.4)	85.6 (79.7-90.4)	
- Singles	198	17.4 (15.2-19.7)	17.9 (15.6-20.1)	14.4 (9.6-20.3)	
Residence environment					0.070
- Urban	268	23.5 (21.09-26.10)	24.5 (21.84-27.4)	18.2 (12.9-24.6)	
- Rural	871	76.5 (73.9-78.9)	75.5 (72.6-78.2)	81.8 (75.4-87.1)	
Education level					0.125
- No formal education	819	71.9 (69.2-74.5)	71.0 (68.0-73.8)	76.8 (70.0-82.7)	
- Educated	320	28.1 (25.5-30.8)	29.0 (26.2-32.0)	23.2 (17.3-30.0)	
Occupation					0.125
- Employed/Self-employed	873	76.7 (74.1-79.1)	75.8 (72.9-78.5)	81.2 (74.8-86.6)	
- Students+household-keepers+unemployed	266	23.3 (20.9-25.9)	24.2 (21.5-27.1)	18.8 (13.4-25.3)	
Mean volume (standard deviation) per day among the 1,139 users	1,139				
- Monday		1.1 (1.9)	0.85 (1.6)	2.48 (2.9)	< 0.0001
- Tuesday		1.0 (1.8)	0.8 (1.5)	2.1 (2.6)	< 0.0001
- Wednesday		1.1 (0.1)	0.83 (2.2)	2.2 (3.0)	< 0.0001
- Thursday		1.2 (2.5)	1.0 (2.2)	2.5 (3.3)	< 0.0001
- Friday		1.0 (1.9)	0.8 (1.5)	2.3 (3.1)	< 0.0001
- Saturday		1.4 (2.8)	1.1 (2.5)	2.7 (3.8)	<

-	Sunday	1.4 (2.7)	1.2 (2.5)	2.5 (3.4)	0.0001 < 0.0001
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*standard deviation for age, the unit for volume was the standardized drink

Table 2: Associated factors with the signs of alcohol dependence among alcohol users' population in logistic regression (n =1,139)

Factors	Univariate analysis			Multivariate analysis		
	cOR	95% CI	p	aOR	95% CI	p
Gender: male vs female (reference)	2.83	1.98-4.03	0.0001	2.24	1.54-3.26	0.0001
Age	1.02	1.01-1.03	0.003	1.01	1.00-1.03	0.173
Environment: rural, vs urban (reference)	1.46	0.97-2.19	0.068	0.99	0.61-1.61	0.981
Marital status: Singes, vs Married/ (ref)	0.77	0.49-1.20	0.244	0.87	0.54-1.40	0.558
Education: Not educated vs educated (ref)	1.35	0.93-1.96	0.111	1.50	1.00- 2.25	0.049
Amount of alcohol drunk on:						
Monday	1.41	1.30-1.52	0.0001	1.24	1.12-1.36	0.0001
Tuesday	1.37	1.26-1.48	0.0001	1.06	0.93-1.20	0.366
Wednesday	1.26	1.18-1.35	0.0001	1.03	0.97-1.09	0.373
Thursday	1.30	1.18-1.36	0.0001	1.05	0.94-1.17	0.359
Friday	1.35	1.25-1.46	0.0001	1.15	1.05-1.27	0.003
Saturday	1.19	1.12-1.26	0.0001	0.98	0.88-1.07	0.612
Sunday	1.16	1.10-1.23	0.0001	0.93	0.85-1.02	0.130

95% CI: 95% confidence interval; cOR: crude odds ratio; aOR=adjusted odds ratio; p: p-value

Figures

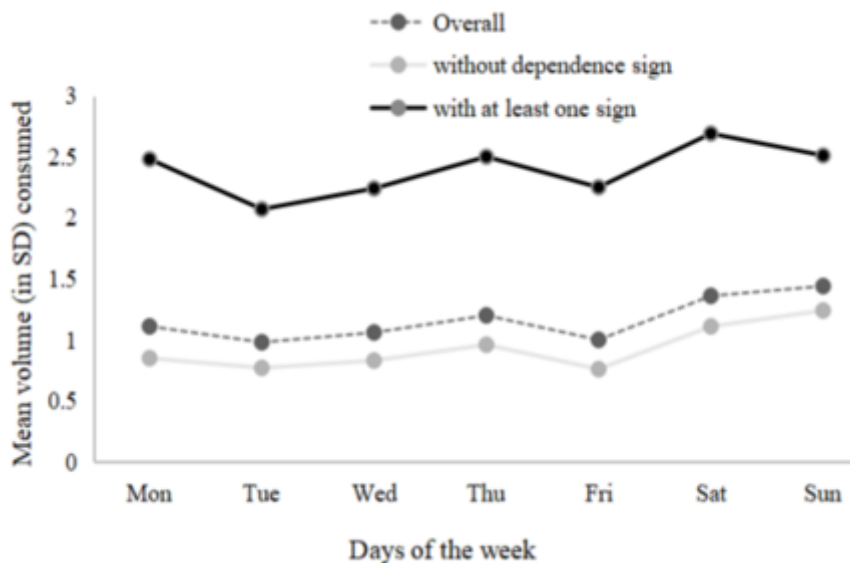


Figure 1

Changing drinking (mean volume consumed in standard drinks [SD]) according to the day of the week among overall drinkers (n = 1,139), in subgroup of drinkers without (n = 958) or with (n = 181) alcohol dependence signs. Mon: Monday, Tue: Tuesday, Wed: Wednesday, Thu: Thursday, Fri: Friday, Sat: Saturday, Sun: Sunday On any given day of the week, the average volume of alcohol consumed by the

subgroup of subjects with at least one dependence sign was significantly higher than that of the subgroup without dependence sign, with $p < 0.0001$. In the supplemental file we provided table (Table 1) showing this comparison.

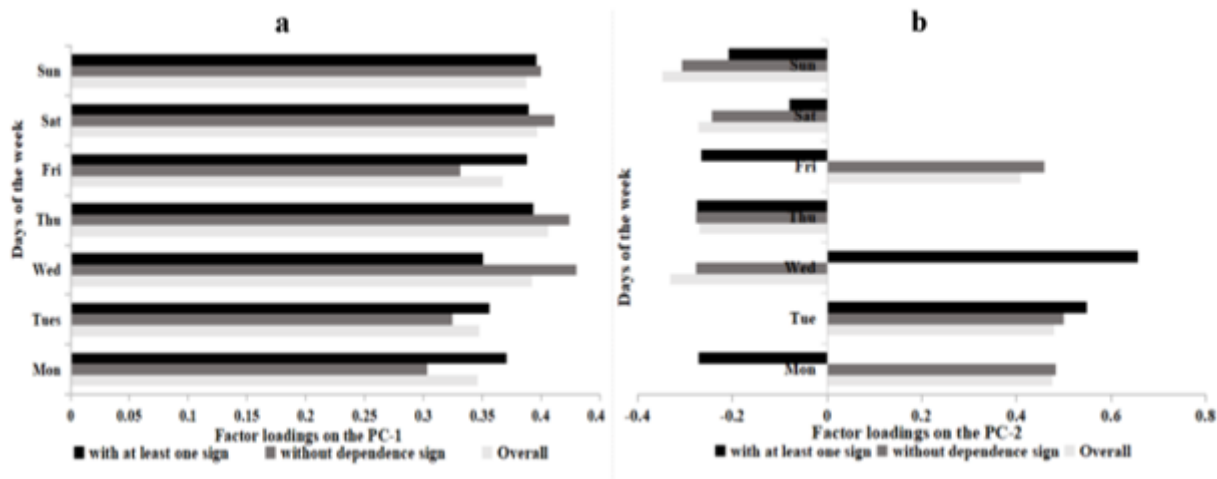
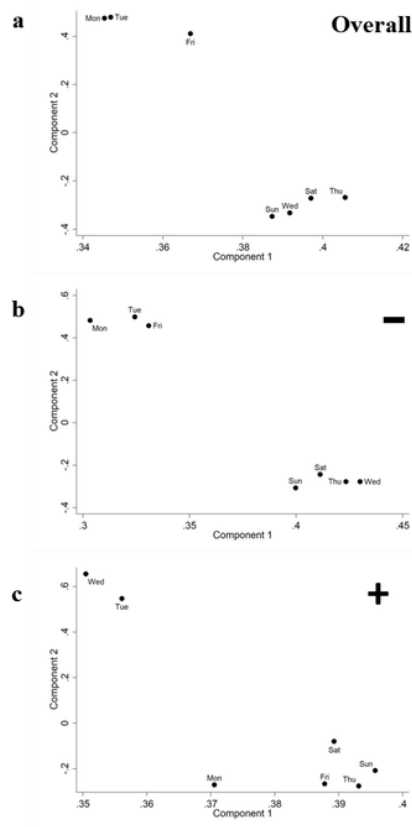


Figure 2

Factor loadings for each day on the first component (PC-1), second component (PC-2) for overall, subgroup of drinkers without or with dependence signs. Mon: Monday, Tue: Tuesday, Wed: Wednesday, Thu: Thursday, Fri: Friday, Sat: Saturday, Sun: Sunday 2a) Factor loadings for each day on the PC-1: All coefficients were positive. Between drinkers without and with dependence signs, difference in coefficients seemed more relevant on Monday, Friday (emphasizing those with dependence signs) and Wednesday (emphasizing those without signs). 2b) Factor loadings for each day on the PC-2: Between drinkers without and with dependence signs, coefficients had contradictory senses on Monday, Friday and Wednesday, while they aligned in the same way on Tuesday (day of lower intake volume), Thursday, Saturday and Sunday (days of higher intake). In the supplemental file we provided (Table 2), characteristics of eigen vectors and the factor loadings obtained by principal component analysis using daily alcohol intake in overall drinkers (N=1,139), drinkers without alcohol dependence signs (n=958), or those with at least one sign dependence (n=181) were more presented.



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Figure 3

Loading plots with the two major principal components (CP) after principal component analysis (PCA) in overall drinkers (3a), drinkers without (3b) and with (3c) alcohol dependence signs (Mon: Monday, Tue: Tuesday, Wed: Wednesday, Thu: Thursday, Fri: Friday, Sat: Saturday, Sun: Sunday, -: Subgroup of drinkers without any sign of alcohol dependence, +: Subgroup of drinkers with at least one sign of dependence). Among overall (3a) as in drinkers without dependence signs (3a), CP-1 roughly gathered behaviors of days for higher intake volumes (Wednesday, Thursday, Saturday and Sunday), while CP-2 gathered behaviors of those for lower intake volumes (Monday, Tuesday and Friday). In those with dependence signs (3c), behaviors on Friday and Monday were strongly or moderately added to PC-1. In the supplementary material we provided (Figure 1), other loading plots using all three PC retained in PCA among overall drinkers and in the subgroup of drinkers without alcohol dependence signs were presented.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Annex.docx](#)