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ORIGINAL ARTICLE

Differences in drinking patterns between men and women in Brazil

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DESCRIPTORS
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Abstract
Objective: To examine sex differences in alcohol consumption according to age groups, and to assess gender and age effects on several aspects of alcohol consumption patterns. *Method*: Based on a Brazilian nationwide representative sample (n = 3,007), we analysed the differences in drinking patterns between genders. We also assessed the effects of gender, age, and gender by age interaction for alcohol consumption dimensions (frequent drinking, usual intake, binge drinking, and frequent binge drinking), using logistic and negative binomial regression models. *Results*: Gender, age, and gender by age interaction had significant effects on the predictive models for all studied drinking patterns, except for the 'usual' dosage. The effect of gender on drinking patterns varies with age. While gender has a greater effect in older age groups, the difference between men and women decreased in the younger age groups. *Conclusions*: Gender convergence regarding alcohol use is a trend that might be influenced by environmental factors and should be addressed in prevention and treatment programs, as well as in public health policies.
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DESCRITORES
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Diferenças nos padrões de consumo de álcool entre homens e mulheres no Brasil

Resumo
Objetivo: Avaliar as diferenças nos padrões de consumo de álcool entre os gêneros de acordo com as faixas etárias e avaliar os efeitos do gênero e da idade em diversos aspectos do padrão de consumo de bebidas alcoólicas. *Método*: Com base em amostra representativa da população brasileira (n = 3.007), nós avaliamos as diferenças nos padrões de consumo de álcool entre os gêneros. Nós também avaliamos os efeitos do gênero, da idade e da interação entre gênero e idade nas dimensões do consumo de álcool (consumo frequente, dose usual, consumo em binge e consumo frequente em binge), com uso de modelos de regressão logística e regressão binomial negativa. *Resultados*: O gênero, a idade e a interação entre gênero e idade tiveram efeitos significantes nos modelos preditivos para todos os padrões de consumo estudados, com exceção da dose usual. O efeito do gênero ao longo das faixas etárias varia com a idade. Enquanto o gênero teve um efeito maior nas faixas etárias mais velhas, a diferença entre homens e mulheres diminuiu nas faixas etárias mais novas. *Conclusões*: A convergência entre os gêneros no que se refere ao uso de álcool é uma tendência que pode ser influenciada por fatores ambientais e deveria ser focada nos programas de prevenção e tratamento assim como nas políticas públicas.
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Introduction

Gender differences in alcohol use are relevant to public health, as they may direct cost-effective prevention and intervention policies.[1] Alcohol-related problems contribute to increased morbidity and mortality rates and involvement in violent situations.[2] Although men used to consume alcoholic beverages more frequently than women, an increase in alcohol consumption among women has been noticed over the last decades.[3,4] Compared to men, women are more vulnerable to alcohol effects,[5] as they have a smaller proportion of alcohol dehydrogenase enzyme and of body water; therefore reaching higher blood alcohol levels when consuming equivalent weight-adjusted amounts of alcohol, increasing their risk of clinical complications, such as brain impairment, hepatic diseases, reproductive dysfunctions, and alcohol dependence.[6] In addition to physiological issues, changes in social roles and the expressive female penetration into the work force in the last decades have also contributed to changes in their behaviors, including increased drinking opportunities.[7]

In a large national survey in the United States, Keyes et al.[8] found evidence for a closing of the gender gap in alcohol use, abuse, and dependence, especially in most recent cohorts. Younger women have an increased risk of alcohol-related problems,[9] which may be mostly attributable to earlier onset ages for drinking during recent decades.[10]

In some developing countries, there is a wide gap in gender differences for heavy drinking.[11] In Latin America and the Caribbean men are more likely to drink heavily and excessively than women, and men are also less likely to abstain from alcohol consumption.[12] The expectations of men and women in society are strongly linked to these differences.[13,14]

In Brazil, there is a paucity of studies on gender differences in alcohol consumption among the general population. Most research aimed at investigating differences between men and women regarding alcohol use has targeted less representative samples, such as students[14] and communities in Brazil;[13,15] the findings have pointed out the trend in gender convergence in alcohol consumption.

Brazilian epidemiological studies of alcohol use are quite recent. The *Centro Brasileiro de Informações sobre Drogas* (Brazilian Information Center on Psychotropic Drugs CEBRID) conducted two studies of substance use in 2001[16] and 2005;[17] the results showed a 11,2% and 12,3% prevalence of alcohol dependence, respectively, with a 3:1 male/female ratio in the last one. There was evidence for an increasing trend in alcohol use among women, especially the youngest.

Between 2005 and 2006, the *Unidade de Pesquisa em Álcool e Drogas* (Research Unit on Alcohol and Drugs - UNIAD) of the *Federal University of Sao Paulo* (UNIFESP) conducted the Brazilian National Alcohol Survey (BNAS),[18,19] with a representative sample of the nationwide population. It found that 58% of Brazilians had drunk at least once in the past year, among them, 65% were men and 41% women. Similar to other Latin American countries, such as Costa Rica and Mexico, Brazilian men had lower abstinence rates than women (35% versus 59%, respectively) and higher rates for very frequent drinking (11% versus 2%, respectively).

Based on BNAS data, this study aimed to examine differences in alcohol consumption between men and women across age groups in Brazil. To our knowledge, this is the first nationwide study focused on sex differences in drinking patterns in this country. Moreover, using logistic and negative binomial regression models, we evaluated the effects of gender, age, and gender by age interaction for different drinking patterns: frequent drinking, usual dose, binge drinking, and frequent binge drinking, using other demographics as covariates. Our findings may contribute to a better understanding of the current trends on alcohol use in Brazil.

Method

Sample

The Brazilian National Alcohol Survey (BNAS)[18,19] was conducted by UNIAD of the *Universidade Federal de São Paulo* (UNIFESP) between November 2005 and April 2006. The nationwide representative sample consisted of 3007 individuals, 14 years of age and older, selected through a multistage cluster sampling procedure in the Brazilian household population.

Sampling involved 3 stages: (1) selection of 143 municipalities using systematic probability proportional to size methods (PPS), after the stratification of the country into 25 strata defined by the 5 Brazilian Regions and 5 groups of the largest city within each region; (2) selection of 2 census sectors for each county, with the exception of the largest selected counties, totalling 325 census sectors, also using PPS; (3) a simple random sampling of households, selected from a list made in each census sector, followed by the selection of a household member to be interviewed using the "closest future birthday" technique.

Face-to-face interviews lasting one-hour, on average, were conducted at the respondents home by trained interviewers using a standardized structured questionnaire. A total of 2522 interviews were conducted in the main survey with respondents aged 14 years and older. Additionally, there was as an oversample of adolescents (14- to 17-year old individuals) that essentially followed the same procedure of the main survey, rendering 485 additional interviews. Replacement was not allowed among subjects that were either not found or who refused to participate in the study. Response rate was 66%.

Data were weighed to correct for differences in probability of selection bias and non-response. First, a base weight was calculated for each respondent as the inverse of the selection probability. Then, non-response weight was applied based on gender and education. Finally, the post-stratification weight corrected the sampling distribution of age, gender, region, and education level so that it matched with figures from Brazilian 2000 Census. In order to correct for clustering effects resulting from the sample design, we used the "Complex Samples" module in SPSS v13.

Variables

Demographics

The age groups analysed in the study were: 14 to 17; 18 to 24; 25 to 34; 35 to 44; 45 to 59; ≥ 60 years old. The age groups were chosen to explore possible non-linearity in the association between age and alcohol consumption. The first age group represents the adolescents. In the remaining age groups we tried to keep the "convention" of boundaries ending in 0 or 5, which usually makes it possible to compare with other studies. The sample size within each range guided the final definition of the groups.

Age and gender were entered into logistic regression models and negative binomial regressions to verify their effect on drinking patterns. The demographics used as covariates were as follows: marital status (single; married or living with a companion; divorced or separated; widow); education (≤ 4th grade; ≤ 8th grade; high school; college); monthly household income (≤ US$225; US$226 to US$ 375; US$376 to US$ 600; ≥US$600; refusal to declare); self-attributed race/ethnicity (White; Black; Mulatto; and others [Asian, Aboriginal, refusal to declare]); religion (none; Catholic; Protestant; other [Umbanda, Candomble, Kardecist Spiritism, among others]); and work status (student; active; unemployed; homemaker; retired).

Drinking patterns

Respondents were asked about the frequency and quantity of alcohol consumption. The following variables were analysed:

Frequent drinking

Frequent drinking was verified by the following question: "*How often do you generally drink any alcoholic beverage (including beer, wine, distilled, alcopops or any other beverage)?*" The possible answers varied from "3 or more times a day" to "never". The consumption of any alcoholic beverage at least once a week was considered frequent drinking; thus the sample was split into frequent drinkers and non-frequent drinkers, and these two subsamples were the dependent variables in the logistic regression.

Usual dose

Usual dose measures the alcoholic beverage quantity consumed during a 24-hour period. Only drinkers were considered in this analysis, and the median usual dose was extracted from the following open question: "*On the days you drink beer, wine, distilled, alcopops, how many units do you often drink during a day?*". Each unit corresponds, approximately, to a beer can of 350 mL, a wine glass of 90 mL, a dose of distilled spirits of 30 mL, or a small bottle of alcopop, with average 10-12 g of alcohol.

Binge drinking

Men who reported drinking 5 intakes or more and women who reported drinking 4 intakes or more in a single occasion during the last year were considered binge drinkers, after the question: "*What is the greatest number of units you remember to have drunk on one single occasion?*"

Frequent binge drinking

Subjects who reported binge drinking at least once a month were classified as frequent binge drinkers, after the following question: "*During the last 12 months, how frequent did you drink (if man) ≥ 5 intakes / (if woman) ≥ 4 intakes on one single occasion? (possible answers: from "everyday" to "never" in the last 12 months).*"

Statistical analysis

Statistical analysis of frequent drinking, binge drinking, and frequent binge drinking consisted of 3 logistic regression models, one for each dependent variable (frequent drinking or not, binge drinking or not, and frequent binge drinking or not). Independent variables (predictors) were gender, age, and gender by age interaction; other demographic variables were used as covariates (marital status, education, monthly household income, self-attributed race/ethnicity, religion and work status). The "Complex Samples" module was used for the logistic regression models. For the usual dose, which is

heavily right skewed and measured in integer values, gender, age, and gender by age interaction effects were assessed through a negative binomial regression model (Stata 9.1), given the high variance. The Log Link was used in the model. Significance level considered was 5%.

For all models, except for the usual dose, we considered all respondents (n = 3,007). For usual dose, non-drinkers were excluded from the analysis. Among drinkers, two subjects were excluded because they refused to answer the usual dose question (final n = 1,588).

Ethical considerations

Written informed consent was obtained from all participants and The Institutional Review Board of the UNIFESP approved the study (Project nr. 1672/04).

Results

Descriptive analysis

Table 1 presents rates of drinking patterns by gender and age group. Overall, men had higher prevalence rates for all drinking variables in all age groups, with a smaller difference between men and women in the youngest age group. There was a general prevalence rate of 23% for frequent drinking, with a male-to-female ratio of 2.8:1. The age group with the highest prevalence rate among men was 35 to 44 years (48%, almost half of men in this age group), and 19 to 24 years among women, with 19% (i.e. almost one fifth of women in this age group reported drinking frequently).

Regarding the usual dose, men had a 80% higher usual amount of alcohol consumed than women, 5.2 (SE = 0.4) units for men versus 2.9 (SE = 0.2) units for women; the gender ratio did not change much across age groups, with a total male-to-female ratio of 1.8:1.

Overall, prevalence rates for binge drinking tended to be approximately twice as high for men as for women. Almost half of the 18- to 24-year-old men reported having binge drunk during the past year, compared to one third of women in this age group. In the next age group (25 to 34 years), men also presented a 50% prevalence rate of binge drinking, compared to women, whose prevalence rate was 24% (i.e., almost one fourth). Frequent binge drinking was reported by 9% of the Brazilian population, with a male-to-female ratio of 3:1.

Logistic and negative binomial regressions

Logistic and negative binomial regressions (Table 2) showed that gender and age effects were significant for all drinking variables ($p < 0.01$). Gender by age interaction was significant (confidence interval: 95%) for frequent drinking and binge drinking, indicating that the gender effect depends on the age. For usual intake, gender by age interaction was not statistically significant ($p = 0.649$), suggesting that, despite a greater proximity in drinking patterns between men and women in the younger age groups, the difference is not great enough to make gender by age interaction significant. For frequent binge drinking, the interaction was not significant at 95% ($p = 0.085$); however, we should note that this p-value is close to the established cutoff point of 5% and we have a small sample of frequent drinkers, especially for females, which causes power reduction (see the large confidence intervals in Table 2).

Finally, in a model without interaction, the effect of gender is the same for all age groups and is given directly by the model as the coefficient of the gender variable. In a model with interaction there is a different effect of gender on each age group and these effects are not apparent from the coefficients of the model. However, they can be estimated and tested through contrasts. Table 3 presents the effect of gender on each age group on each model with significant interaction. These effects are odds ratios, having female as reference group. In general, men have reported greater drinking than women, but the interaction shows that the gender effect is not constant: we have noticed an increasing pattern in the odds ratio for the oldest ages. In the adolescent group, the estimated odds for frequent drinking is 1.5-fold higher for men, compared to women (controlling for demographic variables). This value increases constantly

Table 1 Descriptive analysis of drinking patterns (frequent drinking, usual dose, binge drinking and frequent binge drinking)

	Frequent drinking (%) Drinks at least once a week, n = 3007[a]			**Usual intake (units)** Median for each occasion, n = 1588[b]			**Binge drinking (%)** Binge drank in the past year, n = 3007[a]			**Frequent binge drinking (%)** Binge drank at least once a month, n = 3007[a]		
Age, years	**Male**	**Fem**	**Total**	**Male**	**Fem**	**Total**	**Male**	**Fem**	**Total**	**Male**	**Fem**	**Total**
14 to 17	11	7	9	3.6	2.3	3.0	21	12	16	8	2	5
18 to 24	33	19	26	5.7	3.6	4.7	47	32	40	13	10	11
25 to 34	39	18	28	6.1	3.1	4.8	50	24	37	15	6	10
35 to 44	48	14	30	5.3	2.7	4.2	43	15	28	18	5	11
45 to 59	39	9	23	4.7	2.4	3.8	31	11	20	12	2	7
≥ 60	28	4	15	3.7	2.1	3.0	18	5	10	9	1	4
Total	35	12	23	5.1	2.9	4.2	38	17	27	13	4	9

[a] Total sample. [b] n corresponds to drinkers who did not refuse to report their usual dose.

Table 2 Odds ratio and confidence intervals for logistic and negative binomial regressions

		Frequent drinking (CI 95%)	Usual intake (CI 95%)	Binge drinking (CI 95%)	Frequent binge drinking (CI 95%)
Gender Ref: Fem	**Male**	**8.2 (03.5-19.0)**	**1.8 (1.6-2.1)**	**4.8 (2.1-11)**	**15.6 (2.6-94.8)**
Age (years) Ref: ≥ 60 years old	14 to 17	1.2 (0.4-3.3)	0.9 (0.5-1.4)	**3.0 (1.1-8.3)**	2.4 (0.3-17.7)
	18 to 24	**2.6 (1.0-6.6)**	**1.6 (1.1-2.2)**	**7.7 (2.9-20.2)**	**9.9 (1.7-57.2)**
	25 to 34	2.3 (0.9-6.1)	**1.6 (1.1-2.1)**	**5.6 (2.2-14.5)**	**5.9 (1.0-36.2)**
	35 to 44	1.9 (0.8-4.7)	**1.4 (1.0-2.0)**	**3.2 (1.3-7.6)**	**5.4 (0.9-31.5)**
	45 to 59	1.4 (0.6-3.3)	1.2 (0.9-1.7)	**2.6 (1.1-6.3)**	**2.2 (0.4-11.1)**
Gender * Age Ref: Fem , ≥ 60 years old	14 to 17	**0.2 (0.1-0.6)**		**0.3 (0.1-0.9)**	0.2 (0.0-1.5)[b]
	18 to 24	**0.2 (0.1-0.7)**		**0.4 (0.1-0.9)**	**0.1 (0.0-0.6)[b]**
	25 to 34	0.4 (0.1-1.0)		0.6 (0.2-1.7)	0.2 (0.0-1.6)[b]
	35 to 44	0.8 (0.3-2.1)		0.9 (0.3-2.3)	0.3 (0.0-2.3)[b]
	45 to 59	0.8 (0.3-2.1)		0.6 (0.2-1.5)	0.5 (0.1-3.6)[b]

[a] Frequent drink: drink at least once a week; usual intake: median units consumed in each occasion; binge drinking = consumed ≥ 5 (for men) or ≥ 4 (for women) alcoholic beverages in a single occasion in the past year; frequent binge drinking: binge drank at least once a month.
[b] Demographic data were included in the model as covariates and maintained regardless of having or not a significant association: marital status, education, monthly household income, religion, self-attributed race/ethnicity, and work status.
[c] p = 0.085.
[d] For Usual Intake the exponential of the original coefficient is shown, which can be interpreted as the number of times the dependent variable increases relative to the reference category.

Table 3 Male/female odds Ratio in each age group. Analysis made for the three models where the interaction was significant

Age (years)	Frequent drinking (CI 95%)	Binge drinking (CI 95%)	Frequent binge drinking (CI 85%)
14 to 17	1.5 (0.8-2.7)	1.5 (0.9-2.6)	**3.1 (1.3-7.5)**
18 to 24	**2.0 (1.2-3.5)**	**1.7 (1.0-3.0)**	1.4 (0.6-3.4)
25 to 34	**3.2 (1.9-5.2)**	**3.0 (1.9-4.7)**	**3.5 (1.6-7.6)**
35 to 44	**6.2 (3.5-11.0)**	**4.1 (2.4-7.2)**	**4.9 (2.2-11.2)**
45 to 59	**6.4 (3.7-11.2)**	**2.9 (1.8-4.8)**	**7.8 (2.7-22.4)**
≥ 60	**8.2 (3.5-19.0)**	**4.8 (2.1-11)**	**15.6 (2.6-94.8)**

[a] Frequent drink: drink at least once a week; binge drinking: consumed ≥ 5 (for men) or ≥ 4 (for women) alcoholic beverages in a single occasion in the past year; frequent binge drinking: binge drank at least once a month.

with the age group, and it reaches an odds ratio 8.2-fold higher for men aged 60 years and older. A similar pattern is seen in binge drinking: the estimated odds is 1.5-fold higher for younger men, and 4.8-fold higher for older men. For frequent binge drinking, the odds ratio is 3.1-fold higher for adolescent males, decreasing to 1.4 in the next age group, and increasing to 15.6 when we consider the group above the age of 60.

Discussion

This paper presents an examination of differences in alcohol consumption between men and women across age groups in Brazil. We have reported that both gender and age had significant effects on frequent drinking, usual intake, binge drinking, and frequent binge drinking. The most important finding is that there was a convergence in the odds ratios comparing men and women in the youngest age groups. The male:female odds ratio for the risk of drinking patterns decreased from the oldest to the youngest age groups by a factor of 6.7 (frequent drinking), 3.3 (binge drinking) and 12.5 (frequent binge drinking, from 15.6 in the oldest age group to 3.1 in the youngest age group).

To our knowledge, this is the first nationwide study focused on differences in alcohol consumption between genders in Brazil. Our findings support the cumulative evidence from less representative samples that there is a narrowing of the gender gap in drinking patterns. Kerr-Correa et al.[15] found this trend on a study based on two communities in Sao Paulo, Brazil. Wagner et al.[14] found no significant differences in drinking patterns between genders among university students. Moreover, an international study conducted by WHO[13] found a closing gender gap in drinking patterns in some Latin American countries, such as Brazil and Argentina.

There are some possible explanations for this closing gender gap in alcohol consumption. First, sociocultural factors are important risk factors for the increased alcohol consumption among women;[7,10,17] considering changes in drinking norms, behaviors previously deemed as exclusive for men, such as going out to pubs, are currently observed among women, especially the youngest. Also, women have not been stigmatized for drinking alcohol as much as in previous decades.[1,21] Second, the expressive female entry into the workforce, increasing female opportunities regarding birth control and other indicators of gender role equality may

be important factors contributing to a narrowing of gender differences.[4,8,21,22]

In our study, men were likely to drink larger quantities of alcoholic beverages and more frequently than women. We have also found that men had higher prevalence rates of frequent binge drinking, namely heavy drinking, which is in agreement with the evidence from other studies conducted in Brazil[13,23] and other countries in Latin America, such as Mexico and Costa Rica.[12,13] Indeed, gender differences in alcohol use still remain. Blume et al.[24] reported different reasons for the substance-use initiation in young females and males. Whereas girls tended to drink in order to cope with shyness, anxiety and/or depression, boys related their substance use to curiosity. In addition, physiological female specificities may have contributed to our findings concerning the usual dose group. Descriptive analysis of these subjects found a smaller variation among female age groups than among males. Moreover, gender by age interaction effect on usual intake and frequent binge drinkers was not statistically significant in our study. Vikram et al.[11] found that in some developing countries, heavy drinking may have social relevance among men, such as maintaining friendships or coping with stressful situations. Furthermore, in Latin American cultures, excessive drinking may represent a celebration of male courage, sexual prowess, maturity, and the ability to take risks, including sexual risks.[11]

Another important finding was the high prevalence rates for drinking patterns among adolescents. Frequent drinking prevalence rates in Brazil were lower than American rates[25] in the same period (2006): 11.0% for boys and 7.0% for girls in Brazil versus 16.3% and 17.0% in the U.S., respectively). In contrast, binge drinking prevalence rate in this age group was higher in Brazil than in the U.S. (16.0% versus 10.3%, considering both genders). However, the age group considered in the American study was 12 to 17 years, while our study has included 14- to 17-year-old individuals, which might have influenced this difference.

There are some possible reasons for this higher prevalence rates in alcohol use among the youngest. First, adolescence is characterized by great influence of the peer group, which becomes the reference for clothing, social and behavioral habits, and peer pressure has been found to be a relevant risk factor for substance use.[26] Second, access to alcoholic beverages is currently easier, with widespread alcohol illegal purchase,[27] leading to an earlier initiation in alcohol use.[28] Another important risk factor for alcohol use among adolescents is the increasing exposure to alcohol advertising.[29-31]

It is noteworgthy that early alcohol consumption can lead to several adverse consequences. Adolescents are getting more and more involved in violent situations,[9] such as car accidents, injuries, and fights due to alcohol use.[9,32,33] In addition, Grucza et al.[10] found that a decrease in the age of drinking onset accounts for much of the increase in lifetime alcohol dependence among women. Gender convergence in alcohol use is leading to a narrowing of differences in mental disorders, such as major depression and substance disorders.[8,20]

Older people, on the other hand, had the greatest gender difference in our study, corroborating literature findings.[34,35] As discussed above, social rules and roles have changed in recent years. Over the next decades, it is possible that a huge increase in the rates of drinking and mental disorders among older women will occur due to this gender convergence.[24,36]

A limitation of this study is the fact that the survey is cross-sectional, precluding the analysis of long-term effects on gender differences. Prospective studies are needed to verify the gender convergence trend in drinking patterns and its possible adverse consequences, such as higher prevalence rates for alcohol and mental disorders among women. Also, BNAS response rate was 66%, which limits our findings generalization even after the appropriate corrections. However, response rates of 60% or above have been accepted in epidemiological studies on alcohol consumption in the international literature.[37,38,39,40]

Conclusions

Based on our findings, gender and age had significant effects on Brazilian drinking patterns. Gender differences tend to decrease among the youngest, which brings a new prospect of alcohol use in Brazil. Prospective studies are needed to verify if this trend of gender convergence remains stable over the next decades. Furthermore, our findings also highlight the importance of creating new public health policies targeting alcoholic beverages access and advertisement to adolescents, as well as prevention and treatment programs tailored for the youngest and the female population.

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Disclosures

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* Modest
** Significant
*** Significant: Amounts given to the author's institution or to a colleague for research in which the author has participation, not directly to the author.

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