This is an Accepted Manuscript of an article published by Taylor & Francis in The American Journal of Drug and Alcohol Abuse on 16 May 2023, available at: https://doi.org/10.1080/00952990.2023.2192376.

Alcohol consumption, alcohol expectancies, and drinking contexts in young Argentinean college students before and during the COVID-19 pandemic: a one-year follow-up study

Alcohol consumption, expectancies, and contexts

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Funding:

This research was carried out during the postdoctoral fellowship granted by the National Council of Scientific and Technical Research (CONICET) to Dr. López Steinmetz, but did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Disclosure:

The authors report no relevant disclosures.

ABSTRACT

BACKGROUND: Whether COVID-19 pandemic and lockdowns have had an impact in changing alcohol drinking patterns, expectancies, and/or consumption contexts in students is an open question.

OBJECTIVES: To assess within-person changes in alcohol consumption in young college students, from August 2019 with one-year follow up during the COVID-19 quarantine, considering alcohol expectancies, drinking contexts, and main socio-demographic variables; to cross-validate the stability of these predictors' effects on the alcohol consumption across dependent and independent measures.

METHODS: We assessed one longitudinal (N=300, 70% female) and one cross-sectional (N=165, 78% female) sample via online surveys and applied multilevel analysis and regressions, respectively.

RESULTS: Alcohol consumption was higher during quarantine compared to one-year before (standard deviation 0.43-0.39). In the longitudinal sample, predictors having stable increasing effects on alcohol consumption were social facilitation (effect size [ES] 0.21-0.21), stress control (ES 0.17-0.18), and parental control (ES 0.12-0.13), while age of onset was the only one having a stable inverse effect on consumption (ES 0.12-0.12). In the cross-sectional sample, positive alcohol expectancies (ES 0.23), stress control (ES 0.80), and parental control (ES 0.43) were associated with higher alcohol consumption during quarantine, whereas having high socioeconomic status was related to lesser alcohol consumption as compared to medium socioeconomic status (ES 0.20).

CONCLUSION: Stress control and parental control contexts are stable predictors increasing alcohol consumption before and during COVID-19 quarantine. Training in strategies to cope with stress and parental education on the deleterious alcohol-related effects could help reduce alcohol consumption in college students during both quarantine and non-quarantine situations.

KEYWORDS

Alcohol drinking; Alcohol drinking in college; COVID-19; Longitudinal studies; Expectations; Quarantine; Developing countries

SECOND LANGUAGE ABSTRACT (SPANISH)

ANTECEDENTES: Si la pandemia de COVID-19 y las medidas de confinamiento impactaron en un cambio de los patrones de consumo de alcohol, las expectativas hacia el alcohol y/o los contextos de consumo en los estudiantes, es una pregunta abierta.

OBJETIVOS: Evaluar los cambios intrapersonales en el consumo de alcohol en jóvenes universitarios, desde agosto de 2019 con seguimiento de un año durante la cuarentena por COVID-19, considerando las expectativas hacia el alcohol, los contextos de consumo y las principales variables sociodemográficas; validar de forma cruzada la estabilidad de los efectos de estos predictores sobre el consumo de alcohol a través de medidas dependientes e independientes.

MÉTODOS: Evaluamos una muestra longitudinal (N=300; 70% mujeres) y una transversal (N=165, 78% mujeres) a través de cuestionarios en línea y aplicamos análisis multinivel y regresiones, respectivamente.

RESULTADOS: El consumo de alcohol fue mayor durante la cuarentena comparado con un año antes (desviación estándar 0.43-0.39). En la muestra longitudinal, los predictores con efectos crecientes estables sobre el consumo de alcohol fueron la facilitación social (tamaño de efecto [TE] 0.21-0.21), el control del estrés (TE 0.17-0.18) y el control parental (0.12-0.13), mientras que la edad de inicio fue el único que tuvo un efecto inverso estable sobre el consumo (TE 0.12-0.12). En la muestra transversal, las expectativas positivas hacia el alcohol (TE 0.23), el control del estrés (TE 0.80) y el control parental (TE 0.43) se asociaron con un mayor consumo de alcohol durante la cuarentena, mientras que tener un nivel socioeconómico alto se relacionó con un menor consumo de alcohol en comparación con un nivel socioeconómico medio (TE 0.20).

CONCLUSIÓN: Los contextos de control del estrés y control parental son predictores estables del aumento del consumo de alcohol antes y durante la cuarentena por COVID-19. La capacitación en estrategias para enfrentar el estrés y la educación de los padres sobre los efectos nocivos relacionados con el alcohol podría ayudar a reducir el consumo de alcohol en estudiantes universitarios durante situaciones de cuarentena y no cuarentena.

1. INTRODUCTION

Alcohol consumption in college students is a common behavior that, in some cases, may turn into problematic drinking (1,2). Due to the COVID-19 pandemic, schools and colleges have been suspended in many countries around the world. For instance, on March 20, 2020 – the date when quarantine started in Argentina –, over 82% of total enrolled students (1,437,412,547 students) worldwide were being affected due to 151 country-wide school closures (3). College closures cause disruptions to students' daily routines and for their families and caregivers. Moreover, college students with mental needs suffered the most since these closures not only affected the access to social interactions, but also to the resources they usually have through universities (4).

In Argentina, universities promptly transitioned to an online learning format, which allowed continual access to education, although only to students having access to connectivity. Furthermore, the online classes could not compensate for the lack of social interaction, among other relevant aspects of students' daily routines. The COVID-19 pandemic and the lengthy quarantine imposed in Argentina in response to this pandemic was effective to control disease spread, but have had negative impacts on the mental health of college students (e.g., (5,6)).

Many current studies focused on the changes in alcohol consumption during the COVID-19 pandemic (e.g., (7)), with some studies reporting increased consumption (e.g., (8)). Likewise, there are studies comparing alcohol consumption prior and during this pandemic, although most of them are cross-sectional studies including retrospective self-reporting to assess these two timeframes in a single survey. These studies reported both decreases (e.g., (9–11)) and increases (e.g., (12)) in alcohol consumption among students from developed countries. More recently, some longitudinal studies also compared alcohol consumption before and during this pandemic in students, for example, Vera et al. (13) reported a decreased effect in consumption. These conflicting findings may be due to different methodological designs, such as, the time-points that are compared, time elapsed between these time-points, etc., as well as aspects not related to the design, including different

restrictive levels of lockdowns across countries, among others. Yet, these conflicting findings highlight that the impact of the sudden changes stemming from the pandemic on students' alcohol consumption patterns remains unclear. In South American countries the situation is even more worrying since studies carried-out in these countries on the changes of alcohol consumption in college students, comparing such a consumption before and during the COVID-19 pandemic, are lacking. In South American countries some studies exist, but comparing these changes only during the pandemic (e.g., (14)).

Alcohol expectancies refer to beliefs about the likelihood of experiencing certain effects, positive or negative, as a result of consuming alcohol. The expectancy theory asserts that positive alcohol expectancies foster alcohol drinking, whereas negative ones diminish or even inhibit drinking (15,16). Alcohol expectancies play an important role in subsequent drinking, but alcohol use also varies across contexts. Thus, alcohol expectancies may be affected by drinking contexts (17,18). For instance, drinking expecting to achieve social facilitation (19,20) or sex-seeking (20) is related to increased alcohol drinking among college students in non-pandemic contexts. Research on drinking contexts typically refer to the associations of drinking patterns with the physical situation in which drinking occurs, the occasion for drinking, and the relationships of individuals present in the social setting (21). Research on drinking contexts assess how certain features of the immediate social context of adolescents and young people allow discriminating between different categories of alcohol consumption (22,23).

In the initial stages of the pandemic, two opposite predictions emerged from prior literature regarding the associations between lockdown and alcohol consumption: a) consumption will increase to cope with distress and social isolation; b) consumption will decrease due to reduced alcohol availability (24). Thus, whether COVID-19 pandemic and lockdown sanitary measures have had an impact in changing alcohol drinking patterns, alcohol expectancies, and/or consumption contexts remain as an open question that we will address in this study. If pre-pandemic alcohol expectancies and/or contexts can reliably predict alcohol consumption even during quarantine, these may be used to identify at-risk students and to tailor intervention programs on alcohol misuse during this pandemic and further sanitary

crises. The aims of our study are as follow: **1)** To assess within-person changes in alcohol consumption in young college students, from August 2019 with one-year follow up during the COVID-19 quarantine, considering alcohol expectancies, drinking contexts, and main socio-demographic variables (sex, age, self-perceived socioeconomic status [SES]) as predictors, and **2)** to cross-validate the stability of these predictors' effects on the alcohol consumption across dependent and independent measures.

2. MATERIAL AND METHODS

2.1. Procedure and participants

Eligible participants were college students aged 18 to 24 living in Argentina. Participants were recruited online via social media and word of mouth (i.e., using unsponsored social media advertisement, publications in Facebook groups for universities, emails, WhatsApp groups and contacts, and Twitter and Instagram posts). Data collections were carried out via online, by using the LimeSurvey software.

This study included a longitudinal sample with two-repeated measures (N = 300) and a cross-sectional sample (N = 165). In the longitudinal sample, the first measurement was conducted in August 2019 with one-year follow up in August 2020 (60% attrition). Simultaneously, the unique measurement of the cross-sectional sample was also during August 2020. Further descriptions of the samples are in **table 1**. The same instruments were applied in each sample and measurement.

Before and after each participation, participants were presented with information on mental health services available free of charge. All participants gave their informed consent prior to participation. The Ethics Committee of the Institute of Psychological Research, Faculty of Psychology, National University of Córdoba (CEIIPsi-UNC-CONICET) approved this study.

Table 1. Description of the samples[a]

Sample and variables		n (%) or mean (± s.d.)
Longitudinal sample (N = 300)		
Sex	Woman	210 (70 %)
	Man	90 (30 %)
Age[b]		20.79 (± 1.85)
Age of onset on alcohol consumption		14.16 (± 1.36)
Weekly alcohol consumption[c]	First measurement	6.91 (± 5.88)
	One-year follow-up	8.26 (± 7.79)
Socioeconomic status (self-perceived)[d]	Low	10 (3.33 %)
	Middle	279 (93 %)
	High	11 (3.67 %)
Cross-sectional sample (N = 165)		
Sex	Woman	130 (78.79 %)
	Man	35 (21.21 %)
Age		22.20 (± 1.71)
Age of onset on alcohol consumption		14.64 (± 2.15)
Weekly alcohol consumption[c]		8.80 (± 11.52)
Socioeconomic status (self-perceived)	Low	18 (10.91 %)
	Middle	142 (86.06 %)
	High	5 (3.03 %)

Notes: n (%) or mean (± s.d.): Absolute frequencies and percentages (for categorical variables) or mean and standard deviation (for numerical variables).

[a] Description of the samples prior to imputations.

[b] Age at the first measurement.

[c] Weekly alcohol consumption measured in terms of alcohol units, i.e., the standard measure alcohol by volume.

[d] Socioeconomic status (self-perceived) at the first measurement.

2.2. Measurements

Weekly alcohol consumption (hereafter *alcohol consumption*). We asked participants to indicate the alcoholic beverage that they most consumed and their average weekly consumption. Based on this information, we calculated the alcohol units consumed on average per week for each participant. This is done by multiplying the total volume of a

standard drink (in millimeters [ml]) by its standard measure of alcohol by volume (measured as a percentage) and dividing the result by 1,000. Additional information on these calculations (i.e., how many ml did "a standard drink" have) is in **table S1**.

Alcohol expectancies. We used the Argentine Alcohol Expectancy Questionnaire for Adolescents (CEA; (25)), which is based on the model of Fromme et al. (26). The CEA is a 45-item measure of alcohol expectancies, which allows to discriminate between positive and negative expectancies. The general score of *positive expectancies* consists of three sub-scales: *sociability* (Cronbach's Alpha [α] = .90), *increased sexuality* (α = .84), and *relaxation* (α = .75). The general score of *negative expectancies* consists of three sub-scales: *cognitive and behavioral deterioration* (α = .87), *risk and aggressiveness* (α = .91), and *negative states* (α = .88) (27). The analysis carried out in this study are based on general scores of both positive and negative alcohol expectancies.

Drinking contexts. We used the Argentine Alcohol Consumption Contexts Questionnaire for Adolescents (CCC; (28)). The CCC is a 32-item instrument measuring social contexts of alcohol drinking based on the theoretical model of Beck et al. (22). The CCC consists of four factors. *Social facilitation* factor refers to the consumption of alcohol in situations of social interaction between peers, without parental supervision, and with the aim of having fun (α = .89). *Peer group acceptance* describes alcohol consumption as a response to pressure from the group of peers (α = .88). *Parental control* factor refers to alcohol consumption in situations featured by the presence of an adult, who acts as an external control that regulates and, in some cases, explicitly authorizes the consumption (α = .89). *Stress control* refers to alcohol consumption to eliminate an aversive stimulus (to relieve anxiety, sadness, and loneliness), to increase security and courage (or reduce fear), and to achieve an increase of general activity (α = .86).

Age of onset on alcohol consumption. Participants were asked to indicate the age at which they tried alcohol for the first time.

Sociodemographic variables. Participants were asked to indicate their biological sex (woman or man), age, and self-perceived socioeconomic status (low, middle or high).

2.3. Data analysis

We performed all data analysis with RStudio version 4.0.3 (29). Reproducible R code used in this study is in an open online repository (30). Data were log transformed into natural logarithm plus a constant of 1 to normalize the data. Skewness, kurtosis, and multicollinearity were assessed (**Tables S2** to **S4**).

Missing data were completely at random. We applied multivariate imputation by chained equations using the *mice* package (31). The methods used for imputations were *2L.norm* (two-level linear model) for imputing multilevel data and *pmm* (predictive mean matching) method for imputing numeric data. No categorical data were missing. Setting *m* (i.e., the number of multiply imputed datasets) too low may result in large simulation error, particularly if the fraction of missing information is high (31); therefore, we have set m = 10. We have used the default maximum number of iterations (*maxit* = 5). After assessing convergence (e.g., via plotting parameters against the iteration number), we have decided to complete the datasets with the tenth imputation.

To decide the order in which to enter the predictors into the models, we used the *regsubsets* function from the *leaps* package (32). This is an efficient branch-and-bound algorithm to run exhaustive selections. Then, we ran mixed effects modeling by means of multilevel analysis on the longitudinal sample and multiple regressions on the cross-sectional sample.

For multilevel analysis we used the *nlme* package (33) with the maximum likelihood (ML) method. Alcohol consumption was the outcome variable. The first model only contained the intercept. We built up the models by adding one predictor at a time in order to test the overall main effect of each predictor. We analyzed models including random (intercepts) and fixed effects in a two-level hierarchical data structure. In the random part of the model, we included two-repeated measures of alcohol consumption (level 1) nested within participants (level 2). In the fixed part of the model, we tested the following predictors as additive effects: time (or first and second measurement), alcohol expectancies (positive and negative as measured at time 1), drinking contexts (social facilitation, peer group

acceptance, parental control, and stress control as measured at time 1), biological sex, age (as measured at time 1), age of onset on alcohol consumption, and SES (as assessed at time 1). For the predictor having more than two conditions (SES), we have set non-orthogonal contrasts, which compared the middle status as the baseline versus each one of the remaining conditions. Comparisons on the fit of the models were based on the Akaike's Information Criterion (AIC).

To test the stability of the predictors' main effects on alcohol consumption, we have repeated this entire process, but considering the measurements of alcohol expectancies and drinking contexts at the follow up.

In addition, we have cross-validated the stability of all the same predictors for alcohol consumption, but in an independent cross-sectional sample, by fitting multiple linear regression models.

For calculating effect sizes (ES) in the multilevel models we used the *DSUR.noof* package (34), while in multiple linear regressions we used the Cohen's f. We adopted the Cohen's ES conventions: 0.02 small, 0.15 medium, and 0.35 large (35).

3. RESULTS

3.1. Within-person changes in the two-repeated measures of alcohol consumption considering alcohol expectancies and drinking contexts during the first measurement

The model fit for alcohol consumption significantly improved when within-person changes were modeled ($AIC_{intercept\_only}$ = 1263.22, $AIC_{within\_variable}$ = 1158.75; $X^2_{(3)}$ = 106.47, p < .0001). When models were built up by adding one predictor at a time, there were statistically significant main effects of social facilitation (AIC = 1120.18; $X^2_{(4)}$ = 40.56, p < .0001), stress control (AIC = 1113.12; $X^2_{(5)}$ = 9.07, p = .003), parental control (AIC = 1109.24; $X^2_{(6)}$ = 5.88, p = .01), age of onset on alcohol consumption (AIC = 1106.76; $X^2_{(7)}$ = 4.47, p = .03), and peer group acceptance (AIC = 1103.88; $X^2_{(8)}$ = 4.89, p = .03) on the alcohol consumption. On the contrary, there were no significant main effects of sex (AIC = 1102.11; $X^2_{(9)}$ = 3.76, p = .052), age (AIC = 1101.75; $X^2_{(10)}$ = 2.37, p = .12), time (AIC = 1102.69; $X^2_{(11)}$ = 1.06, p = .30), SES (AIC

= 1106.40; $X^2_{(13)}$ = 0.29, p = .86), positive (AIC = 1108.29; $X^2_{(14)}$ = 0.10, p = .75) nor negative alcohol expectancies (AIC = 1110.25; $X^2_{(15)}$ = 0.05, p = .83) on the alcohol consumption.

In the best fitting model, the alcohol consumption showed significant variance in intercepts across participants (standard deviation [SD] = 0.43; 95% CI: 0.38, 0.50; within-group standard error [s.e.]: 0.43, 0.50). A summary, including the ES, of this best fitting model is in **table 2a**.

3.2. Within-person changes in the two-repeated measures of alcohol consumption considering alcohol expectancies and drinking contexts during the second measurement

The model fit for alcohol consumption significantly improved when within-person changes were modeled ($AIC_{intercept\_only}$ = 1313.01, $AIC_{within\_variable}$ = 1238.57; $X^2_{(3)}$ = 76.43, p < .0001). When models were built up by adding one predictor at a time, there were statistically significant main effects of social facilitation (AIC = 1196.00; $X^2_{(4)}$ = 44.58, p < .0001), stress control (AIC = 1188.55; $X^2_{(5)}$ = 9.45, p = .002), sex (AIC = 1184.02; $X^2_{(6)}$ = 6.53, p = .01), parental control (AIC = 1180.45; $X^2_{(7)}$ = 5.57, p = .02), and age of onset on alcohol drinking (AIC = 1178.15; $X^2_{(8)}$ = 4.30, p = .04) on the alcohol consumption. On the contrary, there were no significant main effects of SES (AIC = 1180.49; $X^2_{(10)}$ = 1.66, p = .44), time (AIC = 1181.18; $X^2_{(11)}$ = 1.30, p = .25), negative alcohol expectancies (AIC = 1183.11; $X^2_{(12)}$ = 0.07, p = .79), peer group acceptance (AIC = 1184.92; $X^2_{(13)}$ = 0.19, p = .66), positive alcohol expectancies (AIC = 1186.92; $X^2_{(14)}$ = 0.002, p = .97), and age (AIC = 1188.92; $X^2_{(15)}$ = 0.0001, p = .99) on the alcohol consumption.

In the best fitting model, the alcohol consumption showed significant variance in intercepts across participants (SD = 0.39; 95% CI: 0.33, 0.47; within-group s.e.: 0.49, 0.57). A summary, including the ES, of this best fitting model is in **table 2b**.

Table 2. Model best fitting alcohol consumption in young college students (N = 300) considering alcohol expectancies and drinking contexts as measured at **a)** the first measurement and **b)** the one-year follow-up (during quarantine)

	Predictors	β	$t_{(df)}$	*p-value*[a]	95% CI		ES
					Lower	Upper	
a)	Intercept	-0.41	-0.65 (300)	.52	-1.65	0.83	
	Social facilitation	0.69	3.77 (294)	.0002	0.33	1.04	0.21
	Stress control	0.33	2.91 (294)	.004	0.11	0.55	0.17
	Parental control	0.22	2.02 (294)	.04	0.007	0.44	0.12
	Age of onset on alcohol consumption	-0.05	-2.09 (294)	.04	-0.10	-0.003	0.12
	Peer group acceptance	-0.29	-2.21 (294)	.03	-0.55	-0.03	0.13
b)	Intercept	-1.01	-1.53 (297)	.13	-2.30	0.28	
	Social facilitation	0.65	3.78 (297)	.0002	0.31	0.98	0.21
	Stress control	0.25	3.12 (297)	.002	0.09	0.40	0.18
	Sex (man)	0.19	2.69 (297)	.007	0.05	0.33	0.15
	Parental control	0.22	1.23 (297)	.03	0.03	0.42	0.13
	Age of onset on alcohol consumption	-0.05	-2.07 (297)	.04	-0.09	-0.003	0.12

Note: 95% CI: 95% Confidence Intervals. ES: Effect size.

[a] Exact p-values are informed, except for p-values under .0001, which are informed as < .0001.

3.3. Cross-validation of alcohol expectancies and drinking contexts as predictors of alcohol consumption in an independent cross-sectional sample

In the independent cross-sectional sample, the alcohol consumption during quarantine was significantly and positively influenced by stress control, parental control, and positive alcohol expectancies, while it was significantly and negatively influenced by the SES, but only when comparing the middle to the high status. On the contrary, the remaining predictors tested had no statistically significant effects on the alcohol consumption. In this multiple regression model, the residual s.e. was of 0.66, corresponding to 34.94% error rate. The multiple R-squared was 0.48 (adjusted R-squared = 0.44). A summary of this regression model is in **table 3**.

Table 3. Regression model best fitting alcohol consumption during quarantine in the cross-sectional sample of young college students (N = 165)

Predictors	**β**	**t**	**p-value**	**95% CI**		**ES with 95% CI [lower, upper]**
				Lower	**Upper**	
Intercept	-2.93	-2.16	**.03**	-5.61	-0.25	
Stress control	0.98	5.98	**< .0001**	0.66	1.31	0.80 [0.61, 0.98]
Parental control	0.65	3.55	**.0005**	0.29	1.01	0.43 [0.26, 0.60]
Positive alcohol expectancies	0.55	2.11	**.04**	0.04	1.06	0.23 [0.07, 0.39]
Socioeconomic status: medium vs low	-0.22	-0.63	.53	-0.90	0.46	0.20 [0.00, 0.35]
Socioeconomic status: medium vs high	-0.46	-2.68	**.008**	-0.81	-0.12	

Age	-0.04	-1.28	.20	-0.10	0.02	0.11 [0.00, 0.27]
Negative alcohol expectancies	-0.17	-0.77	.44	-0.61	0.27	0.05 [0.00, 0.21]
Social facilitation	0.18	0.57	.57	-0.45	0.82	0.04 [0.00, 0.20]
Peer group acceptance	-0.05	-0.28	.78	-0.45	0.34	0.03 [0.00, 0.18]
Age of onset on alcohol consumption	-0.01	-0.27	.78	-0.06	0.04	0.02 [0.00, 0.17]
Sex (man)	-0.03	-0.20	.84	-0.29	0.24	0.02 [0.00, 0.16]

Note: 95% CI: 95% Confidence Intervals. ES: Effect size.

[a] Exact p-values are informed, except for p-values under .0001, which are informed as < .0001. Statistically significant p-values are highlighted in bold.

4. DISCUSSION

This study assessed within-person changes in alcohol consumption in young college students, before the COVID-19 pandemic and one-year follow-up during the health crisis, testing the effects' stability of alcohol expectancies, drinking contexts, and main demographic variables on such changes. Likewise, these predictors' effects were cross-validated on the alcohol consumption across dependent and independent measures. To the best of our knowledge, this is the first South American study that gathered features such as within-person measures before and during lockdown, and independent measures for cross-validation, to address such a pressing concern.

In this study, we found that the quantity of alcohol consumed by college students increased during COVID-19 quarantine when compared to one-year before. In this regard, it is

important to consider that, as we demonstrated in a previous study, self-reported measures on negative alcohol consequences diminished in Argentinean college students as quarantine duration went by (6). Taken together, these findings suggest that, while alcohol consumption increase, awareness on its negative consequences have decreased possibly due to living conditions that characterize quarantine (e.g., the possibility of not having to meet schedules, getting up later, and, therefore, if they have a hangover not having to hide it).

In the longitudinal sample analyzed herein, predictors showing to have a stable – i.e., regardless of whether they were measured during the first measurement or during the one-year follow-up – increasing main effect on alcohol consumption were social facilitation, stress control, and parental control. The only one predictor having a stable inverse main effect on alcohol consumption was age of onset. The positive relationship found between social facilitation and increased alcohol consumption and the inverse relationship between the latter and the age of onset are consistent with the literature (e.g., (19) and (36), respectively). As in the longitudinal sample, stress control and parental control were associated with higher alcohol consumption during quarantine when we tested all the predictors in an independent cross-sectional sample. Overall, these findings indicate that only stress control and parental control contexts are predictors having stable increasing effects on alcohol consumption in college students, across time and under both quarantine and non-quarantine situations.

It is known that lectures and grading may be a stressful factor for college students (37). Based on our findings, quarantine and its associated changes (e.g., classes transitioning to online), may have acted as additional stressors leading to increased alcohol consumption. In this regard, it was reported that coping motives predict higher consumption during lockdowns due to the COVID-19 pandemic (9). However, evidence is not univocal, with studies reporting both increased (8) and decreased (9) alcohol consumption among college students during lockdowns due to this pandemic. According to a longitudinal, population-based study that found a decrease in alcohol consumption – although in adolescents from 13-18 years –, this decrease might be an unintended benefit of isolation (38), which is a

plausible interpretation of such findings. However, we strongly disagree with the conclusion that arised from the cited study, which states that this “might serve as a protective factor against future substance use disorders and dependence” ((38), p. 1). Conversely, we assert that, in order to reduce alcohol consumption among the youngest, social isolation must not be accepted nor normalized as a healthy intervention. Both scientists and mental healthcare workers must be able to develop and implement prevention and treatment interventions not underpinned in social isolation, this is, different to psychiatric hospitalizations, isolation due to pandemics or any similar others.

Regarding parental control, our findings highlight the stable effect that this drinking context has on increasing alcohol consumption in college students. Parental supply is known to be often associated with increased home alcohol access and lenient alcohol-specific rules (39). However, studies based on samples from developed countries report that parentally-supplied adolescents consume fewer drinks on a typical drinking occasion than those supplied from non-parental sources (40) and that parental supply, although associated with greater overall consumption among the youngest, appears to have less impact on drinking in later adolescence (41). Most of these cited studies refer to adolescents, however, numerous studies indicate that parental influence persists even after the move to college, and extends to students’ alcohol use (see, e.g., (42)). All in all, evidence from developed countries on the effects of parental control context in alcohol drinking among young people is not conclusive (43) and there is no evidence to suggest that it is protective (41).

In addition, in the cross-sectional sample analyzed here, positive alcohol expectancies were related to higher alcohol consumption. Although these expectancies are known as classical and strong predictors of high alcohol consumption, mainly among young people (e.g., (44,45)), we only corroborated this relationship during quarantine in the independent cross-sectional sample, but not in the one-year follow up longitudinal sample. In a similar cross-sectional study that we have conducted in Argentina before the pandemic, we found that the quantity of alcoholic beverages consumed by students was both positively correlated with positive alcohol expectancies, and strikingly, with negative alcohol expectancies (46). Our current findings suggest that during quarantine situations, the effects of alcohol

expectancies have on alcohol drinking in college students would not be as strong as expected based on the literature in non-quarantine situations (e.g., (47–49).

Besides, we found that high SES was related to a reduced alcohol consumption when compared to medium SES in the cross-sectional sample. Oppositely, relationships between high SES and higher alcohol consumption were reported in developed countries (50,51), but also between low SES and higher alcohol consumption (52,53). In brief, evidence on the relationship between alcohol consumption and SES is not consistent, perhaps due to different dimensions of drinking (e.g., frequency, quantity, etc.) and different indicators of SES (e.g., educational achievement, occupational activity, income, parental education, etc.) measured by studies as well as populations analyzed (e.g., from developed or developing countries), among other aspects. Moreover, most of the literature analyzed these aspects in non-pandemic situations and focused on comparisons between high and low SES, while leaving aside comparisons with medium SES, a category that we have included in this study since this is usually prevailing among college students.

This study has some limitations. Mainly, the sample size and the percentage of attrition (60%) in the longitudinal sample during the follow-up, for which we have applied imputations. Though, evidence indicates that unbiased results can be obtained even with large proportions of missing data (e.g., up to 90% in simulation studies), provided the imputation model is properly specified and data are missing at random (54). Also, our sample was one of convenience. This is the case in most of the studies performed in Latin-American countries, mainly due to budget shortage. Still, studies based on random selected samples and population-based are required in this region. In our sample, women were overrepresented and, thus, men's features may be underrepresented. Yet, evidence indicates that low participation rates only slightly affect the results and, thus, do not perforce indicate a high level of bias inherent in a study (55). Besides, findings presented herein are based on self-reported measures, which may be accounted as a limitation. Nevertheless, self-reported drinking measures have been demonstrated to be reliable (56). Regarding instruments, both CEA and CCC were developed for adolescents (up to 18 years),

which could imply a bias in our results. However, the most recent definitions of adolescence extend this period to 18-24/25 years old (57,58).

All in all, our findings remain valuable and may be translated into concrete public policies for the mental health care of college students. As mentioned, stress control and parental control contexts are stable predictors increasing alcohol consumption before and during COVID-19 quarantine. Based on these findings, developing health policies aimed at training in strategies to cope with stress during quarantines may be an affordable health tool in terms of cost-benefits for governments, to reduce alcohol consumption among students when implementing restrictive sanitary measures during the current and/or further pandemics. In addition, training in strategies to cope with stress would be beneficial for college students in non-pandemic situations. On the other hand, parental education on deleterious alcohol-related effects should be promptly addressed by specific public policies, since it could help in reducing alcohol consumption in college students during both quarantine and non-quarantine situations.

Acknowledgements

The authors thank Dr. Angelina Pilatti, Ph.D., and Dr. Yanina Michelini, Ph.D. for their important suggestions and comments in pre-reviewing this manuscript.

Ethics

This study was approved by the Ethics Committee of the Institute of Psychological Research, Faculty of Psychology, National University of Córdoba (CEIIPsi-UNC-CONICET; comite.etica.iipsi@psicologia.unc.edu.ar). All participants gave their informed consent for their data to be used in the research.

Data availability statement

The dataset and the reproducible R code are available in the *Open Science Framework* (*OSF*) repository, https://doi.org/10.17605/OSF.IO/FMHUJ

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Supplementary materials for

A longitudinal study on alcohol consumption, alcohol expectancies, and drinking contexts among young college students before and during the Argentinean quarantine due to the COVID-19 pandemic: A one-year follow-up study

INDEX

Table S1. Information used to calculate alcohol units

Alcoholic beverage	Total volume of liquid in a drink (ml)	Alcohol volume (%)	Equivalent units[a] of alcohol in a drink
Beer	330	5	1.65
Fernet	250	12	3
Wine	250	12	3
Vodka	45	40	1.8
Whiskey	45	40	1.8
Liqueur	45	14	0.63
Champagne	150	11	1.65
Geneva	45	40	1.8
Gancia	250	12	3

[a] Alcohol units calculated by multiplying the total volume of a drink (in ml) by its standard measure of alcohol by volume (measured as a percentage) and dividing the result by 1,000.

Table S2. Skewness and kurtosis based on both original and log transformed values for the two-repeated measures scores of weekly alcohol consumption[a], alcohol expectancies and drinking contexts variables

Variables	Based on original values[b]		Based on log transformed values[c]	
	Skewness	**Kurtosis**	**Skewness**	**Kurtosis**
Time 1				
Weekly alcohol consumption	2.04	7.97	0.31	2.73
Positive alcohol expectancies	0.06	2.57	-0.58	3.00
Negative alcohol expectancies	0.67	3.01	0.03	2.41
Social facilitation	-0.09	2.65	-0.72	3.56
Peer group acceptance	1.62	6.24	0.90	3.30
Parental control	0.49	2.45	-0.14	2.27
Stress control	2.34	9.79	1.43	4.49
Time 2				
Weekly alcohol consumption	1.83	6.56	-0.12	2.80
Positive alcohol expectancies	-0.17	2.49	-0.86	3.52
Negative alcohol expectancies	0.70	3.13	0.08	2.59
Social facilitation	-0.33	2.98	-0.99	4.00
Peer group acceptance	1.99	7.96	1.02	3.87
Parental control	-0.10	2.40	-0.84	3.30
Stress control	1.90	6.49	1.13	3.46

[a] Weekly alcohol consumption measured in terms of alcohol units, i.e., the standard measure alcohol by volume.

[b] Skewness and kurtosis were calculated based on the original values (i.e., prior to log transformations) from the entire dataset, which did not have missing values at the first measurement, while they had missing values at the follow up. For the latter, missing values were removed for these calculations.

[c] Skewness and kurtosis were calculated based on the log transformed values from the entire dataset, which did not have missing values at the first measurement, while they had missing values at the follow up. For the latter, missing values were removed for these calculations.

Table S3. Skewness and kurtosis based on both original and log transformed values for single-measures scores of weekly alcohol consumption[a], alcohol expectancies, and drinking contexts variables

Variables	Based on original values[b]		Based on log transformed values[c]	
	Skewness	**Kurtosis**	**Skewness**	**Kurtosis**
Weekly alcohol consumption	4.17	25.26	0.002	3.24
Positive alcohol expectancies	0.08	2.71	-0.70	3.27
Negative alcohol expectancies	0.90	4.08	0.16	2.49
Social facilitation	-0.41	2.96	-1.22	4.52
Peer group acceptance	2.11	9.08	0.95	3.81
Parental control	0.09	2.46	-0.62	2.71
Stress control	1.60	5.39	0.91	2.84

[a] Weekly alcohol consumption measured in terms of alcohol units, i.e., the standard measure alcohol by volume.

[b] Skewness and kurtosis were calculated based on the original values (i.e., prior to log transformations) from the entire dataset having missing data, which were removed for these calculations.

[c] Skewness and kurtosis were calculated based on the log transformed values from the entire dataset having missing data, which were removed for these calculations.

Table S4. Multicollinearity assessment by using the variance inflation factor (VIF), the tolerance statistics, and the mean VIF[a] for the full predictors assessed in the longitudinal sample (N = 300) and in the cross-sectional sample (n = 165)

Sample	Predictors	VIF	Tolerance	Mean VIF
Longitudinal: first measurement	Sex	1.05	0.95	1.23
	Age	1.06	0.94	
	Socioeconomic status (self-perceived)	1.05	0.95	
	Age of onset on alcohol consumption	1.06	0.94	
	Positive alcohol expectancies	2.00	0.50	
	Negative alcohol expectancies	1.62	0.61	
	Social facilitation	2.10	0.48	
	Peer group acceptance	1.26	0.79	
	Parental control	1.53	0.65	
	Stress control	1.32	0.76	
Longitudinal: follow up	Sex	1.22	0.82	1.37
	Age	1.20	0.83	
	Socioeconomic status (self-perceived)	1.29	0.78	
	Age of onset on alcohol consumption	1.18	0.85	
	Positive alcohol expectancies	2.60	0.38	
	Negative alcohol expectancies	1.65	0.60	
	Social facilitation	3.38	0.29	
	Peer group acceptance	1.41	0.71	
	Parental control	1.88	0.53	
	Stress control	1.48	0.67	
Cross-sectional	Sex	1.10	0.91	1.37
	Age	1.11	0.90	
	Socioeconomic status (self-perceived)	1.22	0.82	
	Age of onset on alcohol consumption	1.22	0.82	

Positive alcohol expectancies	2.76	0.36
Negative alcohol expectancies	1.59	0.63
Social facilitation	3.08	0.32
Peer group acceptance	1.54	0.65
Parental control	1.69	0.59
Stress control	1.45	0.69

[a] We calculated the VIF, the tolerance statistics, and the mean VIF by using the *VIF* function from the *car* package of R. We adopted the following criteria for acceptable values: VIF < 10; tolerance > 0.2; mean VIF not substantially greater than 1 (Field et al., 2012).

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