



# Relationship Between Depression and Risky Alcohol Consumption in Women: the Mediating Role of Coping Styles and Age

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Accepted: 29 September 2022 / Published online: 12 October 2022

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## Abstract

Women are more likely to use alcohol as a coping strategy for psychological distress, with higher rates of comorbidity with depression being found in those with an alcohol use disorder. The objective of this study was to analyze changes in problematic alcohol consumption and depression during the COVID-19 lockdown, and to establish a predictive model based on age. A total of 1889 women aged 18–64 years ( $M=36.14$ ) participated. The Patient Health Questionnaire was applied for depression, the Alcohol Use Disorders Identification Test–Short Version for alcohol, and active and avoidant coping were considered. In the period prior to the pandemic, depression and avoidant coping were good predictors of alcohol consumption in women, regardless of age. During lockdown, this predictive capacity was only maintained in women aged 35–64 years. In the mediational models, differences were observed according to age. For women aged 18–34 years, depression was the predictor variable of problematic alcohol consumption, but for women aged 35–64 years it was the avoidant coping style, which is the predominant style in women of this age with clinical depression. The relevance of age in the combined treatments of depression and problematic alcohol consumption is highlighted, and training in active coping strategies is suggested.

**Keywords** Women · Alcohol · Depression · Coping styles · Age

There is ample evidence on the comorbidity of problematic alcohol use and depression (Boden & Fergusson, 2011; Di Florio et al., 2014; Kessler et al., 2003; Kushner et al., 2000; Martins & Gorelick, 2011; Petersen et al., 2019; Schuckit, 2006; Udo & Grilo, 2019). It is known that people with comorbid alcohol use disorder and depression tend to drink more, report poorer mental health, and relapse more quickly than people without comorbid depression (Burns & Teesson, 2002; Burns et al., 2005). It can also affect the

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progression and severity of both problems or the individual's self-care, as well as their adherence to treatment and its results (Mäkelä et al., 2015; Oliveira et al., 2018). Consistent with these findings, some studies also report that alcohol misuse or abuse is higher among those with depression than in the non-clinical population (Grant et al., 2015; Martins & Gorelick, 2011; Murphy et al., 2013; Palzes et al., 2020).

During the SARS-CoV-2 virus epidemic in 2020, governments had to adopt unprecedented measures to contain the spread of the virus, such as mandatory lockdowns and physical distancing (World Health Organization, 2020). These measures affected the mental health of many people worldwide (Huang & Zhao, 2020a; Shigemura et al., 2020; Torales et al., 2020). The increase of psychological distress and the negative impact on emotional well-being were some of the main stress-generating factors (Arias et al., 2020; Ruiz et al., 2020; Wang et al., 2020). In this sense, various studies indicate that the increase in alcohol consumption points to it being used as a defense mechanism against the high level of stress reached during the pandemic (Callinan et al., 2021; Canadian Centre on Substance Use and Addiction, 2020; Wardell et al., 2020). Previous research has documented heavy drinking trends in response to stressors (Keyes et al., 2012), including economic crises (de Goeij et al., 2015) and disasters (Keyes et al., 2012; Vlahov et al., 2004; Wu et al., 2008). That is, alcohol consumption and excessive alcohol consumption are used as maladaptive stress and anxiety management strategies (Clay & Parker, 2020; de Goeij et al., 2015; Eckardt et al., 1998; Gonçalves et al., 2020; Keyes et al., 2011; Wardell et al., 2020).

Some research suggests that women are more vulnerable to experiencing psychological distress from the pandemic than men (Brooks et al., 2020), and therefore may be more motivated to drink in order to cope with pandemic-related distress. In this regard, Rodríguez et al. (2020) associated heavy alcohol use with high levels of COVID-19-related distress in women, but not in men, and Pollard et al. (2020) found a 17% increase in alcohol consumption in women during lockdown. In fact, findings prior to this study have shown a higher prevalence of risky consumption in women than in men, both before the pandemic and during lockdown (Villanueva et al., 2021; Villanueva-Blasco et al., 2021a) and related to age (Villanueva-Blasco et al., 2021b). Similarly, pre-pandemic studies indicate that women are more likely to report drinking alcohol to cope with stress and negative affect (McHugh et al., 2018), and that higher rates of comorbidity with depression are found among women with an alcohol use disorder (Khan et al., 2013).

Despite the existence of research that has analyzed the relationship between depression and alcohol consumption in women, no studies that explore the mediating role of coping styles between depression and problematic alcohol use, while also considering the age variable, have been found. Likewise, the exceptionality of the lockdown situation during the COVID-19 pandemic raises interesting questions regarding both problems and their relationship. Were the changes in alcohol consumption in women during lockdown different according to age? Considering the increase in psychosocial stressors during lockdown, was depressive symptomatology a better predictor of alcohol consumption during lockdown compared to the pre-pandemic period? What role do coping styles have in this relationship between depression and alcohol consumption, both before and during lockdown? Does the coping style of women differ according to age and the presence of depressive symptoms? Is there a coping style that predicts alcohol consumption in women, both before and during lockdown?

To answer these questions, the present study had several objectives: (a) to establish whether the levels of problematic alcohol consumption before and during lockdown, coping styles, and depressive symptomatology during lockdown are different for a sample of

women based on age; (b) to analyze the relationship between these variables and establish a predictive model according to the existing literature.

## Method

### Design

The present study opted for a correlational and cross-sectional design, with a convenience sampling technique. The *online* battery was specifically designed for research, selecting tests with adequate psychometric properties, and adapted to the Spanish population. The age ranges were established based on the criteria that appear in the National Institute of Statistics (2019), related to the efficient access to the Internet of the general population.

### Participants

A total of 1889 women of Spanish nationality participated in this study, aged between 18 and 64 years ( $M=36.14$ ;  $SD=11.53$ ). A total of 84.40% of the sample had completed higher education, 8.30% vocational training, 5.30% high school, 1.20% compulsory secondary education, and 0.60% primary education. Regarding the employment situation during the lockdown period, 41.20% worked full time, 10.00% part time, 6.80% were self-employed professionals, 9.90% were unemployed, and only 0.70% reported being retired. Likewise, 18.50% indicated that they were students and 9.90% were part of temporary workforce reduction programs.

### Instruments

The following instruments were administered:

- Sociodemographic evaluation battery: With the purpose of gathering information on the fundamental characteristics of the sample; an ad hoc interview was designed that inquired about age, sex, educational level, and employment status.
- Depression: For the evaluation of depressive symptoms, the Patient Health Questionnaire (PHQ-9) (Kroenke & Spitzer, 2002), adapted to Spanish (Cassiani-Miranda et al., 2018), was used. The test is composed of 9 items that follow a Likert format ranging from 0 (“never”) to 3 (“every day”), and explore depressive symptoms such as loss of interest in rewarding activities, sadness, decreased appetite, sleep difficulties, or the presence of suicidal ideation. Its content was developed following the diagnostic criteria for major depression contained in the Diagnostic and Statistical Manual of Mental Disorders-revised fourth edition (American Psychiatric Association 2002). The internal consistency of this unifactorial test has been shown to be generally adequate ( $\alpha=0.85$ ) (Baader et al., 2012). Appropriate levels of reliability were also reached in the present study ( $\alpha=0.83$ ).
- Coping: To assess coping, the coping scale for adolescents (Villalobos, 2009) was used. The test consists of 15 items that follow a Likert format with four response anchors, in a frequency spectrum that extends from 1 (“not at all”) to 4 (“a lot”). It explores both active strategies (seeking support, problem-solving attitude, etc.) and avoidant

ones (tendency to cry, self-blame, suicidal ideation, etc.) to deal with stressful events that have occurred in the last 6 months. In the validation study, the Avoidant Coping subscale (eight items) ranges from a minimum of 8 to a maximum of 32 points; and the Active Coping subscale (seven items) ranges from 7 to 28 points. Table 1 shows the descriptive statistics of the Adolescent Coping Questionnaire obtained for the sample in this study. In the present investigation, adequate levels of internal consistency were obtained, for both active coping ( $\alpha=0.74$ ) and avoidant coping ( $\alpha=0.71$ ). Therefore, despite the fact that this scale was initially created to evaluate coping in adolescents, these good psychometric properties allow to estimate the coping in adults.

- Alcohol consumption: To explore alcohol consumption, the Alcohol Use Disorders Identification Test–Short Version (AUDIT-C) (Bush et al., 1998), in its adaptation to Spanish (Contel et al., 1999), was chosen. The test consists of three items that explore frequency of alcohol use, average daily consumption, and the presence of heavy drinking (*binge drinking*). The structure of its items is Likert type, with five response anchors ranging from 0 (low frequency or low consumption) to 4 (high frequency or high consumption). The reliability of the test is adequate based on previous studies, despite its short length ( $\alpha=0.75$ ) (García-Carretero et al., 2016). For this research, the evaluation of alcohol consumption was carried out considering both the period of lockdown and the 6 months preceding it.

## Process

The data collection began on April 14, 2020, 30 days after the lockdown measures were formalized in Spain. Given the restrictions imposed by the healthcare state of alarm, an *online format* consisting of a brief battery of self-administered tests was used. It was distributed through different media: social networks, email marketing, and instant messaging applications. Parallel to this battery, an informed consent was provided detailing the

**Table 1** Descriptive statistics of the Adolescent Coping Questionnaire

Items	Average	SD	IHC
1	3.34	0.70	.71
2	2.21	0.80	.49
3	1.49	0.67	.73
4	3.30	0.71	.62
5	2.07	0.92	.67
6	2.44	0.90	.54
7	2.20	1.00	.66
8	2.89	0.83	.54
9	1.91	0.88	.67
10	1.20	0.52	.43
11	3.12	0.73	.74
12	1.07	0.32	.40
13	1.33	0.60	.54
14	2.92	0.79	.62
15	3.25	0.68	.54

voluntary nature of participation in the study, following the Organic Law 3/2018 for the protection of personal data and digital rights. The project was approved by the ethics committee of the International University of Valencia.

## Data Analysis

To carry out descriptive analyses, central tendency (mean) and dispersion (standard deviation, range, and quartile) statistical indicators were used for the quantitative variables, and percentages were used for the categorical ones. Furthermore, a one-way ANOVA was used for the comparative analyses, considering age (grouped in ranges) as the between-subjects grouping variable. Given that ANOVA is an omnibus test, post hoc measures were used to carry out multiple comparisons (avoiding the increase in type I error). More specifically, Bonferroni was chosen (when compliance with the principle of homoscedasticity was corroborated according to the Levene test) and Games-Howell (when the principle of homoscedasticity was not fulfilled). The Student's *t*-test of related measures was also used to compare the potential change in the pattern of alcohol consumption which could be attributed to lockdown according to age. Likewise, the Student's *t*-test of independent measures was incorporated to explore the effect of clinically relevant depressive symptoms on the dependent variables of interest. Effect size was calculated using Cohen's *d*.

At the same time, a bivariate correlation analysis (Pearson) was carried out to establish the association between the study's different variables of interest, this being understood as a necessary previous step for the elaboration of mediation tests. The mediation tests were carried out through the Macro PROCESS for SPSS, version 3.5 (Hayes, 2012), and particularly using Model 4. The significance was estimated through *bootstrapping*. Depression was considered a criterion variable, while alcohol consumption (before and/or during lockdown) was included as a predictor in the model. Avoidant coping was placed in the mediator position.

All data analysis was performed using the statistical package SPSS in its 25th version. An alpha level of 0.05 was determined for all cases.

## Results

The comparison analysis, considering the different age groups, showed statistically significant differences in all the dependent variables (Table 2). Depression levels showed significant differences between groups ( $F=18.78$ ;  $p<0.001$ ). In particular, a significantly more intense depressive symptomatology was found in women belonging to the 18–24 age group ( $M=8.98$ ;  $SD=4.92$ ) compared to the rest between 30 and 64 years; in the 25–29 age group ( $M=7.78$ ;  $SD=4.31$ ) compared to the remaining groups between 35 and 64 years; and in the 30–34 age group ( $M=6.70$ ;  $SD=4.03$ ) compared to the older group (55–64 years). Mean scores for depression were also found to decline with increasing age.

Regarding alcohol consumption, during the pre-pandemic period, it was observed that younger women (18–24 years old) reported a higher score on the AUDIT-C ( $M=3.15$ ;  $SD=1.81$ ) than those aged 35–44 years ( $M=2.65$ ;  $SD=1.67$ ), the difference being statistically significant ( $F=2.40$ ;  $p=0.036$ ). The differences were accentuated when comparing alcohol consumption during the lockdown period, and the relationship was inverted ( $F=15.91$ ;  $p<0.001$ ): women aged 18–24 reported lower scores on the AUDIT-C ( $M=1.48$ ;  $SD=1.59$ ) compared to the rest between 30 and 64 years, as well as the 25–29

**Table 2** Comparative analysis (ANOVA)

		INDICATORS				ANOVA				POST-HOC		
		M	SD	SS	DF	MS	F	BONF	G-H	P		
DEPRESSION (PHQ-9)	1 18–24 years	8.98	4.92	Inter groups	1744.13	5	348.83	18.78***	1 ≠ 3, 2 ≠ 4	.001 .001		
	2 25–29 years	7.78	4.31	Intra groups	20,196.03	1087	18.58		1 ≠ 4, 2 ≠ 5	.001 .001		
	3 30–34 years	6.70	4.03	Total	21,940.16	1092			1 ≠ 5, 2 ≠ 6	.001 .001		
	4 35–44 years	6.07	4.10						1 ≠ 6, 3 ≠ 6	.001 .008		
	5 45–54 years	5.90	4.19									
	6 55–64 years	4.70	3.67									
AUDIT-C_BEFORE	1 18–24 years	3.15	1.81	Inter groups	32.71	5	6.54	2.40*	1 ≠ 4	.036		
	2 25–29 years	2.89	1.67	Intra groups	2964.55	1087	2.73					
	3 30–34 years	2.69	1.53	Total	2997.26	1092						
	4 35–44 years	2.65	1.67									
	5 45–54 years	2.89	1.65									
	6 55–64 years	2.77	1.16									
AUDIT-C_DURING	1 18–24 years	1.48	1.59	Inter groups	233.74	5	46.75	15.91***	1 ≠ 3, 1 ≠ 6	.005 .001		
	2 25–29 years	1.82	1.72	Intra groups	3194.46	1087	2.94		1 ≠ 4, 2 ≠ 4	.001 .001		
	3 30–34 years	2.13	1.61	Total	3428.20	1092			1 ≠ 5, 2 ≠ 5	.001 .001		
	4 35–44 years	2.57	1.85						2 ≠ 6	.002		
	5 45–54 years	2.67	1.82									
	6 55–64 years	2.74	1.55									
ACTIVE COPING	1 18–24 years	20.63	3.53	Inter groups	127.32	5	25.46	2.37*	1 ≠ 3	.051		
	2 25–29 years	21.25	3.16	Intra groups	11,674.48	1087	10.74					
	3 30–34 years	21.65	3.15	Total	11,801.80	1092						
	4 35–44 years	21.35	3.15									
	5 45–54 years	21.58	3.49									
	6 55–64 years	21.26	2.95									

Table 2 (continued)

	INDICATORS			ANOVA			POST-HOC			
	M	SD		SS	DF	MS	F	BONF	G-H	p
AVOIDANT COPING	1 18–24 years	15.30	3.85	Inter groups	1023.43	5	204.69	18.32***	1#2,2#4	.014 .002
	2 25–29 years	14.20	3.41						1#3,2#5	.005 .001
	3 30–34 years	13.97	3.23	Intra groups	12,144.77	1087	11.17		1#4,2#6	.001 .001
	4 35–44 years	13.07	3.13						1#5,3#5	.001 .004
5 45–54 years	12.68	3.02	Total		1092	13,168.20		1#6,3#6	.001 .002	
6 55–64 years	12.20	2.95								

M medium, SD standard deviation, SS sum-of-squares, DF degrees of freedom, MS mean square, BONF Bonferroni, G-H Games-Howell (\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ )

age group ( $M=1.82$ ;  $SD=1.72$ ) compared to the groups with ages between 35 and 64 years. An increase in AUDIT-C scores was also observed with increasing age.

Regarding coping strategies, significant differences were found for avoidant coping ( $F=18.32$ ;  $p<0.001$ ). Women aged 18–24 years showed significantly higher mean scores ( $M=15.30$ ;  $SD=3.85$ ) compared to the rest of the age groups; so did the 25–29 group ( $M=14.20$ ;  $SD=3.41$ ) compared to the groups between 35 and 64 years; and the 30–34 age group ( $M=13.97$ ;  $SD=3.23$ ) compared to the groups of 45 to 64 years of age. Differences in active coping also reached statistical significance between groups ( $F=2.37$ ;  $p=0.038$ ), highlighting a marginally significant difference between women aged 18–24 ( $M=20.63$ ;  $SD=3.53$ ) and those aged 30–34 years ( $M=21.65$ ;  $SD=3.15$ ) ( $p=0.051$ ). Likewise, for avoidant coping, a decrease in mean scores was observed as age increased. This trend was reversed for active coping, observing an increase with age.

Given the evidence observed in the ANOVA test, a pairwise comparison analysis was performed using Student's  $t$ -test of related measures in order to determine the possible changes in the pattern of alcohol consumption during lockdown compared to pre-pandemic consumption (Table 3). This analysis revealed the groups of younger women to be the ones that show a statistically significant reduction in the AUDIT-C scores, specifically for 18–24 years ( $t_{(214)}=13.09$ ;  $p<0.001$ ), for 25–29 years ( $t_{(274)}=10.93$ ;  $p<0.001$ ), and for 30–34 years ( $t_{(149)}=4.73$ ;  $p<0.001$ ). The women included in the older age groups (35–44 years, 45–54 years, and 55–64 years) show a stable pattern between both periods ( $p>0.050$ ).

Due to the differences in the AUDIT-C scores between age groups, two independent groups (18–34 years and 35–64 years) were created to study the potential association between the variables ( $n=982$  and  $n=907$ , respectively). In Table 4, which shows the group of women aged 18–34, significant and positive correlations are observed for alcohol consumption between before and during lockdown ( $r=0.475$ ;  $p<0.001$ ), and between consumption prior to the pandemic and depressive symptomatology ( $r=0.121$ ;  $p=0.002$ ). Regarding coping, active coping covaries negatively with avoidant coping ( $r=-0.163$ ,  $p<0.001$ ) and with depressive symptomatology ( $r=-0.106$ ,  $p=0.001$ ), while avoidant coping is directly associated with it ( $r=0.412$ ,  $p<0.001$ ). Avoidant coping covaries negatively with consumption prior to the pandemic ( $r=0.097$ ;  $p=0.14$ ).

Table 5 shows the correlations between variables of the group of women aged 35–64 years. In this subgroup, it was shown that the score for the AUDIT-C before lockdown was positively associated with consumption during it ( $r=0.694$ ;  $p<0.001$ ), avoidant

**Table 3** Comparative pre-post analysis for the mean scores of the AUDIT-C, by age

	Before lockdown		During lockdown		$t$	$p$
	M	SD	M	SD		
18–24 years	3.15	1.81	1.48	1.59	13.09	.001
25–29 years	2.89	1.67	1.82	1.72	10.93	.001
30–34 years	2.69	1.53	2.13	1.61	4.73	.001
35–44 years	2.65	1.67	2.57	1.85	0.88	.380
45–54 years	2.89	1.65	2.67	1.82	1.97	.051
55–64 years	2.77	1.16	2.74	1.55	0.25	.801



**Table 4** Correlational analysis in women aged 18–34 years

	ABEF	ADUR	AACT	AAVO	DEP
<i>ABEF</i>	/				
<i>ADUR</i>	.475***	/			
<i>AACT</i>	.001	.017	/		
<i>AAVO</i>	.097*	.015	-.163***	/	
<i>DEP</i>	.121**	-.004	-.106***	.412***	/

*ABEF* alcohol consumption before lockdown, *ADUR* alcohol consumption during lockdown, *AACT* active coping, *AAVO* avoidant coping, *DEP* depression

\*  $p \leq .05$ ; \*\*  $p \leq .01$ ; \*\*\*  $p \leq .001$

**Table 5** Correlational analysis in women aged 35–64 years

	ABEF	ADUR	AACT	AAVO	DEP
<i>ABEF</i>	/				
<i>ADUR</i>	.694***	/			
<i>AACT</i>	-.023	-.031	/		
<i>AAVO</i>	.160***	.090*	-.124***	/	
<i>DEP</i>	.106*	.099*	-.064	.398***	/

*ABEF* alcohol consumption before lockdown, *ADUR* alcohol consumption during lockdown, *AACT* active coping, *AAVO* avoidant coping, *DEP* depression

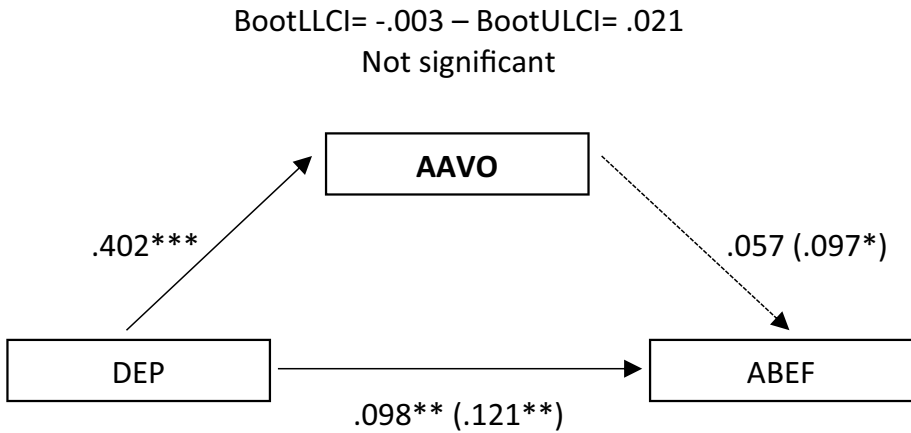
\*  $p \leq .05$ ; \*\*  $p \leq .01$ ; \*\*\*  $p \leq .001$

coping ( $r=0.160$ ;  $p=0.001$ ), and depressive symptomatology ( $r=0.106$ ;  $p=0.025$ ). For its part, the score for the AUDIT-C during lockdown was directly related to avoidant coping ( $r=0.090$ ;  $p=0.050$ ) and depression ( $r=0.099$ ,  $p=0.036$ ). Avoidant coping also covaried positively with depression ( $r=0.398$ ,  $p<0.001$ ). Lastly, active coping was negatively associated with avoidant coping ( $r=-0.124$ ,  $p<0.001$ ).

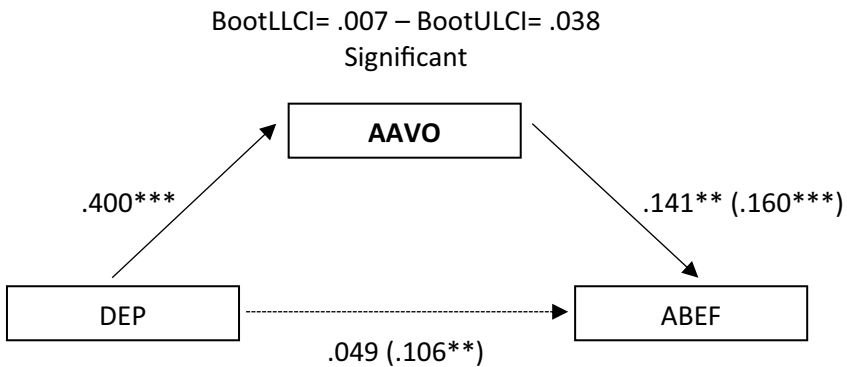
The mediational analysis was configured selecting only those variables that showed a significant association with each other, being a necessary criterion for inclusion in the model. The standardized beta coefficient ( $\beta$ ) was used as reference.

Two differentiated analyses were performed, one with women aged 18–34 years and the other with women aged 35–64 years. In women aged 18–34 years, only consumption prior to the coronavirus pandemic was used as a criterion variable, while in women aged 35–64 years, both this and the one observed during lockdown were used. The reasoning behind this is due to the fact that in the youngest group there was no relationship between the AUDIT-C score during the pandemic and depressive symptoms or the use of avoidant coping strategies, so they could not act as independent predictors of more problematic alcohol consumption. In all cases, depressive symptoms were considered a predictor variable, avoidant coping a mediating variable, and the AUDIT-C score was considered a criterion variable.

In the mediational analysis with women aged 18–34 years, it was observed that the variables depression ( $\beta=0.121$ ;  $t=3.65$ ;  $p=0.003$ ) and avoidant coping ( $\beta=0.097$ ;  $t=2.45$ ;  $p=0.014$ ) exerted an independent predictor effect on higher scores on the AUDIT-C in the pre-pandemic period, and therefore on the probability of prior problematic alcohol



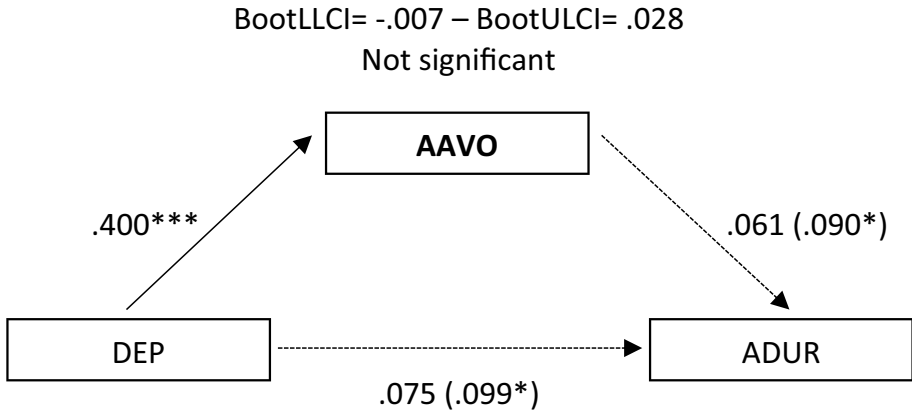
**Fig. 1** Mediation analysis for problematic alcohol consumption prior to the pandemic in women aged 18–34 years. Note: ABEF, alcohol consumption before lockdown; AAVO, avoidant coping; DEP, depression (\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ )



**Fig. 2** Mediation analysis for problematic alcohol consumption prior to the pandemic in women aged 35–64 years. Note: ABEF, alcohol consumption before lockdown; AAVO, avoidant coping; DEP, depression (\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ )

consumption. When considering avoidant coping as a mediating variable, it was observed that the effect of depression on the AUDIT-C score was maintained ( $\beta = 0.098$ ;  $t = 2.71$ ;  $p = 0.007$ ), while that of avoidant coping was diluted ( $\beta = 0.057$ ,  $t = 1.58$ ,  $p = 0.115$ ), so it did not generate a sufficient indirect effect (Fig. 1).

In the mediation analysis with women aged 35–64 years, it was observed that depressive symptoms ( $\beta = 0.106$ ;  $t = 2.67$ ;  $p = 0.008$ ) and avoidant coping ( $\beta = 0.160$ ;  $t = 3.45$ ;  $p = 0.001$ ) were good independent predictors of alcohol consumption before lockdown. However, when the mediation model was run considering depression as a predictor variable and avoidant coping as a mediator, the predictive capacity of depressive symptoms vanished ( $\beta = 0.049$ ;  $t = 1.15$ ;  $p = 0.249$ ) while avoidant coping was maintained ( $\beta = 0.141$ ;  $t = 3.29$ ;  $p = 0.001$ ). Thus, in women aged 35–64 years, avoidant coping exerts a total



**Fig. 3** Mediation analysis for problematic alcohol consumption during lockdown in women aged 35–64 years. Note: ABEF, alcohol consumption before lockdown; AAVO, avoidant coping; DEP, depression (\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ )

**Table 6** Comparison between women aged 35–64 years of alcohol consumption and coping based on the presence of clinical depression (PHQ)

	Depression		No depression		<i>t</i>	<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
ABEF	2.95	1.88	2.72	1.55	-1.07	.283	.133
ADUR	2.87	2.11	2.59	1.74	-1.18	.240	.145
AACT	20.68	3.73	21.40	3.30	2.29	.022	.204*
AAVO	14.83	3.63	12.25	2.74	-7.80	.001	.802***

Depression: 15.23%; no depression: 84.77%; *M* mean, *SD* standard deviation, *ABEF* alcohol consumption before lockdown, *ADUR* alcohol consumption during lockdown, *AACT* active coping, *AAVO* avoidant coping, *DEP* depression

\* small effect size; \*\*moderate effect size; \*\*\*large effect size

mediation effect in the relationship between depression and alcohol consumption in the pre-pandemic period (Fig. 2).

The second mediational analysis with women aged 35–64 years considered alcohol consumption during lockdown as a criterion variable, depressive symptoms as a predictor variable, and avoidant coping as a mediating variable. In this case, it was observed that, despite the fact that depressive symptoms ( $\beta = 0.099$ ;  $t = 2.50$ ;  $p = 0.009$ ) and avoidant coping ( $\beta = 0.090$ ;  $t = 1.96$ ;  $p = 0.050$ ) were good independent predictors, the inclusion of both in the mediation model implied the dissolution of the predictive capacity of depression ( $\beta = 0.075$ ;  $t = 1.73$ ;  $p = 0.084$ ) and avoidant coping ( $\beta = 0.061$ ;  $t = 1.41$ ;  $p = .161$ ). Thus, in this case, no mediation effect was determined (Fig. 3).

Finally, a comparative analysis of the sample of women aged 35–64 years was carried out, discriminating based on the presence/absence of clinically relevant depressive symptoms ( $PHQ > 9$ ), and considering the AUDIT-C score and coping to be dependent variables. Table 6 shows that women between 35 and 64 years of age with depression make significantly less use of active coping strategies ( $M = 20.68$ ;  $SD = 3.73$ ) compared to women in this age range without depression ( $M = 21.40$ ;  $SD = 3.30$ ) ( $t_{(905)} = 2.29$ ;  $p = 0.022$ ), with

moderate effect sizes ( $d=0.204$ ). On the contrary, women with depression have a significantly higher use of avoidant strategies ( $M=14.83$ ;  $SD=3.63$ ) than those without depression ( $M=12.25$ ;  $SD=2.74$ ) ( $t_{(905)}=-7.80$ ;  $p<0.001$ ), with large effect sizes ( $d=0.802$ ). However, despite the fact that the AUDIT-C score is slightly higher among those who report depressive symptoms both before lockdown ( $t_{(451)}=-1.07$ ;  $p=0.283$ ) and during the same ( $t_{(451)}=-1.18$ ;  $p=0.240$ ), statistical significance was not reached in any case.

## Discussion

The objective of this study was to establish the relationship between problematic alcohol consumption and depressive symptomatology in women. The predictive relationship was analyzed in both directions, also considering the avoidant coping style as a mediating variable. Given the scarcity of studies carried out in this line, specifically in the female population, and considering age a determining variable, the novelty of the findings presented should be highlighted. Additionally, the circumstantiality of having been developed during the period of COVID-19 lockdown offers equally relevant findings, extrapolated to similar pandemic contexts. However, they also make it possible to encourage a deep reflection on how they transfer to the planning of preventive actions in non-pandemic periods.

Regarding depressive symptomatology in women in general terms, its presence decreased as age increased. The data indicate a greater presence in the 18–24 age group compared to the rest aged 30 to 64 years, being double when compared to the 55–64 age group. A greater presence of depressive symptomatology was also observed in the 25–29 and 30–34 age groups with regard to groups of older women. These findings are in line with those of other studies (Huang & Zhao, 2020b; Ozamiz-Etxebarria et al., 2020) that report a higher prevalence of depressive symptoms in people under 35 years of age. By itself, the phenomenon suggests the need to reflect on what may be the reasons why younger women have more depressive symptoms than older women, and whether there could be social dynamics that favor it.

Regarding alcohol consumption, the youngest women (18–24 years old) were the ones with the highest mean scores for the AUDIT-C before the pandemic. However, during lockdown, statistically significant reductions in the AUDIT-C score were observed for women aged 18–24 years, with a decrease of more than half, 1.6 times lower for those aged 25–29 years, and 1.3 times lower for the 30–34 age group. However, older women, aged 35 to 64 years, presented similar AUDIT-C scores before and during lockdown. This finding is consistent with previous published data from this same study (Villanueva et al., 2021; Villanueva-Blasco et al., 2021a, b) and others (Bonar et al., 2021; Callinan & MacLean, 2020; Jackson et al., 2021), highlighting the effect that the lockdown measures had on the alcohol consumption of the younger population. This fact could be explained by the closure of the spaces in which young people used to regularly drink alcohol (clubs, festivals, and *pubs*) (Chodkiewicz et al., 2020). Thus, one of the especially noteworthy findings of this study is that, in relation to the changes observed in the pattern of alcohol consumption in women before and during the lockdown period, two clearly differentiated age groups are observed, i.e., 18–34 years and 35–64 years, with significant decreases in the former and maintenance of consumption in the latter. This fact is decisive in the interpretation of the findings of the relationship between depressive symptomatology and alcohol consumption.

In the mediational analysis with women aged 18–34 years, depressive symptomatology ( $\beta=0.121$ ;  $t=3.65$ ;  $p=0.003$ ) and avoidant coping ( $\beta=0.097$ ;  $t=2.45$ ;  $p=0.014$ ) predict independently higher scores on the AUDIT-C in the period prior to the pandemic, and therefore a greater probability of problematic alcohol consumption in that period. However, when considering avoidant coping as a mediating variable, the predictive effect of this variable disappears, while it is maintained for depressive symptomatology ( $\beta=0.098$ ;  $t=2.71$ ;  $p=0.007$ ). In other words, in women aged 18–34 years who showed greater depressive symptoms during lockdown, alcohol consumption in the pre-pandemic period was higher. In line with other studies (Grant et al., 2015; Martins & Gorelick, 2011; Murphy et al., 2013; Palzes et al., 2020), the presence of greater depressive symptomatology would be the predictor of problematic consumption of previous alcohol, pointing out that its improper use or abuse among those suffering from depression is higher than that among the non-clinical population. However, this fact cannot be confirmed with data related to the relationship between both variables in the period during lockdown, given that no significant correlation was found between them. It is hypothesized that the lack of significance could be explained by the significant decreases in alcohol consumption in young women aged 18–34 years, for the reasons previously indicated regarding the lockdown measures. Likewise, the fact that avoidant coping lost its predictive capacity in the mediational analysis when considered a mediating variable may be due to the fact that the use of avoidant strategies predominates in women aged 18–34 years.

In the mediation analysis with women aged 35–64 years, depressive symptomatology ( $\beta=0.106$ ;  $t=2.67$ ;  $p=0.008$ ) and avoidant coping ( $\beta=0.160$ ;  $t=3.45$ ;  $p=0.001$ ) were good independent predictors of higher scores on the AUDIT-C before lockdown, and therefore of alcohol consumption in that period. However, when depressive symptomatology was considered a predictive variable and avoidant coping as a mediator, the predictive capacity of depressive symptomatology vanished, while that of avoidant coping was maintained ( $\beta=0.141$ ;  $t=3.29$ ;  $p=0.001$ ). Thus, avoidant coping exerts a total mediation effect in the relationship between depression and alcohol consumption in the pre-pandemic period. This finding in women aged 35–64 years differs from that found for the same period of alcohol consumption in women aged 18–34 years, in which depression was the variable that maintained its predictive value and avoidant coping the one who lost it in the mediational model. However, this fact can be explained by the fact that women aged 35–64 years make more use of active coping strategies than women 18–34 years of age.

In the second mediational analysis with women aged 35–64 years, the AUDIT-C score during lockdown was considered a criterion variable. In this case, depressive symptomatology ( $\beta=0.099$ ;  $t=2.50$ ;  $p=0.009$ ) and avoidant coping ( $\beta=0.090$ ;  $t=1.96$ ;  $p=0.050$ ) were good independent predictors. But, in the mediation model, both lost their predictive capacity. To explain this finding, we analyzed whether the scores on the AUDIT-C in the pre-pandemic period and during lockdown were significantly different between women aged 35–64 years with clinical depression and those without clinical depression, and no differences were found. However, there were significant differences in the use of avoidant strategies, being higher in women with depression. This finding is in line with what was observed in this age group for alcohol consumption in the pre-pandemic period.

The findings discovered in relation to the subgroup of women aged 34–65 years suggest that problematic alcohol consumption would not be explained, in general terms, as a maladaptive strategy to cope with the negative affect associated with depression (McHugh et al., 2018) nor as a response to the stress associated with the COVID-19 pandemic and

lockdown measures (Rodríguez et al., 2020), given that alcohol consumption remained similar to the pre-pandemic period. The key lies in the avoidant coping style.

Among the limitations of this study, we can point out that, despite the fact that the sample is large, a convenience sample was used, without random selection or stratification, where 85% of the participants have higher education, so it is not possible to generalize the obtained results. The coping scale used, despite the fact that it has adequate psychometric properties in the adult population, has not been validated in this population, so it would be interesting to replicate this study with another coping scale to perform a convergent validation. Likewise, conducting the study during the period of lockdown due to COVID-19 has provided interesting findings, but also leaves important questions. The fact that the lockdown measures have especially affected alcohol consumption in young people under 35 years of age has made it difficult to analyze the relationship between the study variables during that period and to determine their stability.

## Conclusions

The findings discovered in the present study have important implications in the treatment processes of both problems.

For the pre-pandemic period, depressive symptomatology and avoidant coping are good independent predictors of problematic alcohol use in women (AUDIT-C score), regardless of age. This predictive capacity is maintained for consumption in women aged 35–64 years during lockdown, which indicates the consistency of both variables as predictors of problematic alcohol consumption. That is, in the treatment of alcohol abuse, addressing sub-clinical depressive symptomatology or dual pathology should be considered when there is a clinical diagnosis of depression. In this regard, the combined treatment of alcohol abuse and depression may be more effective than their separate approach. In a meta-analysis carried out by Riper et al. (2014), the combined treatment of cognitive behavioral therapy and motivational interviewing was demonstrated to be effective in treating subclinical and clinical alcohol use disorders and major depressive disorders. Likewise, in this clinical approach to both problems, the present study highlights the importance of training the use of active coping strategies and reduction of avoidant strategies.

Similarly, in the mediational models developed in the present study, differences are observed in the predictive capacity of depressive symptomatology and avoidant coping according to age. For women aged 18–34 years, depressive symptomatology is the predictor variable of problematic alcohol consumption, but for women aged 35–64 years, it is the avoidant coping style, which is the predominant style in women of this age with depression. This finding raises interesting questions regarding efficacy studies of combined treatments for problematic alcohol use and depression, given that these may be age-dependent, showing greater efficacy at ages younger than 35 years. It also indicates that training in active coping strategies when treating depression and problematic alcohol use should be done at any age, but more intensely in women aged 35–64 years.

**Author Contribution** All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Víctor José Villanueva-Blasco, Joaquín Mateu-Mollá, and Verónica Villanueva-Silvestre. The first draft of the manuscript was written by Víctor José Villanueva Blasco and Andrea Vázquez-Martínez, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

**Funding** This study was financed by the Valencian International University (ref. PII2020\_05) and was approved by the Committee of Evaluation and Follow-up of Research with Human Beings (CEISH) from Valencian International University (protocol code CEID2020\_02).

## Declarations

**Ethics Approval** Approval was obtained from the ethics committee of University XX. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

**Informed Consent** All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

**Conflict of Interest** The authors declare no competing interests.

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