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Alcohol consumption change among individuals in COVID-19 lockdown as a result of lockdown consequences: the effect of stress, financial deterioration and reduction of working hours

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Abstract

Concerns have been raised in recent literature that the sudden life changes caused by COVID-19 lockdown could have triggered increased alcohol consumption among individuals. In December of 2019, the new SARS-CoV-2 virus was identified in Wuhan, China and spread across the world. Infections caused large numbers of fatalities and in order to prevent massive outbreaks as much as possible, a large amount of countries announced lockdowns. Considering the negative consequences of increased alcohol consumption, it is essential to predict which population groups are most at risk so that interventions and support can then be targeted towards these particular groups. This study aims to contribute to existing literature by answering the following research question: To what extent did alcohol consumption change among individuals in COVID-19 lockdown as a result of lockdown consequences?

The theoretical framework identified three consequences of lockdown that might positively influence alcohol consumption; stress, financial deterioration and working hour reduction, with gender moderating the effect of stress and working hour reduction. To test the hypotheses that stress, financial deterioration and working hour reduction lead to higher alcohol consumption during lockdown as compared to before, cross-sectional data from a large study of UK inhabitants, collected during the first weeks of lockdown, was investigated. The data was analyzed using multiple regression analyses with interactions for gender. The results showed positive effects of stress and financial deterioration on alcohol consumption change, as was hypothesized. No evidence was found that indicates working hour reduction affects alcohol consumption in this dataset. Evidence for a moderating role of gender in the effects of stress and working hour reduction was also not found. Furthermore, some control variables were found to positively influence alcohol consumption change. Overall, none of the effects was large enough on its own to result in alcohol consumption increase. The results therefore suggest that people who experienced multiple risk factors are most likely to have experienced alcohol consumption increase during lockdown as compared to before lockdown.

Keywords: alcohol consumption, COVID-19 lockdown, stress, finances, working hours, gender

Introduction

In December of 2019, a new coronavirus was identified in Wuhan, China. It did not take long for the SARS-CoV-2 virus to spread across the globe. Infections led to flu-like symptoms and caused fatalities in vulnerable groups such as elderly and people with underlying medical conditions (Centers for Disease Control and Prevention, 2020). The outbreak of the virus was declared a pandemic by the World Health Organization on March 11th 2020 (Mahase, 2020). During that month, in order to prevent massive outbreaks as much as possible, a large amount of countries announced lockdowns (ACAPS, 2020). People were urged to stay home as much as possible, and to only go out for absolute necessities such as grocery shopping. Schools and the majority of businesses were required to close in many countries. Recent literature has raised concerns that these sudden enormous life changes could have triggered increased alcohol consumption among individuals in COVID-19 lockdown (Rehm et al., 2020; Shigemura, Ursano, Morganstein, Kurosawa, & Benedek, 2020; Sun et al., 2020).

Not long after the initiation of the lockdowns, newspapers began reporting soared supermarket alcohol purchases in the United Kingdom as well as in the United States (Forster, 2021; Inman, 2020). This could have however been caused by stockpiling. Data from Alcohol Change UK (2020) do in fact suggest that some people consumed more alcohol during the lockdown than they did beforehand. Nevertheless, other people reported decreased alcohol consumptions. It is yet unclear what contributes to these directional differences in alcohol consumption change during the lockdown.

Increased alcohol consumption can result in all sorts of issues, the most obvious being deteriorated health and increased prevalence of alcohol use disorder (Ahmed et al., 2020). Furthermore, literature suggests alcohol use during lockdown is related to suicide, domestic violence and the prevalence of mental health issues (Choi, Hui, & Wan, 2020; Conejero et al., 2020; Gunnell et al., 2020; Holmes et al., 2020; Sacco et al., 2020). Alcohol Change UK's research (2020) found that 7% of respondents feel that alcohol increased tensions in their household. Among respondents with household members aged under 18, this percentage was 14%.

There is reason to believe alcohol consumption changed differently among individuals during the first lockdown in May 2020. Considering the negative consequences, it is essential to predict which population groups are most at risk of increased alcohol consumption. Interventions and support can then be targeted towards these particular groups. The

development of new viruses that will lead to a COVID-19-like pandemic in the future is not impossible, which makes the occurrence of new lockdowns plausible. Findings can therefore also contribute to precautionary measures for future lockdowns, which could include providing risk groups with alternative coping mechanisms. Other recent studies that have been carried out investigating alcohol consumption found that a substantial proportion of respondents reported changes in alcohol consumption during the lockdown as compared to before the pandemic, in different European countries as well as in the United States and Australia (Callinan et al., 2020; Chodkiewicz, Talarowska, Miniszewska, Nawrocka, & Bilinski, 2020; Manthey et al., 2020; Neill et al., 2020; Panagiotidis, Rantis, Holeva, Parlapani, & Diakogiannis, 2020; van der Bruggen et al., 2020). However, the overall direction of the reported changes in alcohol consumption varied, as well as the investigated predictors and measurements. This study aims to contribute to existing literature by answering the following research question: To what extent did alcohol consumption change among individuals in COVID-19 lockdown as a result of lockdown consequences?

Cross-sectional data from a large study of UK inhabitants which have been collected during the first weeks of lockdown will be utilized. This study will focus on three of the most prominent effects that the COVID-19 pandemic and lockdown have brought; increased stress, financial deteriorations and working hour reduction/job loss. Furthermore, this study distinguishes itself by investigating the possible moderating role of gender. Gender differences in alcohol consumption during lockdown have been investigated, but a possible moderating effect of gender on the main effects of stress and working hour reduction have not yet been examined. This is important because of the gender differences in negative consequences caused by alcohol consumption. Women suffer from serious negative consequences caused by alcohol consumption at lower doses and to a greater extent than men (Nolen-Hoeksema, 2004).

Theory

There are numerous plausible explanations as to why individuals' consumption of alcohol changed during a national lockdown.

Stress

Experiencing being in lockdown can cause stress, which may lead to increased alcohol consumption. Taking into consideration the tempo with which the coronavirus caused outbreaks and led to sudden restrictions, the first period of the lockdown was likely highly stressful for people. Studies that took place during the early stage of the COVID-19 pandemic in multiple countries around the world indeed found that individuals reported higher levels of overall distress (Brooks et al., 2020; Gaidhane et al., 2020; Jahanshahi, Dinani, Madavani, Li, & Zhang, 2020; Qiu et al., 2020). This stress was likely caused by the social isolation and routine changes that the lockdown situation brought, combined with the concernment about getting ill with COVID-19 (Fancourt, Bu, Mak, & Steptoe, 2020).

Alcohol has commonly been hypothesized to function as a coping mechanism against stress (Allan & Cooke, 1985; Cappell & Greeley, 1987; Krause, 1991). Alcohol is a substance that is well-known for its sedative effects on the nervous system of consumers (Pohorecky, 1977). The Tension Reduction Hypothesis, as posed by Conger (1956), states that these tranquillizing compounds cause alcohol to reduce tension and anxiety, which results in alcohol consumption being reinforced. While some studies have found evidence to support this hypothesis in the form of a positive association between stress and alcohol use, other studies found the opposite effect (Romelsjo, Lazarus, Kaplan, & Cohen, 1991; Temple et al., 1991).

Despite extensive research, the general relationship between stress and alcohol consumption remains ambiguous (Temple et al.*,* 1991; Pohorecky, 1991). Nevertheless, multiple recent studies have found overall increased alcohol consumptions reported by individuals that experienced stress related to the COVID-19 pandemic (Callinan et al., 2020; Chodkiewicz, Talarowska, Miniszewska, Nawrocka, & Bilinski, 2020; Kim et al., 2020; Koopmann, Georgiadou, Kiefer, & Hillemacher, 2020). This positive effect of stress on alcohol consumption during lockdown can be better understood in the light of other coping mechanisms that are used in order to deal with stress. Coping mechanisms for stress can be found in social support, religious practices, recreation and counseling/therapy (Holmes et al., 2020). During lockdown, social distancing and the closing of religious, recreational and therapeutic accommodations decreased the possibilities of coping with stress in these ways, which could have resulted in more people coping with stress by consuming alcohol.

The discussed findings result in the following hypothesis (H1): Experiencing stress leads to increased reported alcohol consumption among individuals in lockdown.

Gender as a moderator

The positive effect of stress on alcohol consumption might be greater for women compared to men. Different studies have investigated whether the direction of the effect of stress on alcohol consumption differs for certain socio-demographic factors. Of particular interest in these studies is the role of gender, because alcohol consumption has greater negative consequences for women compared to men (Nolen-Hoeksema, 2004). Assembled results indicate that men and women develop different stress-response patterns (Kajantie & Phillips, 2006). Overall, evidence shows that women are more likely to use alcohol to regulate and cope with stress than men (Peltier et al., 2019). Developing an Alcohol Use Disorder as a result of another stress-related psychological disorder is also more common for women than for men (Kessler,1997). This would imply that being female is a moderator that strengthens the positive effect of stress on alcohol consumption.

No recent studies taken place during the COVID-19 pandemic have investigated this moderating relationship. However, recent literature has found that women of all ages are more likely to experience increased levels of stress during the pandemic as compared to before (Etheridge & Spantig, 2020; Niedzwiedz et al., 2020; Stanton et al., 2020). This is presumably caused by gender inequality in changes caused by the pandemic. Women have experiences higher rates of job loss (Adams-Prassl, Boneva, Golin, & Rauh, 2020; Collins, Landivar, Ruppanner, & Scarborough, 2020; Landivar, Ruppanner, Scarborough, & Collins, 2020). Furthermore, being in lockdown resulted in increased risks of domestic violence and a disproportionately higher responsibility for women of domestic tasks, fulltime childcare and home schooling (Almeida, Shrestha, Stojanac, & Miller, 2020). Moreover, multiple studies have found that despite alcohol consumption increased for both men and women during lockdown, this increase was greatest for women (Garnett et al., 2021). Women are thus reported to experience the highest increase in both stress and alcohol use during lockdown as compared to men. This might support the moderating role of being female on the effect of stress on alcohol consumption.

Therefore, the following effect is expected to be found (H1a): The positive effect of COVID-19 related stress on alcohol consumption is greater for females than for males.

Financial deterioration

Deterioration in financial resources may have led to increased alcohol use during lockdown. During the COVID-19 pandemic, a lot of people lost (part of) their income due to losing their job or reduction of working hours as a result of the socio-economic consequences

(Nicola et al., 2020). A deterioration in financial resources can lead to financial stress, which may influence alcohol use. Different studies have provided support for a positive relationship between financial stress and alcohol use, because alcohol is used as a way of coping with financial stress caused by financial deterioration (Moos, Fenn, Billings, & Moos, 1988; Pearlin & Radabaugh, 1976).

San José, van Oers, van de Mheen, Garretsen, and Mackenbach (2000) however found that stress related to financial difficulties was related to alcohol abstinence rather than increased alcohol consumption. A possible explanation for abstinence of alcohol as a result of financial stress, is that financial deterioration affects the availability of alcohol for individuals (Cunningham, Blomqvist, Koski-Jännes, & Cordingley, 2005). When there is less money to spend, individuals can cut back on alcohol in order to save money. This implies that a decrease in financial resources might influence alcohol consumption negatively.

Nevertheless, evidence from previous (economic) crises, like the 2007 economic crisis in Europe and the Unites States, found financial deterioration to lead to increased alcohol use (de Goeij et al., 2015). Recent studies taken place during the pandemic have found that a deterioration in financial resources led to increased alcohol use as well, in line with the findings from previous crises (Garnett et al., 2021; Oldham et al., 2021). It is likely that during the first weeks of lockdown, financial resources did not suddenly decrease so much that individuals were not able to buy alcohol anymore. However, financial deterioration did likely lead to financial stress which influenced alcohol consumption positively.

Based on these findings, it follows that (H2): Deteriorated financial resources lead to an increase in alcohol consumption among individuals in lockdown.

Reduced working hours

A decrease in working hours might have led to an increase in alcohol consumption. During the lockdown stage of the pandemic, many individuals experienced a reduction in working hours (von Gaudecker, Holler, Janys, Siflinger, & Zimpelmann, 2020). According to the International Labour Organization (2020), working hours decreased globally by 10.5% during the second quarter of 2020 as compared to pre-pandemic. During lockdown, people were encouraged to stay home with their household members, which made it difficult to spend time on things other than work and household tasks and possibly caring for family members such as children and elderly. It is likely that these constraints may have elicited boredom in individuals (Boylan, Seli, Scholer, & Danckert, 2021). Indeed, it appeared that there was a significant increase in Google searches related to boredom in Europe and the United States

during lockdown (Brodeur, Clark, Fleche, & Powdthavee, 2020; Lin & Westgate, in press). A recent French study found highly increased rates of boredom during lockdown (Droit-Volet et al., 2020).

Boredom during free time has been identified to significantly affect individuals' alcohol use (Caldwell & Smith, 1995; Sharp et al., 2011). Alcohol consumption is used as a coping mechanism in order to deal with boredom (Biolcati, Passini, & Mancini, 2016). People who experienced a reduction in working hours might therefore be at risk of increased alcohol consumption. Additionally, working less hours practically leaves more free time to drink alcohol, since the great majority of people do not drink while working. A recent study that investigated alcohol consumption changes, indeed found that furlough workers in the UK were more likely to report increased drinking during lockdown as compared to the average individual (Howlett, 2020).

Based on the discussed findings, is it expected that (H3): Reduced working hours lead to an increase in alcohol consumption among individuals in lockdown.

Gender as a moderator

There is reason to suspect that men and women experienced a different effect of working hour reduction on alcohol consumption. A recent study taken place in the Netherlands shows that although men's portion of time spend on domestic tasks increased, women still reported taking on a greater share of household tasks and taking care of children during lockdown (Yerkes et al., 2020). Because schools were (partly) closed and families spend much time together at home, it is likely that women experienced less boredom than men because of the unequal division of household and caring responsibilities. Results from a large cross-national study that included 63,336 respondents from 116 countries indeed showed that boredom was higher among men than among women (Westgate, Buttrick, Lin, & El Helou, 2021). This is especially remarkable knowing that mostly women experienced a reduction in working hours (Queisser, Adema, & Clarke, 2020; Yerkes et al., 2020).

Based on these findings, the following gender effect is expected (H3a): The positive effect of reduced working hours on alcohol consumption among individuals in lockdown is greater for males than for females.

All expected effects are visualized in Figure 1.

Figure 1

The hypothesized effects of stress, financial deterioration and working hour reduction on alcohol consumption, with the moderating role of gender on the effect of stress and working hour reduction.
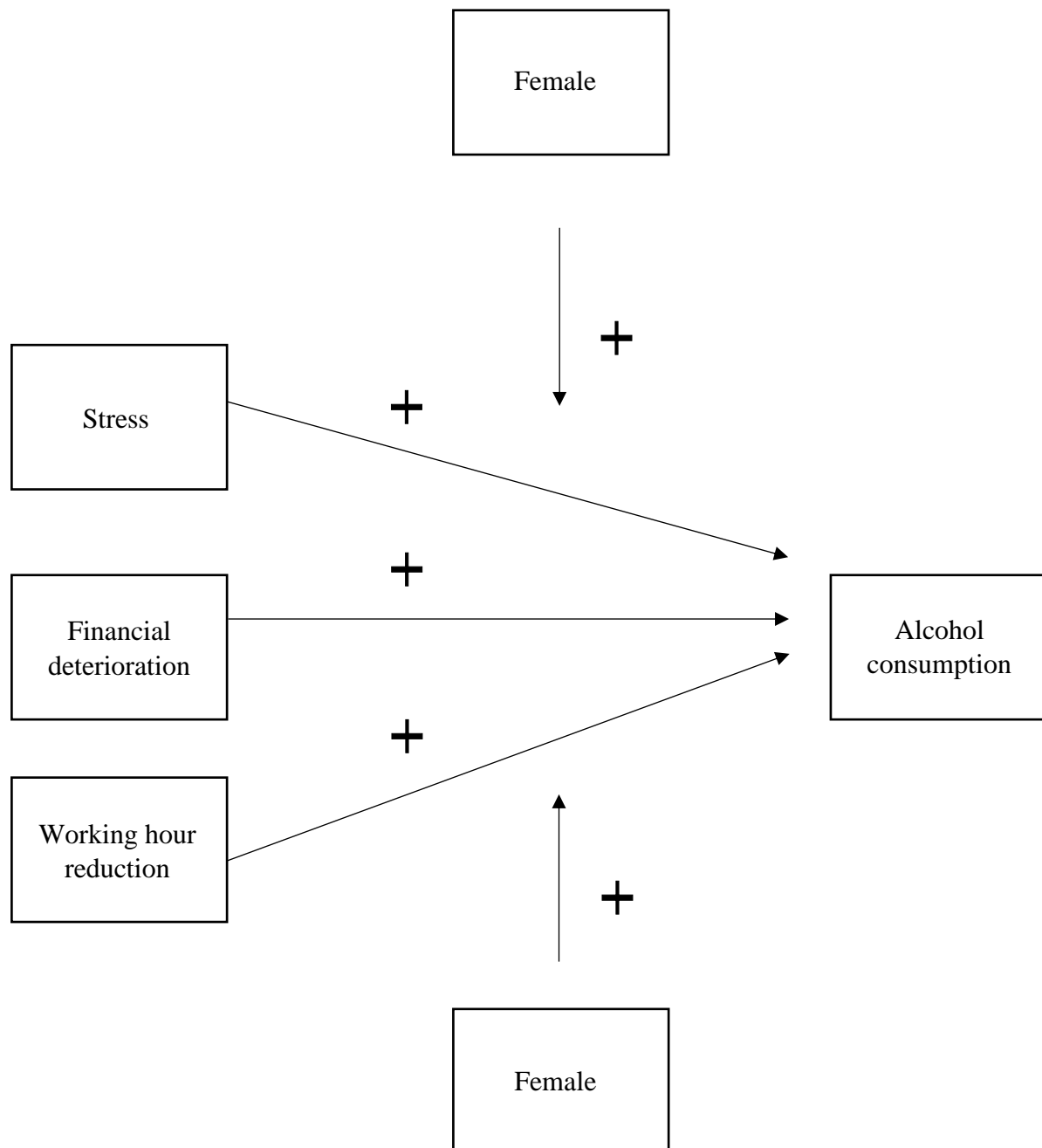
Methods

　　To answer the research question, the COVID-19 Survey by University College London (UCL) and the Centre for Longitudinal Studies (CLS) was utilized (University College London, UCL Institute of Education, & Centre for Longitudinal Studies, 2020). This survey was taken out in the United Kingdom at the very beginning of the COVID-19 pandemic, with the goal to gain insight in the social, economic and health impacts caused by it (Brown et al., 2020). The first wave of the survey was used, since it was carried out in May of 2020 at the height of the pandemic and restrictions. The respondents are members of the four national longitudinal cohort studies that UCL manages. These are all wide-ranging studies that have received ethical approval from the National Research Ethics Service and are nationally representative for the United Kingdom. UCL's four studies separately consist of people born in 1958 (NCDS), 1970 (BCS70), 1989-1990 (Next Steps) and 2000-2001 (MCS). Additionally, the parents of the participants of the Millennium Cohort Study (cohort 2000-2001) are able to participate in surveys. This applied to the COVID-19 survey as well. Because of these various cohort studies, the participants in the COVID-19 survey are currently aged between 19 and 64. The survey contains questions about respondents' social, occupational and daily life in their current situation during lockdown, as well as a month before lockdown. Because at the time of lockdown, CLS was not able to send large postal mailings, the survey invitations were sent by email, meaning only people with an email address were able to participate (Brown et al., 2020). Reminders were also sent via email. The survey was administered online in a total of 16777 participants for Wave 1, with an overall response rate of 35.7%. Because the hypothesized effect of reduced working hours only applies to people who were employed before and/or during lockdown, only those respondents were included in the analyses. This selection left out 9329 respondents, mainly from the younger cohort of 2000-2001 (2436), leaving a total of 7448 respondents. For this reason, the findings of this study can only be generalized to (previously) employed people. In this study, listwise deletion was applied, meaning that only respondents with valid answers to all used variables are used in the analyses. This left 7038 participants, meaning listwise deletion caused another 410 respondents to fall out due to invalid answers to the questions on alcohol consumption or stress.

Operationalization

Alcohol consumption change

Firstly, the variable that measures change in alcohol consumption was computed. Previous and current alcohol use was questioned through two questions concerning the respondents alcohol use. The first question was posed as; 'In the month before the coronavirus outbreak, how often did you have a drink containing alcohol?'. Answer options were: '4 or more times a week', '2-3 times a week', '2-4 times per month', 'Monthly or less' and 'Never'. The quantity of alcohol beverages consumed when drinking was asked with; 'In the month before the coronavirus outbreak, how many standard alcoholic drinks have you had on a typical day when you were drinking?' to which respondents could answer with 1-2, 3-4, 5-6, 7-9 or 10+. These two questions were then also asked about the time since the coronavirus outbreak. In order to be able to compare respondents' alcohol consumption, the amount of alcoholic beverages a respondent drank per month on average before and since the coronavirus lockdown was calculated. In this calculation, the amount of times a respondent drank per month (derived from the first question) was multiplied by the amount of drinks they typically consumed when drinking. To finally compute the variable change in alcohol consumption, the average amount of alcoholic drinks per month before the coronavirus was subtracted from the average amount of drinks since the lockdown. This variable can therefore take large negative as well as large positive values, which respectively indicate large decreases and increases in alcohol consumption.

Stress

Experienced stress was measured using a mean scale that consists of four questions regarding symptoms of anxiety and depression. Research has shown that experiencing symptoms of anxiety and depression is associated with increased psychological stress (Crawford & Henry, 2003; Heinen, Bullinger, & Kocalevent, 2017). In addition, anxiety, depression and stress have been found to be strongly correlated (Lovibond & Lovibond, 1995). The first two items, concerning feeling nervous and anxious, and worrying, are the first two questions (GAD-2) of the Generalized Anxiety Disorder scale (GAD-7). These two items have been proved to be useful as a brief screening tool for anxiety (disorders) (Plummer, Manea, Trepel, & McMillan, 2016). The other two questions, concerning anhedonia (decreased interest in doing things that previously brought pleasure) and feeling depressed, are two items from the Patient Health Questionnaire (PHQ-2) that have been proven valid for screening depression (Kroenke, Spitzer & Williams, 2003). The four items combined were

found to be a valid tool for detecting anxiety and depression symptoms (Kroenke, Spitzer, Williams, & Löwe, 2009; Löwe et al., 2010). All four items were combined into one question in the COVID-19 Survey, and were questioned with; 'Over the last 2 weeks, how often have you been bothered by the following problems?'. Answers could be given on a 4-point scale, ranging from 'Not at all' to 'Nearly every day'. For this study, the four items were combined into one mean stress scale with a good Cronbach's alpha value of .873. Only participants who answered all 4 items individually have a valid score on the stress scale. This resulted in 7196 respondents having a valid value for the stress scale, and 249 respondents dropping out.

Financial deterioration

Change in financial resources was measured based on a question that asked how respondents feel their financial situation in lockdown compared to that of before the outbreak. Answers were given on a 5-point scale ranging from 'I'm much worse off' to 'I'm much better off'. Based on this answer, a dummy variable was constructed that indicates whether a respondent experienced a deterioration in financial situation or not.

Reduced working hours

To determine change in working hours, two separate questions about the amount of hours a week that respondents worked before and since the coronavirus outbreak were used. By subtracting the amount of working hours before the coronavirus outbreak from the amount of working hours that respondents reported since the outbreak, the change in working hours was calculated. The variable for working hours was chosen to hold the amount of hours a respondent worked less during lockdown as compared to before, since negative and positive effects could otherwise cancel each other out. This means that when respondents reported working the same amount of hours or more during lockdown as compared to before, they scored a value of 0 on this variable. Additionally, someone who reported working 30 hours prior to lockdown and 25 hours during, scored a value of 5 on this working hour reduction variable.

Control variables

Control variables that were added to the models are health deterioration, working from employer's premises, cohabiting with partner and cohort.

During lockdown, many people have been infected with SARS-CoV-2 and have experienced (heavy) symptoms as a result of which their health deteriorated. These individuals might have realized the importance of their health and adjusted their lifestyle

accordingly, lowering their alcohol intake. Nevertheless, a recent study in the UK with a relatively small sample size found that deteriorations in physical health were associated with increased alcohol use during lockdown (Oldham et al., 2021). Therefore, health deterioration, which was constructed as a dummy variable, was controlled for.

During lockdown, a lot of people moved from working at the premises of their employer to working from their own home. Working from employers' premises prevents respondents from drinking whenever they want, compared to working from home, which is likely to affect alcohol consumption change.

Cohabiting partners can affect each other's alcohol use by positively reinforcing alcohol consumption (Bartel et al., 2017). Therefore, cohabiting with a partner was included as a control variable.

Furthermore, alcohol use is known to differ in different age groups with a generally increasing alcohol consumption up to individuals' late 20's and a decrease in consumption during adulthood (Leigh & Stacy, 2004; O'Connell, 2003). Since the dataset does not include age as a variable, cohort was used as a control variable.

Assumptions and Analyses

First, the necessary assumptions were checked. In order to test whether multicollinearity existed between the independent variables, correlations between these variables were investigated. The correlations indicated that no noticeable significant correlations existed between the independent variables. The variable inflation factors (VIF) were examined as well, which were all found to be lower than 1.2, except for the control cohort variables who had higher VIF values but still remained below 8. Therefore, no evidence of multicollinearity was found that may have affected the results of the multiple regression analyses. To test the assumption of linearity, scatterplots of stress and alcohol consumption change and working hour reduction and alcohol consumption change were eyeballed. Stress and alcohol consumption change were found to have a positive linear relationship. However, for working hour reduction and alcohol consumption change no linear relationship was observed. The assumption of linearity therefore was met for stress, but was validated for working hour reduction. The variables were checked for outliers. For weekly working hours, 6 people reported they worked 24 hours a day (168 hours a week) prior to the lockdown, and 5 people reported doing so during. Although it is possible that these people work 24 hours a day, they were excluded from the analyses because of the influence of these values on the outcomes and the small amount of respondents it concerned.

To investigate the main effects (H1, H2 and H3) a multiple regression analysis (Field, 2017) was performed with alcohol consumption change as the dependent variable, and stress (H1), financial deterioration (H2) and working hour reduction (H3) as independent variables. In this first model (Model 1), the control variables health, working from employers' premises, cohabiting with a partner and cohort were included, as well as the moderator for gender, 'female'. In Model 2, two interaction variables were added to the existing model in order to test hypotheses H1a and H3a, one for the interaction between stress and gender, and one for the interaction between working hour reduction and gender.

Results

Descriptive statistics of all variables that were used in the analyses can be found in Table 1. Variables on alcohol use and working hours prior to and during lockdown were added, as well as the different statistics for men and women on stress and working hour reduction.

Table 1

Descriptive statistics for all variables used in the analyses and informative variables about alcohol use and working hours prior to and during lockdown.

	N	Min.	Max.	Mean	SD
Change in alcohol consumption (in beverages per month)	7038	-170	153.50	3.32	17.37
Alcohol cons. prior to lockdown	7038	0	170	20.19	24.36
Alcohol cons. during lockdown	7038	0	170	23.51	27.53
Stress scale	7038	1	4	1.42	.58
Male	7038	1	4	1.32	.52
Female	7038	1	4	1.50	.61
Financial deterioration[a]	7038	0	1	.22	-

Working hour reduction (in amount of hours per week)	7038	0	60	3.84	7.88
Male	7038	0	60	3.60	7.85
Female	7038	0	52	4.03	7.90
Working hours prior to lockdown	7038	0	105	37.38	11.88
Working hours during lockdown	7038	0	105	33.56	13.35
Female[a]	7038	0	1	.57	-
Health deterioration[a]	7038	0	1	.04	-
Work at employers'[a]	7038	0	1	.34	-
Cohabiting partner[a]	7038	0	1	.73	-
Cohort 2000-2001[a]	7038	0	1	.04	-
Cohort 1989-1990[a]	7038	0	1	.15	-
Cohort 1970[a]	7038	0	1	.36	-
Cohort 1958[a]	7038	0	1	.23	-
Parents of MCS cohort[a]	7038	0	1	.23	-
Valid N (listwise)	7038				

Note. [a] 0 = no, 1 = yes.

It is visible that change in alcohol consumption ranges from -170 to 153.50, meaning that at least one respondents reported drinking 170 drinks per month less in lockdown as compared to before, and at least one respondent reported drinking 153.50 alcoholic beverages more in lockdown. The average amount of alcoholic drinks respondents reported consuming per month prior to lockdown is approximately 20. This average amount increased with almost 3.5 drinks per month during lockdown, which means that overall, alcohol consumption increased slightly. However, the relatively large standard deviations of previous and current alcohol consumption and alcohol consumption change indicate a great amount of variation in alcohol consumption (change) among respondents. The mean stress scale score of 1.42 suggests that on average, respondents experienced little stress. The maximum value of working hour reduction being 60 indicates that at least one of the respondents experienced a reduction in working hours of 60 hours less during lockdown as compared to prior to the lockdown situation. The average amount of working hours prior to the lockdown (37.38) decreased by almost 4 hours during lockdown (33.56), however, the relatively large standard deviations indicate a lot of variation in (reduced) working hours as well. The mean of the dummy variable for health deterioration shows that only a very small percentage of

respondents experienced a deterioration in health (.04). Furthermore, it is visible that the amount of respondents in the 2000-2001 cohort is relatively small.

In order to test the main effects, hypothesis 1 through 3, a multiple regression analysis was performed. The results are shown in Table 2 (Model 1). The regression model appeared to be significant with a rather small explained variance of 2.4% (R^2 = .024; F(11, 7026) = 15.880; p < .001). The intercept of -8.734 (t = 6.654; p < .001) shows that men from cohort 2000-2001, who did not experience financial deterioration, working hour reduction and health deterioration, who worked from home and lived without a partner, approximately drank 9 alcoholic beverages less during lockdown as compared to before.

Hypothesis 1 expected to find that stress has a positive effect on alcohol consumption and thus leads to an increase. The results indicate that stress has a significantly positive effect on alcohol consumption change during lockdown (b = 2.502; t = 6.760; p < .001). For every point higher on the 4-point stress scale, alcohol consumption significantly increased with approximately 2.5 beverages per month. This is evidence in support of hypothesis 1.

Hypothesis 2 posed that deteriorated financial resources lead to an increase in alcohol consumption. As can be seen in Table 2 (Model 1), financial deterioration was found to significantly positively affect alcohol consumption change (b = 1.135; t = 2.236; p = .025). This means that people who experienced a deterioration in financial resources drank approximately 1 alcohol beverage per month more during lockdown as compared to prior to. This is evidence that supports hypothesis 2, however, the observed effect is rather small.

The third hypothesis expected to find a reduced amount of working hours to lead to an increase in alcohol consumption. Nevertheless, the results show that no significant effect of working hour reduction on alcohol consumption change was found (b = .002; t = .072; p = .942). With this results, no evidence that supports hypothesis 3 was found in the current dataset.

For the control variables in model 1, all cohorts showed to significantly affect alcohol consumption change which means that alcohol consumption changed differently for the different age groups as compared to respondents born in 2000-2001. All other cohorts significantly experienced higher alcohol consumption increase (b = 5.589; t = 4.559; p < .001; b = 7.239; t = 6.106; p < .001; b = 4.388; t = 3.639; p < .001; b = 7.364; t = 5.997; p < .001). Being female led to a small significant increase in alcohol consumption of almost one beverage per month (b = .926; t = 2.193 p = .028). Furthermore, cohabiting with a partner significantly increased alcohol consumption by nearly 2.5 drink a month (b = 2.449; t = 4.940; p < .001).

Although some significant effects of the main predictors and control variables were found, no effect on its own was big enough to turn over the intercept of -8.734 into a positive number. This means that risk factors can only lead to an increase in alcohol consumption in this model when combined. To illustrate this; for women belonging to the parents of MCS cohort, experiencing high levels of stress (4 on the stress scale), financial deterioration and cohabiting with a partner, alcohol consumption increased by almost 11 beverages per month during lockdown (-8.734 + .926 + 7.364 + (3*2.502) + 1.135 + 2.449).

The regression model was then expanded to test whether being female moderated the effect of stress and/or working hour reduction on alcohol consumption change as was proposed in hypotheses H1a and H3a. The interaction variables for stress and being female, and working hour reduction and being female were added in Model 2 (Table 2). The results show that the explained variance almost stayed the same with 2.5% and the model was significant (R^2 = .025; F(13, 7024) = 13.692; p < .001). It is clear that the addition of both interaction variables did result in changes in Beta coefficients for various predictors compared to Model 1. The coefficients for stress and financial deterioration slightly increased, while the effect of being female became unsignificant (b = 3.048; t = 5.032; p < .001; b = 1.171; t = 2.302; p < .001; b = 1.819; t = 1.610; p = .108). The interaction variable for being female and stress has no significant effect, meaning being female does not moderate the effect of stress on alcohol consumption (b = -.846; t = -1.137; p = .256). Based on these results, no evidence that supports hypothesis H1a is found. The interaction variable for being female and working hour reduction was also not found to have a significant effect on alcohol consumption change (b = .075; t = 1.430; p = .153). For this reason, no evidence in support of hypothesis H3a was found.

Table 2

Multiple regression analyses with change in alcoholic consumption as dependent variable and various independent variables

	Model 1: Main effects with control variables			Model 2: Main effects with control variables and interaction effects		
	B	SE	β	B	SE	β
Stress scale	2.502***	.370	.084	3.048***	.606	.102
Financial deterioration	1.135*	.508	.027	1.171*	.509	.028
Working hour reduction (in amount of hours per week)	.002	.027	,001	-.042	.040	-.029
Female	.926*	.422	.026	1.819	1.130	.052
Interaction stress and gender				-.846	.744	-.043
Interaction work. h. reduction and gender				.075	.053	.027
Health deterioration	.591	.997	.007	.609	.998	.007
Work at employers'	-.599	.439	-.016	-.616	.439	-.017
Cohabiting partner	2.449***	.496	.062	2.463***	.496	.063
Cohort 2000-2001 (ref.)						
Cohort 1989-1990	5.589***	1.226	.115	5.524***	1.226	.114
Cohort 1970	7.239***	1.186	.200	7.175***	1.186	.198
Cohort 1958	4.388***	1.206	.106	4.377***	1.206	.106
Parents of MCS cohort	7.364***	1.228	.177	7.283***	1.229	.175
Intercept	-8.734***	1.313		-9.262***	1.453	
F	15.880***			13.692***		
Explained variance R²	.024			.025		
N	7038			7038		

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

Discussion and conclusion

Findings

This study set out to identify the effect of the COVID-19 pandemic and lockdown on people's alcohol consumption. There is reason to believe alcohol consumption increased for some people during lockdown as compared to before the COVID-19 outbreak. Identifying risk factors for an increase in alcohol consumption can help predict which subgroups are most at risk of the negative consequences that increased alcohol consumption can lead to. The effects of stress, financial deterioration and working hour reduction were investigated, and gender was added as a moderator for the effect of stress and working hour reduction. Multiple control variables were added, including cohabiting with a partner and different cohorts.

In line with the hypothesis and recent research that took place during the COVID-19 pandemic, stress was found to lead to increased alcohol consumption during lockdown as compared to before (Callinan et al., 2020; Chodkiewicz, Talarowska, Miniszewska, Nawrocka, & Bilinski, 2020; Kim et al., 2020; Koopmann, Georgiadou, Kiefer, & Hillemacher, 2020). A higher score of 1 point on the 4-point stress scale leads to an increase of approximately 2.5 alcoholic beverages per month. Comparing two individuals of which one has the lowest score on the stress scale (1) while the other scores highest (4), this would imply a difference of 7.5 alcoholic beverages per month caused by stress.

Although some literature proposed that the effect of stress on alcohol consumption would be amplified by being female, no evidence for this moderating effect was found. However, being female increased alcohol consumption on itself with almost 1 beverage per month, and the descriptive statistics showed that the mean score on the stress scale was slightly higher for women. Therefore, although no moderating effect was found, there is some evidence that indicates women experienced higher increased alcohol consumption during lockdown, and slightly higher stress levels which also lead to increased alcohol consumption. This is in line with previous findings in studies taken place during lockdown (Etheridge & Spantig, 2020; Garnett et a 2021; Niedzwiedz et al., 2020; Stanton et al., 2020).

The results showed that a deterioration in financial resources has a positive effect on individuals' alcohol consumption during lockdown of approximately 1 drink per month. Existing literature was ambiguous on the particular effect of this independent variable on alcohol consumption change. While some studies found negative associations, the current study found a positive relationship between financial deterioration and alcohol consumption change. This finding is in line with recent other studies taken out during lockdown, and earlier

research that was taken out during previous global crises (de Goeij et al., 2015; Garnett et al., 2021; Oldham et al., 2021). The positive effect of financial deterioration on alcohol consumption is likely mediated by financial stress, but this variable was not included in the dataset. Future research is needed to investigate whether financial stress mediates the positive effect of financial deterioration that has been found.

Furthermore, no effect of working hour reduction on alcohol consumption change was found, although this effect was expected. This might indicate that individuals who worked less and had more free time still did not experience boredom, however, it is more likely that people used other coping strategies in order to deal with boredom instead of increasing their alcohol consumption. Moreover, it is possible that being at home with family members decreased the possibility of consuming alcohol. Social control practiced by family members could have prevented individuals from drinking in their free time, however, a contrary significantly positive effect was found when controlling for cohabiting with a partner. Future studies are needed to determine whether the effect of working hour reduction on alcohol consumption could only be present for certain groups of individuals, since an overall effect was not observed in the current study, despite expectations.

The effects were controlled for the different cohorts, which proved to strongly influence alcohol consumption changes. Compared to the 2000-2001 cohort, all other cohorts reported drinking 4 to 7 beverages more per month during lockdown as compared to before. A possible explanation as to why these effects were found, lies in the different drinking behavior among these age groups. During lockdown, face to face social interactions were limited and pubs and bars were closed. Drinking at places like pubs and bars is common among young people, especially in the United Kingdom (Ally, Lovatt, Meier, Brennan, & Holmes, 2016). Because exposure to these environments reduced as a result of lockdown restrictions, the 2000-2001 cohort likely lowered their alcohol consumption. Future research should further investigate the effect of age and cohabiting on alcohol consumption change.

Overall, these findings imply that in order to effectively target people at risk of developing negative consequences caused by alcohol (ab)use, support must mainly focus on people experiencing high levels of stress and/or financial deterioration. However, a negative alcohol consumption change was found for respondents without any of the independent variable characteristics, and no effect on its own was big enough to turn over the alcohol consumption change into an increase. This means that risk factors combined, result in the highest likelihood of increased alcohol consumption during lockdown. The combination of experiencing high levels of stress, financial deterioration, being female, cohabiting with a

partner and being born around 1970 portrays the most at risk group of increased alcohol consumption of approximately 11 drinks per month on average.

Strengths and limitations

The limitations of this study must be considered. Alcohol consumption prior to the lockdown was not measured until during the lockdown, which could have resulted in recall bias. The reliance on self-reported information can contribute to this as well. Multiple studies have proven that individuals underestimate their own alcohol consumption because of a lack of memory of previous drinking sessions and/or desirability bias (Northcote & Livingston, 2011). Additionally, the answer options for the amount of drinking days were limited to '4 or more times per week' which was interpreted as 4 times a week for practical reasons. The maximum amount of alcoholic beverages per drinking episode that individuals could answer with was 10. Because of these self-reporting biases and answer option limitations, it is possible that the findings of this research underestimate alcohol consumption in a real population. However, the average amount of drinks consumed per month being approximately 20 (prior to lockdown) and 23.5 (during lockdown) do not immediately indicate underestimations.

Another limitation lies in the generalizability of the findings. Because variables about working hours and location were included, the analyzed sample of respondents only consists of respondents who had a job prior to and/or during lockdown. Because of this, out of the youngest cohort of people born in 2000-2001 only a very small group was included in the final analyses. Additionally, members of the oldest cohort that was included in the dataset are 64 years of age. The findings can therefore only be generalized to people aged 64 or younger who have had a job prior to and/or during lockdown, but caution is recommended when generalizing to people born in 2000-2001 because of the small sample size.

Nonetheless, this study contains multiple strengths. The overall sample size was large, and the different cohorts of respondents were sampled so that they are representative for inhabitants of the United Kingdom. This study examined the effect of three of the most prominent effects that the COVID-19 pandemic and lockdown have brought; increased stress, financial deteriorations and working hour reduction/job loss, while controlling for multiple control variables. It contributes to the existing ambiguous direction of alcohol consumption change during lockdown that has been reported in literature. A possible moderating effect of

gender on the main effects of stress and working hour reduction had not yet been examined, which distinguishes this study from existing studies.

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