Changes in Alcohol use in the Netherlands before and during the COVID-19 pandemic:

exploring the Effects of Personality, Loneliness and Gender

Master Thesis

Milena Völler

S2116286

University of Twente

Faculty of Behavioural, Management & Social Sciences

Department of Positive Clinical Psychology & Technology

1st Supervisor: Dr. Jan Alexander de Vos

2nd Supervisor: Prof. Dr. G. J. Westerhof

Abstract

Background: The COVID-19 pandemic and the precautionary restrictions targeting the transmission of the virus resulted in a high psychological burden for the public and might have potentially affected health-related behaviour, including alcohol use. Some studies have identified personality traits (especially extraversion), loneliness, and gender as contributing factors to drinking patterns. This study examined changes in alcohol use before and during the pandemic and whether there was a difference between men and women, people with high, moderate, or low extraversion, and individuals who were lonely or not.

Methods: The sample of 3671 Dutch citizens from the LISS Panel's longitudinal quantitative study provided information about demographics and variations in alcohol use, extraversion and loneliness from 2018 to 2021. Mixed-design ANOVAs were conducted to investigate the effect of gender, extraversion, and loneliness on alcohol use over time. A multiple linear regression analysis was performed to detect whether loneliness and gender act as confounding variables between extraversion and alcohol use.

Results: Alcohol use showed to remain stable from 2018 to 2021. Extraversion and time, loneliness and time, and gender and time each had no significant interaction effect on alcohol use. Those scoring highly in extraversion drank more than those scoring moderately or low. Participants labelled as not lonely also consumed more alcohol than those categorized as lonely. Overall, men drank more than women. Gender and loneliness did not act as confounding variables in the relationship between extraversion and alcohol use.

Discussion: It seems that neither the COVID-19 pandemic nor differences in extraversion, loneliness, and gender had as high of an impact on alcohol consumption as expected. The results of other studies investigating the same topic may have been different due to different questionnaires, data collection methods or characteristics of the samples. Since extroverts enjoy social interactions, and drinking is correlated with social acceptance and sociability, those with a high extraversion score appeared to drink more. As alcohol cultivates social bonds, and people drink because they experience positive emotions, it would explain why people who were not lonely drank more. Lastly, gender differences might exist due to physiological differences, gender roles and different risk perceptions.

Key words: COVID-19, pandemic, alcohol use, personality, extraversion, loneliness, gender

Table of Contents

Table of Tables and Figures

Changes in Alcohol use in the Netherlands before and during the COVID-19 pandemic: exploring the Effects of Personality, Loneliness and Gender

In December 2019, the first outbreak of the novel coronavirus called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) was registered in Wuhan, China and has since rapidly spread around the world (Neill et al., 2020). It is responsible for coronavirus disease 2019 (COVID-19), a highly contagious and infectious disease characterised by symptoms such as fever, cough, tiredness, and difficulty in breathing (Chodkiewicz et al., 2020). As time passed, transmission rates rose and the World Health Organization declared the COVID-19 outbreak a pandemic by March 11th, 2020 (Aschwanden et al., 2021). The virus's outbreak has created a serious public health threat due to large numbers of infections and high mortality rates worldwide (Aschwanden et al., 2021). As of March 22nd, 2022, 469.212.706 infections and 6.077.252 deaths have been registered, with numbers still growing (World Health Organization, n.d.). Hence, several countries reacted by imposing precautionary restriction measures to reduce transmission and slow the spread of SARS-CoV-2 (Gubler et al., 2021). Citizens were instructed to engage in social distancing, lockdowns were imposed, and stores, universities, schools, restaurants, etcetera were closed, resulting in people being isolated for long periods (Singh & Singh, 2020, Clay & Parker, 2020). These physical distancing interventions led to drastic modifications of lifestyle behaviours accompanied by increased psychological distress, uncertainty, concern about the situation and isolation (Arora & Grey, 2020). In turn, this may result in adverse changes in health behaviours, such as sleep problems, worsened eating habits, and misuse of drugs, tobacco, and alcohol (Cancello et al., 2020). Alcohol consumption, in particular, may have been subject to rapid changes, as it is the most commonly consumed psychoactive drug, which also enables temporary relief from unpleasant emotions and tends to increase during times of crisis (Niedzwiedz et al., 2021; Guo et al., 2001). This study aims to investigate if there are changes in alcohol consumption before and during the pandemic using longitudinal data from the

Netherlands. Further, it will also be examined whether the personality trait extraversion, gender and loneliness can be accounted for possible changes in drinking patterns since the COVID-19 pandemic started, as these have already been considered factors associated with health behaviours in pre-pandemic studies.

The Netherlands experienced the COVID-19 outbreak at about the same time as other European countries, starting with the first wave in mid-March 2020 and shortly after imposing restrictions to dim the spread of the virus (Engström et al., 2021; Wallenburg et al., 2022). Many COVID-19 patients required hospitalised care, and death cases became more frequent (Wallenburg et al., 2022). To "flatten the curve" of COVID-19 cases, which primarily means to slow the virus' spread, an "intelligent COVID-19 lockdown" was implemented (Yerkes et al., 2020). This approach involved cancelling events, closing schools, universities, restaurants and bars, imposing self-quarantine, and internal travel restrictions (Engström et al., 2021; van Zyl, 2021). However, if citizens adhered to a distance of 1.5 metres, they could still meet others and move around (van Zyl, 2021). The Dutch approach has been considered milder than that of other European countries, as emphasis lay on the citizens' responsibility and sense of morality (Yerkes et al., 2020). Prime Minister Mark Rutte justified this decision by declaring that a total lockdown, as had been implemented by China or Italy, was "unrealistic" and also "not fitting the 'sober Dutch'" (Boin & Lodge, 2021, p. 1139). The Netherlands is regarded as more open and egalitarian and has a high reputation for institutional trust, which allowed the government to draw on softer measures and civic mindedness (Pattyn et al., 2021). Yet, measures became more strict in the third lockdown than during the first and second, due to new spikes of infections (e.g. a period of 4 months (January 23, 2021- April 28, 2021), an implementation of an evening curfew and closure of unessential shops and schools) (Ori et al., 2022; Government of the Netherlands, 2021; Deutsche Welle, 2021).

Substantially, those measures were intended to protect citizens' health, but along with the pandemic, they started and continue to cause, extensive psychological pressure and other

health-related problems for a considerable number of people (Li et al., 2020). Citizens were forced to adapt to an unknown situation and deal with concerns regarding finances, health, abrupt changes in their social life, unpleasant emotions, and uncertainty (Gubler et al. 2021, Chodkiewicz et al., 2020). As a consequence, and evidenced by plenty of scientific studies, these measures have led to increased stress levels and a higher prevalence of anxiety, depression, stress, post-traumatic stress disorder and disturbed sleep (Vall-Roqué et al., 2021; Xiong et al., 2020; Salari et al., 2020; Alzueta et al., 2021). To quote Vall-Roqué et al. (2021), "although the COVID-19 crisis is, in the first instance, a physical health crisis, it has the seeds of a major mental health crisis as well" (p. 1).

Similar findings were found regarding mental health among the Dutch population. For instance, De Vroege and van den Broeks (2022) examined the mental well-being of Dutch healthcare professionals by means of a cross-sectional online survey and found that poor work-life balance, the imposed restrictions, and the pressure of caring for more infected patients contributed to an increase in stress, anxiety, and depression. Another study with a longitudinal design discovered higher rates of anxiety and depression during COVID-19 lockdowns, as well as increased suicidal ideation among young adults, but also a decrease in prevalence rates after restrictions were loosened (Ori et al., 2022). However, there are also some studies which claim that mental health issues did not increase in the Dutch population. In Van der Velden et al. 's (2021) longitudinal study, anxiety and depression rates declined slightly, but significantly during the outbreak compared to the pre-outbreak level. Other cross-sectional studies also reported improvements in participants' mental health following the first wave of the pandemic (e.g., Gijzen et al., 2020; Pan et al., 2021). A possible explanation could be that lockdown measures likely contributed to fluctuations in the mental health of Dutch citizens. While depression and anxiety rates remained stable or decreased during the first lockdown because Dutch citizens enjoyed more freedom than other European countries, prevalence rates significantly increased when measures became stricter and lockdowns were

prolonged (Van der Velden et al., 2021).

Overall, this long-lasting period of adversity and distress brought on by the pandemic had led to variable resonances among individuals (Volk et al., 2021). The term "coping response", which is used in this context, describes the individual style of dealing with an unpleasant or stressful event and concerns problem-solving, support seeking, evaluation of the situation, and avoidance (Volk et al., 2021; Carver & Connor-Smith, 2010; Folkman & Moskowitz, 2004). While some cope adaptively by taking preventative actions to minimise health risks as much as possible, others respond maladaptively by not adhering to the released measures, having elevated anxiety about COVID-19 or engaging in unhealthy lifestyle habits, for instance, increasing their alcohol consumption (Volk et al., 2021).

Alcohol is a common substance used to enable relief from negative emotions and cope with stress and there is scientific evidence stating that alcohol consumption tends to increase during highly stressful circumstances like economic crises and periods of disaster (Chodkiewicz et al., 2020; Callinan et al., 2021, Neill et al., 2020). Accordingly, Rehm et al. (2020) also suggest that the COVID-19 pandemic might have worsened alcohol consumption due to the emerging uncertainty, social isolation, financial issues and increase in psychological distress. Especially in this period of isolation, alcohol misuse, relapse or developing alcohol use disorder may follow (Clay & Parker, 2020). Additionally, alcohol use after crises does not necessarily return to normal levels but can remain elevated if not intervened (Neill et al., 2020). Alcohol misuse increases the likelihood of domestic incidents, negatively affects the immune system, aggravates psychological symptoms and contributes to about 3 million deaths globally each year, making it one of the most preventable causes of death (Clay & Parker, 2020; Bollen et al., 2021). Since the COVID-19 pandemic and restrictions represent a high psychological burden for the citizens, it should be considered that these might even exacerbate the issue of alcohol abuse.

A few studies already found alterations in alcohol consumption since the outbreak of

the pandemic, but the picture is mixed as to how drinking habits had changed in the population. Some studies suggest that the overall alcohol use may have dropped during the pandemic (Kilian et al., 2022; Sohi et al., 2022; Plata et al., 2022). This could be explained by the reduced availability of alcohol (e.g., closing of bars and restaurants) and limited drinking occasions due to limited social gatherings (Kilian et al., 2022; Sohi et al., 2022). On the other hand, a meta-study by Acuff et al. (2022), which examined 128 scientific studies about changes in alcohol use across 58 countries, revealed that the COVID-19 pandemic impacted drinking behaviour and either "interrupted decreasing population-level drinking trends in some countries and escalated increasing population-level drinking trends in others" (p. 12). Other cross-sectional studies also found that after stay-at-home orders were released, beverage sales and alcohol consumption increased across many states (Barbosa et al., 2021; Wessely et al., 2022).

As Chodkiewicz et al. (2020) investigated common factors of those who increased their alcohol consumption by means of a longitudinal study, they found poor mental health, suicidal thoughts, using alcohol for stress management, and increased alcohol intake pre-outbreak to be particularly important, which has also been observed in other studies (Kilian et al., 2022; Sohi et al., 2022; Schmits & Glowacz, 2022). There are also dozens of other common risk factors for alcohol misuse identified by literature (e.g., genetic predisposition, poor family management, early age of initiation, positive attitude towards drug use, certain psychological conditions and personality) (Juergens, 2021; Hawkins et al., 1997; Ray et al., 2006). Since the COVID-19 pandemic has the potential to exacerbate the risk of excessive alcohol consumption, it is also essential to identify possible factors for developing unhealthy drinking patterns to tailor education and intervention programs for those who are at risk (Neill et al. 2020).

According to research, personality traits appear to influence health-related behaviours (Aschwanden et al., 2021). Even though little evidence exists, it is also assumed that

personality traits may predict pandemic-related behaviour during the COVID-19 pandemic (Kekäläinen et al., 2021). Personality traits can be defined as "relatively stable patterns of thinking, feeling, and behaving and they have been shown to drive behaviour even in highly controlled situations" (Kekälinen et al., 2021, p. 2) The Five-Factor Model (FFM), a popular model explaining dimensions of personality, captures significant features of five fundamental traits: Agreeableness (e.g. the tendency to be appreciative, forgiving, generous, trusting), extraversion (e.g. the tendency to be active, outgoing, talkative, enthusiastic), neuroticism (e.g. the tendency to be anxious, tense, unstable, self-pitying), openness (e.g. the tendency to be curious, imaginative, insightful, original, artistic) and conscientiousness (e.g. the tendency to be efficient, organised, reliable, planful, responsible) (McCrae & John, 1992).

Extraversion is one personality trait Volk et al. (2021) indicate as being highly relevant for coping responses to COVID-19 and the imposed measures. For instance, Volk et al. (2021) suggest extroverts as more optimistic concerning upcoming challenges of the COVID-19 pandemic. Furthermore, extraversion has been considered a protective factor for people's well-being and against stress (Bellingtier et al., 2021). Individuals scoring higher in extraversion tend to be more socially engaged, enjoy social activities, and have a more extensive social network compared to introverts and consequently feel less lonely and experience less negative affect (Gubler et al., 2021). Besides, extraversion is linked to higher peer support and higher social status, but extroverts also experience more likeability, popularity and more positive affect compared to introverts (Buecker et al.,2020, Gubler et al., 2021).

However, current scientific findings do not yet provide any definite conclusions as to how extroverts have been affected by the COVID-19 restrictions. A cross-sectional study showed that people high in extraversion reported feeling less anxious, depressed and concerned, and also found a positive association between extraversion and adaptive coping (Gubler et al., 2021). One possibility might be that extroverts tend to get more social support

to rely on during a crisis (Gubler et al., 2021). Other findings suggest that extraversion was linked to reduced well-being and higher levels of loneliness (Entringer & Gosling et al., 2021; Alt et al., 2021). As citizens were restricted to staying at home and having as little physical contact as possible, this may feel more unnatural to extroverts as they have a strong urge to be socially engaged (Wijngaards et al., 2020; Entringer & Gosling et al., 2021). Wijngaards et al. (2020) also hypothesized that the stricter the measures, the more negative effect extroverts experience.

There is also uncertainty as to whether alcohol consumption by extraverted individuals has changed during the pandemic. Since Bellingtier et al. (2021) point out that extraversion acts as a protective factor, one hypothesis could be that people scoring higher in this trait might be less affected and did not increase their alcohol consumption, even though it would be a typical response. An alternative hypothesis could be that extroverts might be even more affected. It is important to note that extraversion has been regarded as a potential risk factor for alcohol use disorder (Fairbairn et al., 2015). Particularly individuals with high levels of extraversion tend to engage in problematic and heavy drinking as they experience greater mood-enhancing and stress dampening effects from alcohol consumption than introverts do (Fairbairn et al., 2015). On the other hand, it may also be that, as physical contact was restricted for safety reasons and social venues like bars or restaurants were inaccessible, "the stress and isolation experienced with the current pandemic could serve as a significant trigger for alcohol use" (Ramalho, 2020, p. 524).

In this context, loneliness appears to be particularly relevant. Loneliness can be described "as an enduring condition of emotional distress that arises when a person feels estranged from, misunderstood, or rejected by others and/or lacks appropriate social partners for desired activities, particularly activities that provide a sense of social integration and opportunities for emotional intimacy" (McWhirter, 1990, p. 418). Evidence showed that isolation may lead to issues like stronger feelings of loneliness and decreased well-being

(Flett & Heisel, 2021). Coming back to the COVID-19 situation, where people had to stay at home and avoid social contact as much as possible to prevent getting infected by COVID-19, there is also reason to believe that loneliness has increased among the population. Furthermore, several pre-pandemic studies linked loneliness to unhealthy behaviour, including alcohol use (Canham et al., 2016; Grigoropoulos & Daoultzis, 2022). Because of the drastic changes in social life and increased isolation people had to endure since the pandemic began, as well as the relationship other studies have found between loneliness and alcohol, it may also be that loneliness has contributed to changes in alcohol use (Horigian et al., 2021).

A further factor that might be of high relevance to alcohol use is gender. It is one important demographic factor connected to coping responses and shapes risks and experiences (Rana et al., 2021; Volk et al. 2021). Even though little research has focused on how demographic factors influence coping responses during the COVID-19 pandemic, gender could also pose a potential risk factor for engaging in maladaptive coping, including increased alcohol use (Volk et al., 2021). A frequent finding so far is that women of all ages consistently drink less alcohol and have fewer alcohol-related problems, whereas engaging in weekly excessive alcohol use and daily consumption is more prevalent among men (Nolen-Hoeksema, 2004; Schmits & Glowacz, 2022). However, there is already one study with opposite findings, namely that particularly women tended to exceed their alcohol consumption during the COVID-19 pandemic (Barbosa et al., 2021). According to literature, this may be because more women consume alcohol to cope with negative emotions, unlike men, who drink for social reasons (Thompson et al., 2021; Harrell & Karim, 2008). There is therefore a great deal of interest in determining whether drinking patterns changed differently for men and women during these challenging times. This provides insight into whether these gender differences still exist and whether one gender is more prone to developing unhealthy drinking habits during difficult times.

Against this background, the current study's first aim is to investigate whether alcohol use during the COVID-19 pandemic has changed compared to pre-pandemic levels. Right now, the picture is mixed as to how drinking habits have changed during the pandemic. Since increased alcohol use is a concern during crises, it has become essential to examine how the COVID-19 pandemic influenced alcohol consumption to reduce its impacts and developing interventions for future crises (Chodkiewicz et al., 2020). The second objective is to determine whether extraversion, loneliness, or gender can explain changes in alcohol consumption. Before COVID-19, extraversion, gender, and loneliness showed to be related to alcohol use. More specifically, individuals scoring higher on extraversion tended to engage in problematic drinking, as did those with higher levels of loneliness and males (Fairbairn et al., 2015; Canham et al., 2016; Nolen-Hoeksema, 2004). It is relevant to examine whether this tendency remains in times of the COVID-19 pandemic. This knowledge is beneficial as it allows understanding of the effects of these factors, but also which individuals are more likely to develop unhealthy drinking patterns during crises, predicting behaviour in future disease outbreaks, and providing help for public health services to give personality-tailored advice (Aschwanden et al., 2021). Lastly, it will be investigated whether loneliness and gender confound the results of possible changes in alcohol use among different extraversion scores, because, as already explained, these constructs have been linked to alcohol consumption and might therefore impact these results.

In this sense, the following research questions will be investigated:

RQ1: Are there changes in alcohol use before and during the COVID-19 pandemic?

RQ2: Are changes in alcohol use before and during the COVID-19 pandemic different between individuals with low, moderate, and high extraversion?

RQ3: Are changes in alcohol use before and during the COVID-19 pandemic different between individuals being lonely and not lonely?

RQ4: Are changes in alcohol use before and during the COVID-19 pandemic different between individuals of different genders?

RQ5: Does extraversion predict changes in alcohol use before and during the COVID-19 pandemic, with loneliness and gender as controlling factors?

Methods

Design

The current study utilised existing data from the Longitudinal Internet Studies for the Social Sciences (LISS), administered by Centerdata. The LISS panel is based on a true probability sample and offers data from over 5000 independent and private Dutch households, containing over 7500 individuals, who complete online questionnaires every month (Scherpenzeel, 2011). The sample of households was taken from the Dutch population register by "Statistics Netherlands" (Bol, 2020). For households without internet access, computers and internet connections were provided for them to complete the questionnaires. As a requirement, participants have to be aged 16 years or older, permanently residing in the Netherlands and given informed consent to participate in monthly surveys (Scherpenzeel, 2011). Each completed questionnaire is rewarded with a monetary payment (Scherpenzeel, 2011).

The LISS core study, a quantitative longitudinal study, offers repeated measurements on the same ten thematic modules each year to follow changes in people's lives (LISS Panel, n.d.). Participants are required to fill out a monthly questionnaire based on one of the thematic modules of the study. In each module, there are about 100 questions that take 15-30 minutes to complete, and they cover a variety of topics (e.g., income, personality, happiness, partnership) (Simons et al., 2017).

This study utilised data from the module "Personality" (Project 7), "Health" (Project 2) and "Social Integration and Leisure" (Project 4). For each module, data was retrieved from

two timepoints in 2018 and 2019 pre-COVID-19 (Personality: Wave 10 & 11; Health: Wave 11 & 12; Social Integration and Leisure: Wave 11 & 12) and in 2020 and 2021 during COVID-19 (Personality: Wave 12 & 13; Health: Wave 13 & 14; Social Integration and Leisure: Wave 13 & 14) to detect possible changes. Further, the Personality module is administered in May through July, the Health module in November through December, and the Social Integration and Leisure module in October through November.

Participants

Table 1 summarizes the demographics of those who answered the alcohol question in 2018 at baseline (Baseline), at all time points (Included), and who did not answer the alcohol question at all time points since 2018 (Excluded). 5457 participants answered the alcohol item in the beginning of the data collection. There was a drop-out rate of 758 participants in 2019, 551 participants in 2020 and 477 participants in 2021. In total, 3671 participants were counted, who filled out the alcohol item at all time points.

At the beginning of the data collection, the proportion of women was slightly higher than the proportion of men, with 54.1 % women and 45.9% men. The reported mean age of this sample was 52.20, with 16 years being the youngest registered age and the oldest participant being 101 years old. Most participants had a higher vocational education (N = 1358) and 519 out of 5476 participants did not have a monthly income. One point four percent did not start nor completed any education. The reported mean net income amounted to 1737.10 euros. Further, the percentage of married (52.2%) was higher than that of unmarried participants (30.8%). The majority of respondents did not have children (N = 3274; 60%).

Multiple chi-square tests of independence and independent sample t-tests revealed significant differences between the excluded and included participants for age, income, gender, highest level of education, domestic situation, civil status, and primary occupation (Table 1). The sample including those who answered the alcohol item at all timepoints showed less females, less people with a university degree and without any education, less

people with children and a lower income, but a higher mean age, more pensioners, and more married people.

Table 1

Sociodemographic information of participants

Characteristics	Baseline (N = 5457)	Included (N = 3671)	Excluded (N =1786)	Statistics	
	M (SD)	M(SD)	M(SD)	t	d
Age	52.20	54.73	47.01	15.02**	17.83
	(18.19)	(16.79)	(19.79)		
Income	1737.10	1687.13	1839.42	15.02*	4378.92
	(4379.08)	(1314.09)	(7410.69)		
	N (%)	N (%)	N (%)	χ^2	φ
Gender				(1)13.81**	0.05
Female	2962 (54.1)	1921 (52.3)	1030 (57.7)		
Male	2511 (45.9)	1750 (47.7)	756 (42.3)		
Highest level of education				(8)35.46**	0.08
Primary school	217 (4.0)	120 (3.2)	97 (5.4)		
Vmbo (intermediate secondary education)	1125 (20.6)	800 (21.8)	325 (18.2)		
Havo/Wvo (higher secondary education)	584 (10.7)	381 (10.4)	203 (11.4)		
Mbo (intermediate vocational education)	1290 (23.6)	872 (23.8)	418 (23.4)		
Hbo (higher vocational education)	1358 (24.9)	940 (25.6)	418 (23.4)		

Wo (university)	673 (12.3)	430 (11.7)	243 (13.6)		
Other	117 (2.1)	77 (2.1)	40 (2.2)		
Not (yet) completed any education	79 (14)	44 (1.2)	35 (2)		
Not yet started any education	14 (.3)	7 (.2)	7 (.4)		
Domestic situation				(2)96.05**	.13
Without child(ren)	3274 (60)	2318 (63.1)	956 (53.6)		
With child(ren)	2012 (36.9)	1242 (33.8)	770 (43)		
Other	171 (3.1)	111 (3)	42 (3.4)		
Civil status				(4)140.43**	.16
Married	2848 (52.2)	2088 (56.9)	760 (42.6)		
Seperated	22 (.4)	13 (.4)	9 (.5)		
Divorced	550 (10.1)	390 (10.6)	160 (9)		
Widow or widower	355 (6.5)	229 (6.2)	126 (7.1)		
Never been married	1682 (30.8)	951 (25.9)	731 (40.9)		
Primary occupation				(9)167.59**	.18
Paid employment	2349 (43)	1559 (42.5)	790 (44.3)		
Works in family business	44 (.8)	25 (.7)	19 (1.1)		
Self employed	250 (4.6)	154 (4.2)	96 (5.4)		
Job seeker following job loss	109 (2)	84 (2.3)	25 (1.4)		
Attending school or university	430 (7.9)	191 (5.2)	133 (13.3)		
Housekeeper	431 (7.9)	314 (8.6)	117 (6.6)		
Pensioner	1391 (25.5)	1042 (28.4)	349 (19.6)		
Partial work disability	233 (4.3)	164 (4.5)	69 (3.9)		
Voluntary worker	109 (2)	77 (2.1)	32 (1.8)		

Other	105 (2)	58 (1.5)	47 (2.6)

Note. N= number of respondents, % = percentage of respondents, * p <.05, ** p < .01.

Materials

Alcohol use

To examine people's alcohol use before and during COVID-19, Module 2 named "Health" was utilised. For this study, only one item was of interest for the analysis, namely how many alcoholic drinks were consumed over the course of the past year with 8 answer options (1 = almost every day; 2 = five or six days per week; 3 = three of four days per week; 4 = once or twice a week; 5 = once or twice a month; 6 = once every two months; 7 = once or twice a year; 8 = not at all over the last 12 months). For the analysis, the values and the corresponding labels were reverse coded (1 = not at all over the last 12 months; 2 = once or twice a year, etcetera). There was no information provided by LISS or other scientific papers regarding the psychometric properties of this item.

Extraversion

To calculate how participants scored on the personality trait "Extraversion", Module 7 named "Personality" was used from the LISS panel. In this questionnaire, items derived from the International Personality Item Pool (IPIP) assessed individuals' scores on different personality traits. The IPIP, an open-source website with about 250 different scales and over 3000 items, provides access to measures of individual differences, such as the Big Five personality traits (International Personality Item Pool, 2022). In total, ten items of the Big Five scale are used in the LISS panel for the trait extraversion. Responses to the questions were scored on a Five-Point Likert scale, with answer options ranging from very inaccurate (1) to very accurate (5) and five items being reverse coded. One example item reads as follows: "I am the life of the party". As indicated by the International Personality Item Pool (n. d.), the total score needs to be calculated in order to conduct further analysis. To detect whether there are differences between individuals who score higher or lower on extraversion,

the sample was divided into three roughly equal groups based on the measurement from 2021 (low = 10 - 23.3; moderate = 23.4 - 36.6; high = 36.7 - 50). Furthermore, Cronbach's Alpha was rated with α= .86 (International Personality Pool, n.d.), and in the current study, the analysis revealed a reliability of 0.90 (Wave 10), 0.88 (Wave 11), 0.89 (Wave 12), 0.90 (Wave 13) and a good test-retest reliability of 0.79.

Loneliness

Module 4 of the LISS panel on "Social Integration and Leisure" was utilised to assess loneliness. The questionnaire used is the shortened 6-item version of de Jong Gierveld & van Tilburgs's (2006) loneliness scale, which had been proven suitable for large surveys. One example item read as follows: ”There are a lot of people that I can fully rely on”, with three answer options (0 = Yes; 1 = More or less; 1 = No). Three items were negatively formulated and required to be reverse coded (1 = Yes; 1 = More or less; 0 = No). Further, the reliability of the questionnaire had been considered good with a Cronbach's alpha of 0.81 (Wave 11), 0.82 (Wave 12), 0.79 (Wave 13), and 0.82 (Wave 14). The loneliness score was computed by calculating the total score of all 6 items, with higher scores indicating higher loneliness. For this scale, de Jong Gierveld & van Tilburg (2006) specified cut-off scores of 0-1 (not lonely) and 2-6 (lonely).

Analysis

In this study, the statistical software IBM SPSS Statistics version 25 was used. All data sets on Health, Personality and Social Integration and Leisure were combined into a single file. Next, the data was prepared by removing all irrelevant items for the analysis to get a clear and structured overview of the data.

To test whether significant correlations between extraversion, loneliness, gender and alcohol use existed, a two-tailed Pearson correlation analysis was conducted, with $r = .10$ considered a small effect size, $r = .30$ interpreted as a medium effect size and $r = .50$ considered as large effect size (Cohen, 1992). This was done for each year (2018, 2019, 2020,

2021). A descriptive statistics table was created as well, to gather mean values and corresponding standard deviations for each variable.

Following that, repeated measures ANOVA were conducted for RQ1, RQ2, RQ3 and RQ4. Through repeated measures ANOVA, means across variables which are measured repeatedly can be compared to detect significant changes across time (Park et al., 2009). Here, $\eta p2 = .01$ indicated a small effect size, $\eta p2 = .06$ was interpreted as a medium effect size and $\eta p2 = .14$ being considered as large effect size (Levine & Hullett, 2002). Before that, it was tested if all ANOVA assumptions were fulfilled for all four research questions. First, the data had to be normally distributed, which was checked by creating respective Q-Q plots for all variables. All variables showed a normal distribution aside from loneliness, whose distribution was right-skewed. The assumption of sphericity was tested through Mauchly's test of sphericity. If p-values were lower than .05, the assumption was considered violated. Assumption three, named independence, was fulfilled as the LISS panel states that participants have been randomly selected from the population register, which implied that all observations were independent of each other.

To answer RQ1, whether alcohol use changed before and during the pandemic, a repeated measures ANOVA was conducted. For this research question, the criterion was that the alcohol item was answered at all time points. Here, alcohol use served as the dependent, and time as the independent variable. In cases where the analysis of variance was significant, post-hoc comparisons were done to uncover specific differences between the time points.

Next, a second repeated measures ANOVA was conducted, and all cases were included who filled out the Health module and the Personality module at all time points. In addition, it was examined in which year most participants completed the Personality module. That year was then selected as the between-subjects factor. Here, extraversion and time acted as the independent variable and alcohol use functioned as the dependent variable. If significant effects were found, post-hoc comparisons were executed.

The third research question was answered by doing a repeated measures ANOVA with loneliness and time as independent variables and alcohol use as the dependent variable. Those cases were included who filled out the Social Integration & Leisure module and the Health module. Further, it was checked how many participants answered the loneliness questions in each of the four years. Afterward, the year with the most cases was chosen as the between-subjects factor. Additionally, post-hoc comparisons were calculated if significant effects were found.

To examine possible gender differences in alcohol use before and during the COVID-19 pandemic, gender and time functioned as the independent variable and alcohol use as the dependent variable, with gender as the between-subjects effect. Additionally, post-hoc analyses were conducted if an effect turned out significant in order to determine significant mean differences between groups.

Lastly, it was tested whether loneliness and gender act as confounding variables in the relationship between extraversion (IV) and alcohol use (DV) by doing multiple regression analysis. Beforehand, the difference scores for alcohol use between 2019 and 2018, between 2019 and 2020, as well as between 2021 and 2020 were calculated, which then functioned as the dependent variables. Prior to the analysis, however, all assumptions of multiple regression analyses were examined. The first assumption, that there is a linear relationship between the dependent variable and all independent variables, was checked by creating scatter plots and checking them for linearity. None of these scatter plots showed a linear relationship between the independent variables and the dependent variable. Second, the assumption of homoscedasticity was reviewed by creating scatterplots of residuals against predicted values and showed to be fulfilled as well. Third, the assumption of no multicollinearity between all independent variables was fulfilled, as the correlations table only showed small correlation effect sizes between the independent variables (Table 3). Next, the Durbin Watson statistic was used to test the assumption that values of residuals are independent. With a value of 2.0,

the assumption was confirmed. Lastly, multivariate normality, which indicates that residuals are normally distributed, was tested by creating normal probability plots. This assumption was met as well.

Results

First, Table 2 shows that alcohol use was highest in 2018 and lowest in 2021, but these values did not vary much over the four years. The values indicate that on average, this sample consumed alcohol once or twice a month. Likewise, there was not much variation in extraversion scores between years. In 2018, the highest mean score of extraversion was detected. The scores of those with low, moderate, and high extraversion also demonstrate stability over the years. Lastly, in 2018, the mean loneliness score was the highest, and lowest in 2021. As of 2019, the highest mean score was recorded among those classified as lonely, while in 2020 it was highest among those classified as not lonely. According to the values of "loneliness" and "not lonely", the standard deviations were higher than the respective means, assuming variation in the data.

Table 2

Overview of Descriptive Statistics pre-and during the Covid-19 pandemic

Variable	Pre-Pandemic		During Pandemic	
	2018	2019	2020	2021
	M (SD)	M (SD)	M (SD)	M (SD)
Alcohol use per year	4.46 (2.22)	4.39 (2.22)	4.33 (2.27)	4.29 (2.28)
Extraversion	32.35 (7.09)	31.97 (6.55)	31.74 (6.76)	31.88 (6.68)
Low	19.93 (2.81)	20.32 (2.74)	19.92 (2.94)	20.13 (2.86)
Moderate	30.38 (3.65)	30.57 (3.42)	30.51 (3.51)	30.54 (3.43)
High	40.57 (3.51)	40.11 (2.94)	40.42 (3.16)	40.33 (3.12)
Loneliness	1.64 (1.87)	1.61 (1.89)	1.63 (1.84)	1.53 (1.87)

Lonely	3.50 (1.44)	3.59 (1.45)	3.47 (1. 41)	3.54 (1.42)
Not lonely	.29 (.45)	.29 (.45)	.31 (.46)	.26 (.44)

Note. M = Mean, SD = Standard Deviation.

Pearson correlation

To get an impression of the correlations between all variables (alcohol use, extraversion, loneliness and gender), a Pearson correlation was conducted across all four years. Due to its size, Table 3 can be found in Appendix B. The frequency of alcohol use demonstrated small significant negative correlations with loneliness (2018: r = -.11; 2019: r = -.10; 2020: r = -.09; 2021: r = -.12) and gender (2018: r = -.19; 2019: r = -.19; 2020: r = -.18; 2021: r = -.19) at all time points. Loneliness also showed small negative significant correlations with extraversion in 2018 (r = -.32), 2020 (r = -.24) and 2021(r = -.25), but in 2019, no significant correlation was detected. Additionally, extraversion and the frequency of alcohol use displayed small significant positive correlations in all years (2018: r = .13; 2019: r = .13; 2020: r = .09; 2021: r = .11). However, neither extraversion nor loneliness displayed significant correlations with gender.

Changes in alcohol use over time

A repeated measures ANOVA was performed to assess whether alcohol use per year (Within-Subjects Factor) changed within the sample from 2018 to 2021. In total, 3671 participants were included. First, Mauchly's Test of Sphericity indicated a violation of sphericity, $\chi^2(5) = 494.37$, $p < .001$. Therefore, a Greenhouse-Geisser correction was used. A significant and very small effect of time on alcohol use was detected, $\eta p2 = .009$, F (2.74, 10060.86) = 34.65, $p < .001$.

Follow up comparisons indicated that no significant difference between 2021 and 2020 existed (M-diff = -.04, 95% C.I. [-.01, .08], $p = .112$). Otherwise, all remaining pairwise differences proved to be significant, with $p < .001$. Figure 1 demonstrates that participants

tended to drink less frequently since 2018. In 2021, respondents drank the least frequently compared to all other years.

Figure 1

Line chart of the frequency of alcohol use from 2018 to 2021
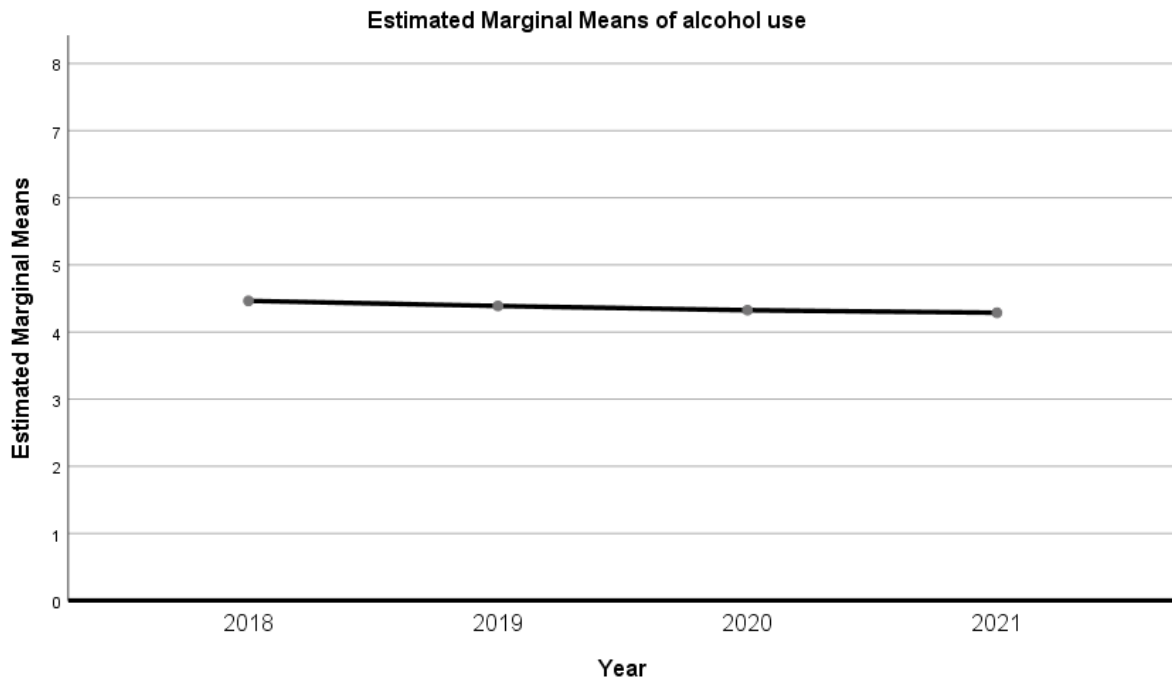
Note. 1 = not at all over the last 12 months; 2 = once or twice a year; 3 = once every two months; 4= once or twice a month; 5 = once or twice a week; 6 = three of four days per week; 7 = five or six days per week; 8 = almost every day.

Extraversion and changes in alcohol use

Among the four years, the Personality module showed the highest response rate in 2021. Thus, that year was chosen as the between-subjects factor. A repeated measures ANOVA was conducted to examine the effect of time and extraversion on alcohol use. Whereas alcohol use served as the dependent variable, time and extraversion were considered independent variables. Overall, 3528 participants were included for this analysis. Mauchly's test of Sphericity demonstrated a violation, $\chi^2(5) = 486.63$, $p < .001$. The ANOVA revealed a significant and very small difference in alcohol use between at least two groups of extraversion, $\eta p2 = .008$, $F (2, 3525) = 14.27$, $p < .001$. Nonetheless, there was no significant

interaction effect of time and extraversion on alcohol use, $\eta p2$ = .001, F (5.46, 9626.46)
= 2.16, *p* = .051).

Pairwise comparisons for low, moderate, and high extraversion revealed significant

differences in alcohol use between those who scored high and moderate on extraversion (M-

diff = .43, 95% C.I. [.23, .64], *p* < .001), and who scored high and low on extraversion (M-

diff = .51, 95% C.I. [.19, .82], *p* < .001). No significant differences were found between those

with low and moderate extraversion scores (M-diff= -.08, 95% C.I. [-.36, .21], *p* = 1).

Furthermore, the higher the extraversion score, the more frequently alcohol is consumed

throughout a year, but all three groups show a similar trajectory of change in alcohol use

(Figure 2). Across all groups and four years, alcohol was most frequently consumed in 2018

among those who scored high in extraversion (M = 4.82, SD = 2.01) and least frequently

consumed in 2021 among those who scored low in extraversion (M = 4.12, SD = 2.41).

Figure 2

Line chart of the frequency of alcohol use from 2018 to 2021 for different extraversion scores
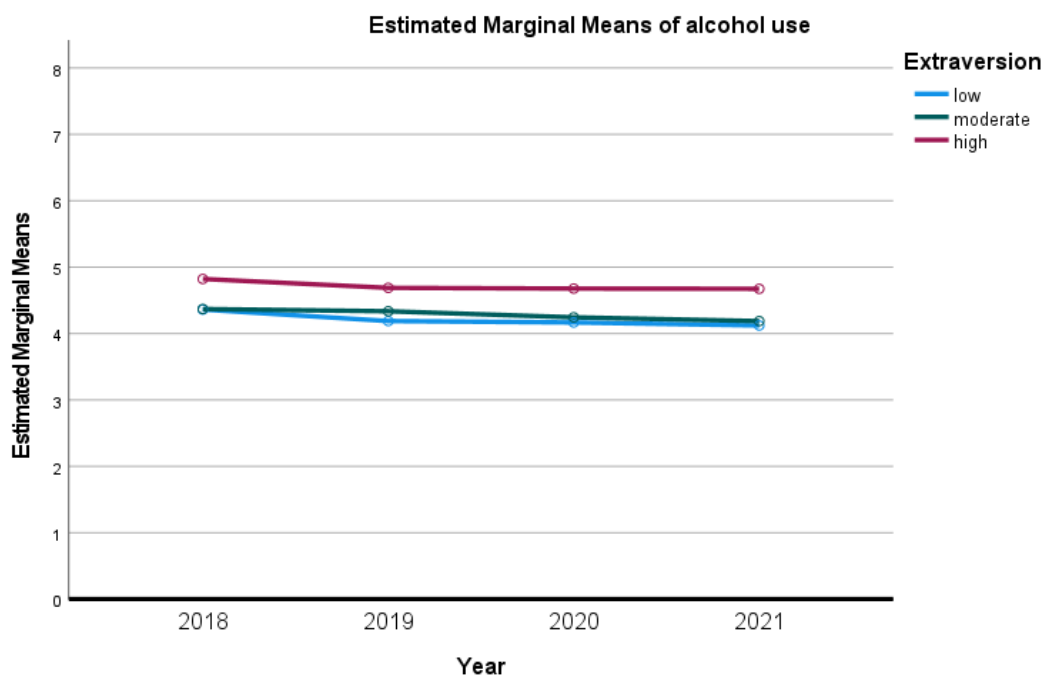
Note. 1 = not at all over the last 12 months; 2 = once or twice a year; 3 = once every two months; 4= once or twice a month; 5 = once or twice a week; 6 = three of four days per week; 7 = five or six days per week; 8 = almost every day.

Loneliness and changes in alcohol use

The loneliness scores in 2020 were selected as the between-subjects factor, as among all four years, the highest response rate for the Social Integration and Leisure module was registered in that year. Alcohol use served as the dependent variable and time and loneliness were considered independent variables. In total, 3611 participants were included for this analysis. Mauchly's test of Sphericity demonstrated a violation, $\chi^2(5) = 460.66$, $p < .001$. The ANOVA revealed a significant and very small difference in alcohol use between those who were labelled as lonely and not lonely, $\eta p2 = .005$, $F(1, 609) = 17.99$, $p < .001$. However, there was no significant interaction effect of time and loneliness on alcohol use, $\eta p2 = .001$, $F(2.75, 9928.31) = .26$, $p = .835$).

Follow up comparisons between those categorized as lonely and not lonely turned out significant (M-diff = -.31, 95% C.I. [-.45, -.16], $p < .001$). Furthermore, alcohol was most frequently consumed among those who were not lonely in 2018 (M = 4.61; SD = .05) and least frequently consumed among those who were lonely in 2021 (M = 4.11; SD = .06). Both groups show a similar trajectory of change for alcohol use (Figure 3).

Figure 3

Line chart of the frequency of alcohol use from 2018 to 2021 for different loneliness scores

Note. 1 = not at all over the last 12 months; 2 = once or twice a year; 3 = once every two months; 4= once or twice a month; 5 = once or twice a week; 6 = three of four days per week; 7 = five or six days per week; 8 = almost every day.
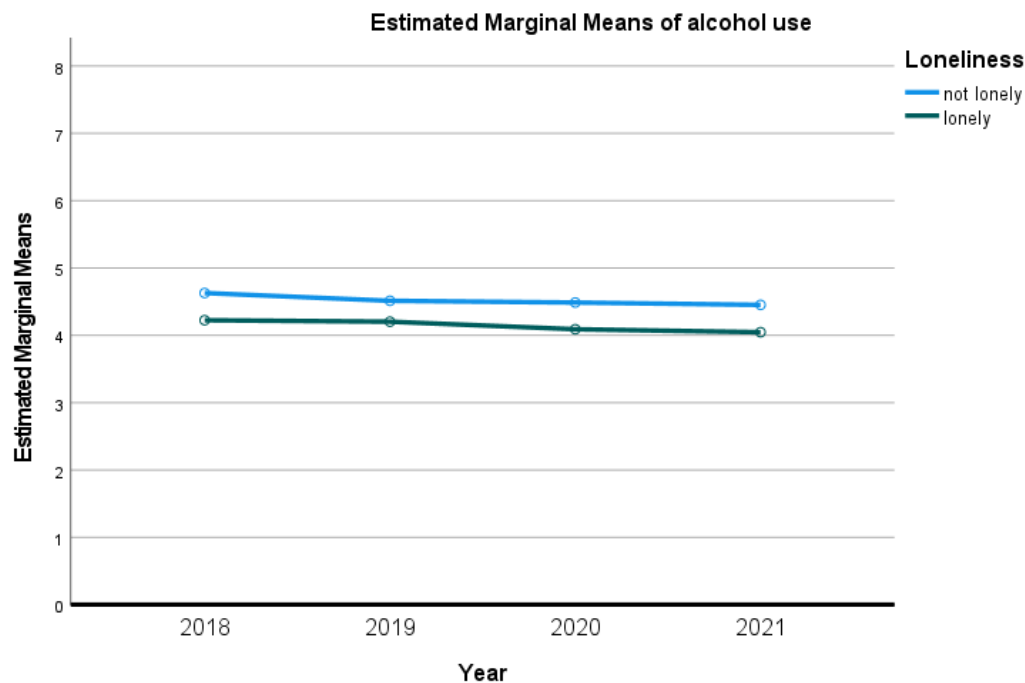
Gender and changes in alcohol use

Gender and time functioned as independent variables on alcohol intake (dependent variable) per year. In total, 1750 participants were identified as males and 1921 as females. First, a violation of Mauchly's test of Sphericity was detected, $\chi^2(5) = 491.62$, $p < .001$. Next, according to the repeated measures ANOVA, small significant differences between both genders concerning alcohol use were detected, $\eta p2 = .04$, $F (1, 3669) = 161.61$, $p < .001$. However, gender and time had a non-significant interaction effect on alcohol use, $\eta p2 = .00$, $F (2.74, 10051.34) = .41$, $p = .728$.

Pairwise comparisons between males and females revealed M-diff = .88, 95% C.I. [.74, 1.01], $p < .001$. The drinking patterns over the years were similar between males and females, however, males tended to drink significantly more each year than females.

Figure 4

Line chart of the frequency of alcohol use from 2018 to 2021 for different genders

Note. 1 = not at all over the last 12 months; 2 = once or twice a year; 3 = once every two months; 4= once or twice a month; 5 = once or twice a week; 6 = three of four days per week; 7 = five or six days per week; 8 = almost every day.
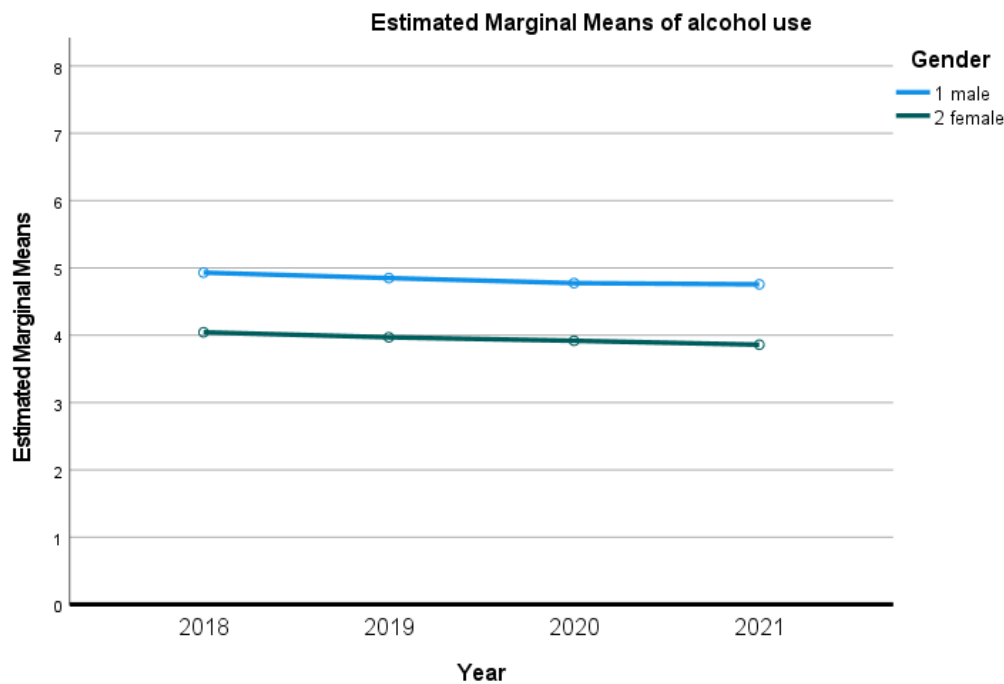
Extraversion, gender, loneliness, and the relationship with alcohol use

A multiple regression was run to predict changes in alcohol use before the COVID-19 pandemic by gender, extraversion, and loneliness. These variables did not predict statistically significantly changes in alcohol use, $F (3, 2833) = .78$, $p = .503$, $R^2 = .00$. Further, none of the three variables added to the prediction in a statistically significant way, $p > .05$.

The second multiple regression aimed to test whether gender, extraversion, and loneliness functioned as predictors of changes in alcohol use for the timespan from before the pandemic to the onset of the pandemic. Neither of the three independent variables predicted significant changes in alcohol consumption from 2019 to 2020, $F (3, 3546) = .38$, $p = .768$, $R2 = .00$. Additionally, neither extraversion, nor loneliness or gender contributed significantly to the prediction, $p > .05$.

The final multiple regression was conducted to determine whether gender, extraversion, and loneliness predicted changes in alcohol use during the COVID-19 pandemic. Changes in alcohol use during the pandemic were not significantly predicted by these variables, $F (3, 4347) = .58$, $p = .628$, $R^2 = .00$. No variable contributed significantly to the prediction, $p > .05$.

Discussion

The current novel coronavirus, COVID-19, has radically altered people's lives and forced them to adapt to a new reality. Although social distancing restrictions were introduced to slow the spread of COVID-19, there are concerns that they adversely affected populations' well-being and led to changes in health behaviours. Thus, the present study aimed to investigate whether there was a change in alcohol use before and during the COVID-19 pandemic among a Dutch true-probability sample using data from the LISS Panel. Further, it was investigated whether extraversion, loneliness and gender impacted changes in alcohol use from 2018 to 2021. These constructs were chosen since they have already been associated with alcohol use in pre-pandemic studies. Understanding what factors cause fluctuations in alcohol use and which individuals are more vulnerable to increasing their alcohol use during burdening circumstances facilitates providing personalized advice. In the following, all results will be discussed.

To begin with, the answer to the first research question ("Are there changes in alcohol use before and during the Covid-19 pandemic?") is, that very small changes in alcohol use have been found. People consumed slightly less alcohol during the pandemic, but this trend has already been discovered in 2019 pre-pandemic. Since the changes are very small, it can be argued that more stability rather than a change in alcohol use was found from 2018 to 2021. Next, the second research question "Are changes in alcohol use before and during the COVID-19 pandemic different between individuals with low, moderate, and high extraversion?" must be negated. No significant interaction effect of extraversion and time on

alcohol use was found and changes for those with low, moderate, and high extraversion turned out similar. Nonetheless, individuals with high extraversion tend to drink more than individuals with low or moderate extraversion, irrespective of the pandemic. The third research question "Are changes in alcohol use before and during the COVID-19 pandemic different between individuals being lonely and not lonely?" must also be answered in the negative. Again, no significant interaction effect was found between loneliness and time on alcohol use, and changes in alcohol use for those being lonely and not lonely were similar, even though people being not lonely tend to drink more than people being lonely. Furthermore, the fourth research question "Are changes in alcohol use before and during the COVID-19 pandemic different between individuals of different genders?" must also be answered with a no. There was no interaction effect of time and gender on alcohol and the small changes in alcohol use were the same for men and women. Generally, during and before the pandemic, men drank more than women. The last research question "Does extraversion predict change in alcohol use before and during the COVID-19 pandemic, with loneliness and gender as a controlling factor?" was also negated. None of the variables (gender, extraversion, loneliness) revealed to have a significant effect on the frequency of alcohol consumption and did not predict changes in alcohol use before and during the COVID-19 pandemic.

Concerning the first research question, it was expected that alcohol use changed from 2018 to 2021, but this could not be supported by the results. The COVID-19 pandemic may not have had as much of an impact on alcohol consumption as expected, or there may have been other influencing factors, that have not been addressed yet. The finding is also contradictory to other studies, which either found an increase (Barbosa et al., 2021; Wessely et al., 2022; Grossmann et al., 2020) or a decrease (Callinan et al., 2021) in alcohol consumption. Following are some reasons that could contribute to this.

Firstly, age may be partly responsible for the stability of alcohol use before and during the pandemic. A study by Guignard et al. (2021) found that increases or decreases in alcohol

consumption during the pandemic were associated with young age (18-34), as opposed to older adults with more stable drinking habits before and during the pandemic. This theory also aligns with other scientific findings (Capasso et al., 2021; Jacob et al., 2021; Callinan et al., 2021). The sample of this study has a mean age of 54, demonstrating that more middle-aged to older adults were included. The number of pensioners, which accounted for 28.4%, confirms this. As older adults made up a large proportion of this study's sample, age-dependent changes in alcohol use could explain the discovered lack of variation in alcohol use.

Secondly, the method of data collection may have influenced the findings in a certain direction. Most studies that investigated changes in alcohol use during the pandemic and found significant differences used a cross-sectional design (e.g., Barbosa et al., 2021; Wessely et al., 2022; Callinan et al., 2021; Grossmann et al., 2020; Jacob et al. 2021). Since they can only report behaviour at a particular point in time, their claims that the COVID-19 pandemic either led to increases or decreases in alcohol use are limited (Rindfleisch et al., 2008). The present study, however, used a longitudinal design and collected data at two time points before (2018 & 2019) and during the pandemic (2020 & 2021) of the same participants. Therefore, this study can detect developments in alcohol use over time at a group-and individual level more reliably compared to cross-sectional studies (Rindfleisch et al., 2008). In summary, this study may have found different results, namely stable levels of alcohol consumption, because it collected data over four years, unlike other studies, which found changes based on momentary assessments.

Thirdly, it should be noted that the other studies were also conducted in different countries. Even before the COVID-19 epidemic, differences in alcohol consumption between countries were detected (Ritchie & Roser, 2018). For example, Barbosa et al.'s study (2021), conducted in the United Kingdom, found significant increases in alcohol. The United Kingdom ranked 18th in alcoholism by country in 2022, whereas the Netherlands ranked

significantly lower (World Population Review, 2022). As mentioned in the introduction, Chodkiewicz et al. (2020) found high alcohol intake pre-pandemic to be a risk factor for increased alcohol consumption during the pandemic. In light of these findings, one could conclude that due to the high alcoholism rate, the alcohol intake was generally more likely to have increased in the United Kingdom than in the Netherlands. Further, it is also worth considering that lockdown conditions differed across countries. According to Plata et al. (2022), there was a significant increase in high-risk alcohol consumption among those who reported living under strict lockdown restrictions compared to those who did not. As mentioned before, the Netherlands lockdown policy has been considered milder than that of other European countries, except for the third lockdown, which might explain the stability in alcohol use in this sample (Yerkes et al., 2020; Ori et al., 2022). All in all, it can be hypothesized that changes in alcohol consumption could also be traced back to the country where the data was collected (Kilian et al., 2021).

Lastly, this study's alcohol measurement instrument may explain why its results contradict other studies' findings related to alcohol consumption. In this study, a single item was used, asking about how frequently an individual consumes alcohol over the year. Some studies who found changes in alcohol use during the pandemic made use of the "alcohol use disorder identification test" (AUDIT) (e.g., Callinan et al., 2021; Schmits & Glowacz, 2022; Boschuetz et al., 2020; Villanueva-Blasco; 2021). It includes ten items, such as "How many standard drinks do you have on a typical day when you are drinking?". The AUDIT also measures the amount of alcohol intake and issues related to alcohol use (de Meneses-Gaya et al., 2009). The difference between AUDIT and the question used in the current study shows that other studies might have measured different dimensions of alcohol consumption. It is a possible reason why the current study's results differ.

Next, people with low, moderate, and high extraversion did not alter their alcohol intake before and during the pandemic, which indicates that individual differences in

extraversion had less of an impact on changes in alcohol use, at least in this sample. This finding was surprising since research investigating the same topic reported different results. A longitudinal study examining personality traits and changes in health behaviour from before to during the pandemic conducted by Kekäläinen et al. (2021) discovered higher extraversion to be related with decreased alcohol use. However, it should be noted that this study solely included women aged 47 to 55. They collected data from November 2019 to March 2020 (pre-pandemic), in March 2020 (in-pandemic 1) and in May 2020 (in-pandemic 2), whereas this study also included data from 2018 and 2021. Further, they only assess average weekly alcohol consumption, compared to this study who assessed the yearly alcohol consumption. Additionally, their sample was significantly smaller than the sample of the present study. Consequently, the comparability of this study and Kekäläinen et al. (2021) is questionable due to the differences between the two studies.

However, the finding that individuals scoring high in extraversion drank most compared to those who scored moderately or low on extraversion before and during the pandemic, aligns with several other studies. In that context, social mechanisms are of relevance. In Fairbairn et al.'s (2015) study, individuals who identified themselves as being highly social and scored accordingly high on extraversion experienced more alcohol-related rewards than those who tended to be more introverted. Extroverts were found to have greater mood-enhancing effects when drinking alcohol compared to introverts. Further, extraverted individuals also showed to experience greater stress dampening effects, but this only applied in a social setting and not when drinking alone. This would explain the finding that extroverts, who seek out social interaction more often also tend to drink more frequently overall in order to experience these positive effects, irrespective of the pandemic.

Social learning theory could also explain why particularly extroverts tend to drink more. According to this theory, behaviour is learned by observing others and if a particular type of behaviour leads to rewards, repetition of this type of behaviour is likely (Nogueira-

Arjona et al., 2019). As extroverts desire social attention and being socially engaged itself is a reward, participating in activities which lead to social acceptance and attention is likely to follow (Nogueira-Arjona et al., 2019). Since drinking is strongly correlated with social acceptance, it makes sense that extroverts tend to drink more often than introverts as they derive pleasure from the resulting social engagement and acceptance (Mäkelä & Maunu, 2016).

Furthermore, the discovery that people with high and low loneliness also did not show a change in drinking patterns before and during the pandemic contradicts other research. For instance, in Fitzke et al.'s (2021) study, increased alcohol use during COVID-19 was found related to high loneliness. Nonetheless, their findings should be interpreted with caution. Even though their study's sample size was adequate (N = 1230), it solely included white-skinned veterans of the US Armed Forces aged 18 to 40. The current study included older people, as well as people with different occupations, which is a relevant difference to mention. Next, Fitzke et al. (2021) only collected data in 2020 at two different time points (pre-pandemic: February 2020; in-pandemic: August 2020), whilst this study had two timepoints pre-pandemic and two timepoints in-pandemic. Further, they used the 20-item UCLA Loneliness scale, demonstrating more questions than the 6-item scale of De Jong Gierveld & van Tilburg (2006) used in the current study. Another study by Bragard et al. (2022) investigated the same topic and found opposite findings to Fitzke et al. (2021), as people high in loneliness were found to drink more and those less lonely consumed less since the onset of the COVID-19 pandemic. Even though the sample had more variety, e.g., in education and ethnicity, compared to Fitzke et al. (2021), the downside is the small sample (N= 78). Besides, loneliness and alcohol use were assessed by single items. Participant had to indicate how much alcohol they consumed each day for a duration of 30 days.

Still, the finding that higher loneliness was associated with less drinking had also been detected in other studies. In contrast to the assumption that loneliness and isolation contribute

to unhealthy alcohol consumption, it should be considered that alcohol cultivates social bonds, and people drink because they experience positive emotions and expect positive outcomes (Canham et al., 2016; Bragard et al., 2022). Instead of assuming that drinking alcohol has the purpose of alleviating negative factors, it should be considered that "regardless of whether people are lonely or have deep, meaningful relationships, they may be less likely to report loneliness if they have established connections with others who drink" (Canham et al., 2016, p. 13). Wootton et al.'s study (2021) supports this hypothesis since they found that individuals who felt lonelier consumed less alcohol, whereas individuals who felt more socially supported consumed more.

Concerning the non-detected differences in changes in alcohol use between men and women before and during the COVID-19 pandemic in this study, some scientific investigations showed otherwise, but others also verified this finding. Skurvydas et al. (2021) also found alcohol intake remained stable for both genders in a Lithuanian sample. Their study shares some similarities with the current study, as they also collected data pre-pandemic (October 2019 – June 2020) and during the pandemic (November 2020 – March 2021). The sample size was also adequate for the first (N = 6369) and second data collection (N = 2392). Further, they also used a similar item for alcohol use, which asks how often they drink alcohol during a year, with seven answer options. However, the researchers did not study the same subjects before and during the pandemic as they used a cross-sectional design, which distinguishes their study from the current study. Consequently, they are limited in drawing conclusions about the impact of COVID-19. Further, people with a higher education and women were also overrepresented, plus they also included individuals below the age of 16 and had a lower mean age of 38 years. Among those studies that found differences in change in alcohol use before and during the pandemic between men and women, the same arguments can be implied as for the first research question, for instance, a different recruitment design, different questionnaires, or differences in sample characteristics.

Nonetheless, it was overall found that men always drank more than women, which is a stable finding in literature (Nolen-Hoeksema, 2004; Schmits & Glowacz, 2022). This can be caused by gender roles, namely that males perceive drinking as a form of displaying masculinity and earning prestige (Holmila & Raitasalo, 2005). As drinking more frequently is accepted among men, women are more likely to get judged since it seems less feminine, so they might drink less to prevent getting judged (Dir et al., 2017). However, this is still influenced by an individual's identification with gender roles and personal motives for drinking (Dir et al., 2017).

Furthermore, due to different effects of alcohol on a male and a female body, biological gender differences are also considered a factor for differences in alcohol consumption (Holmila & Raitasalo, 2005). Even if men and women consume identical amounts of alcohol in the same time frame, women still show higher blood alcohol levels, which makes them less able to consume the same amounts of alcohol as men (Holmila & Raitasalo, 2005). The attitude concerning alcohol can also play a significant role, as women showed a greater likelihood to understand the accompanying dangers of alcohol, which may discourage them from engaging in dangerous drinking behaviour (Holmila & Raitasalo, 2005).

Finally, the last research question had to be negated since neither extraversion, nor loneliness or gender revealed a significant interaction effect on alcohol use. Therefore, there is no explainable relation.

Strength and Limitations

In this study, some strengths and limitations became apparent, which should be considered while interpreting the results. First, a strength of this study is that validated questionnaires, like the Big-Five questionnaire for the trait extraversion, were used. The extraversion and loneliness questionnaires showed to have good reliability and were suitable for doing quantitative research.

Another strength implicates the use of the LISS panel, as it is free of charge and provides an extensive database for research purposes (LISS Panel, n. d.). In addition, those with no internet access are also included in the research, as they are provided with an internet connection and a computer, enabling a more diverse sample, and preventing age groups from being excluded.

Further, the recruitment method could be considered a strength. Participants in this sample have been randomly selected out of the Dutch population register by "Statistics Netherlands". Hence, all Dutch citizens who are at least 16 years old and officially registered in the Netherlands have an equal chance to get selected. Since this process is randomized, it also reduces the risk of sample bias during the data collection.

Additionally, it should be highlighted that the study also provides knowledge to a new research field, as the topic of COVID-19 has become particularly relevant after the outbreak in Wuhan in December 2019 and research is still limited. Considering how little time has passed since the COVID-19 pandemic began, studies investigating topics related to the pandemic could make a relevant contribution by providing an understanding of how it has affected the public.

Lastly, a strength worth mentioning is the longitudinal design of the study. With the LISS Panel, data from different years can be retrieved and, since the same questionnaires are distributed year after year, it allows to compare data between the years and to make claims about possible changes concerning the constructs of interest. This distinguishes this study from many studies, which used a cross-sectional design and focused on one particular point in time. Using a cross-sectional design might be a cost-effective way of collecting data in a short period, but it also prevents making any definite cause-and-effect statements.

However, in light of the limitations of this study, the results must be interpreted cautiously. One limitation of the study is that only one item was used to measure alcohol use among participants. Even though the item was suitable for this type of analysis (repeated

measures ANOVA), it can only provide limited information about how alcohol use has changed in this sample over the years. There is no information given about the number or type of drinks a person consumes at home or when spending time with others. In addition, the item makes it difficult to define heavier drinkers. In this study, only the frequency of alcohol consumption per year received attention rather than the amount per drinking occasion, so someone who drinks one glass of wine every day would be considered drinking a lot of alcohol, as opposed to a person who drinks once a week and several alcoholic drinks. Aside from that, the item used to measure alcohol use offers eight answer options in total, but irregular drinkers may overestimate or underestimate their consumption, as their drinking behaviour is not represented. It might also be that the self-reported responses concerning alcohol use have been susceptible to social-desirability bias, which means that participants tried to give an answer they perceive as more socially desirable, by over-or underestimating their consumption (Davis et al., 2010). In addition, as no psychometric properties for this item were given, it is unclear whether this item is a reliable and valid research instrument for measuring alcohol use. It is also important to keep in mind that all modules of the LISS panel are only measured once every year. Even though this study found stability in alcohol use from 2018 to 2021, there might still have been fluctuations, which could not be detected.

The last limitation concerns missing data that results from repeated measures ANOVA. In this study, alcohol use was measured at four different time points. The listwise deletion approach is used to handle missing data when conducting repeated measures ANOVAs, so all responses from a subject are excluded if one measurement is missing, which reduces the sample size. Overall, 1786 responses were not included in the analysis, which is approximately a third of the sample at the beginning of the data collection. It also affects the generalizability of findings to the population, as the included and excluded sample show significant differences regarding gender distribution, domestic situation, civil status, education, primary occupation, age and monthly income. The used sample showed less

students, more pensioners and a higher mean age (M= 54) compared to those with missing data (M = 47). This indicates that more middle-aged to older adults have participated and young adults were underrepresented. This might be a side-effect of the random sampling technique used. Although random sampling aims to be unbiased and represent the population, as discussed in the strengths, there is still a possibility of sample selection bias, which can lead to an underrepresentation of subgroups as it has been in this study. Consequently, the sample becomes less representative of the larger population.

Future Implications

There are some implications worth highlighting. It would be beneficial to include more items concerning alcohol use in a new study to gain more insights of how alcohol use has changed before and during the COVID-19 pandemic. For instance, a potential item could ask about how many beverages are consumed on average on a typical drinking night. Another possibility is to use a common alcohol assessment instrument like the AUDIT. In addition, it may be advantageous to consider other possible confounding variables, which were not included in this study. For instance, alcohol use among different age groups could be examined since research shows that drinking behaviour varies with age. It is also worth considering recruiting more young adults to enable a more representative sample of the Dutch population.

The present study also showed that extraversion and alcohol use are related. In the future, it might be valuable to also pay attention to the remaining personality traits (agreeableness, openness, neuroticism, conscientiousness) and how these are correlated to alcohol use. This may facilitate predicting behaviour in future disease outbreaks and to tailor education and intervention programs (Aschwanden et al., 2021).

Lastly, it might be worth investigating how alcohol use has changed in other countries, as this study solely focused on Dutch citizens. Previous research demonstrated that alcohol

use varies across countries, so it would be interesting to do comparative research and check whether there are also significant differences in changes of alcohol use between countries.

Conclusion

The present study contradicted what has been suggested in previous studies. Alcohol consumption from 2018 to 2021 showed relative stability. This implies that the COVID-19 pandemic did not impact alcohol use, at least on a group level. Furthermore, differences in extraversion, loneliness, and gender did not demonstrate a change in drinking patterns before and during the pandemic. Nonetheless, it was found that those scoring high in extraversion tend to drink more alcohol, as well as that males drink more compared to women. Aside from this, it was expected that especially those who scored high in loneliness drink more alcohol, but the contrary proved to be the case. This study offers new insights into how the COVID-19 pandemic impacts alcohol use, however a future implication is to control for other confounding variables and using another questionnaire for alcohol use. Gaining further insights into how different factors interact and influence the consumption of alcohol can facilitate developing intervention programs for those who are at-risk for developing unhealthy drinking patterns.

References

Acuff, S. F., Strickland, J. C., Tucker, J. A., & Murphy, J. G. (2022). Changes in alcohol use during COVID-19 and associations with contextual and individual difference variables: A systematic review and meta-analysis. *Psychology of addictive behaviors : journal of the Society of Psychologists in Addictive Behaviors*, *36*(1), 1–19. https://doi.org/10.1037/adb0000796

Alt, P., Reim, J., & Walper, S. (2021). Fall from grace: Increased loneliness and depressiveness among extraverted youth during the German COVID-19 lockdown. *Journal of Research on Adolescence, 31*(3), 678–691. https://doi.org/10.1111/jora.12648

Alzueta, E., Perrin, P., Baker, F. C., Caffarra, S., Ramos-Usuga, D., Yuksel, D., & Arango-Lasprilla, J. C. (2021). How the COVID-19 pandemic has changed our lives: A study of psychological correlates across 59 countries. *Journal of clinical psychology*, *77*(3), 556-570. https://doi.org/10.1002/jclp.23082

Arora, T., & Grey, I. (2020). Health behaviour changes during COVID-19 and the potential consequences: A mini-review. *Journal of Health Psychology*, *25*(9), 1155-1163. https://doi.org/10.1177/1359105320937053

Aschwanden, D., Strickhouser, J. E., Sesker, A. A., Lee, J. H., Luchetti, M., Stephan, Y., ... & Terracciano, A. (2021). Psychological and behavioural responses to coronavirus disease 2019: The role of personality. *European journal of personality*, *35*(1), 51-66. https://doi.org/10.1002/per.2281

Barbosa, C., Cowell, A. J., & Dowd, W. N. (2021). Alcohol Consumption in Response to the COVID-19 Pandemic in the United States. *Journal of addiction medicine*, *15*(4), 341–344. https://doi.org/10.1097/ADM.0000000000000767

Bellingtier, J. A., Mund, M., & Wrzus, C. (2021). The role of extraversion and neuroticism for experiencing stress during the third wave of the COVID-19 pandemic. *Current*

Psychology, 1-11. doi: 10.1007/s12144-021-02600-y

Boin, A., & Lodge, M. (2021). Responding to the COVID-19 crisis: a principled or pragmatist approach?. *Journal of European Public Policy*, *28*(8), 1131-1152. https://doi.org/10.1080/13501763.2021.1942155

Bol, T. (2020). Inequality in homeschooling during the Corona crisis in the Netherlands. First results from the LISS Panel. *SocArXiv,* 1-21. https://doi.org/10.31235/osf.io/hf32q

Bollen, Z., Pabst, A., Creupelandt, C., Fontesse, S., Lannoy, S., Pinon, N., & Maurage, P. (2021). Prior drinking motives predict alcohol consumption during the COVID-19 lockdown: A cross-sectional online survey among Belgian college students. *Addictive Behaviors*, *115*, 106772. https://doi.org/10.1016/j.addbeh.2020.106772

Boschuetz, N., Cheng, S., Mei, L., & Loy, V. M. (2020). Changes in alcohol use patterns in the United States during COVID-19 pandemic. *Wmj*, *119*(3), 171-176. https://wmjonline.org/wp-content/uploads/2020/119/3/boschuetz.pdf

Bragard, E., Giorgi, S., Juneau, P., & Curtis, B. L. (2022). Loneliness and daily alcohol consumption during the COVID-19 pandemic. *Alcohol and Alcoholism*, *57*(2), 198. doi: 10.1093/alcalc/agab056

Buecker, S., Maes, M., Denissen, J. J., & Luhmann, M. (2020). Loneliness and the Big Five personality traits: A meta–analysis. *European Journal of Personality*, *34*(1), 8-28. https://doi.org/10.1002/per.2229

Callinan, S., Smit, K., Mojica-Perez, Y., D'Aquino, S., Moore, D., & Kuntsche, E. (2021). Shifts in alcohol consumption during the COVID-19 pandemic: early indications from Australia. *Addiction*, *116*(6), 1381-1388. https://doi.org/10.1111/add.15275

Cancello, R., Soranna, D., Zambra, G., Zambon, A., & Invitti, C. (2020). Determinants of the Lifestyle Changes during COVID-19 Pandemic in the Residents of Northern Italy. *International Journal of Environmental Research and Public Health, 17*(17), 6287. https://doi.org/10.3390/ijerph17176287

Canham, S. L., Mauro, P. M., Kaufmann, C. N., & Sixsmith, A. (2016). Association of

    alcohol use and loneliness frequency among middle-aged and older adult drinkers.

    Journal of aging and health, *28*(2), 267-284. DOI: 10.1177/0898264315589579

Capasso, A., Jones, A. M., Ali, S. H., Foreman, J., Tozan, Y., & DiClemente, R. J. (2021).

    Increased alcohol use during the COVID-19 pandemic: The effect of mental health

    and age in a cross-sectional sample of social media users in the US. *Preventive*

    Medicine, *145*, 106422. doi: 10.1016/j.ypmed.2021.106422

Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual review of*

    psychology, *61*, 679-704. https://doi.org/10.1146/annurev.psych.093008.100352

Chodkiewicz, J., Talarowska, M., Miniszewska, J., Nawrocka, N., & Bilinski, P. (2020).

    Alcohol consumption reported during the COVID-19 pandemic: The initial stage.

    International journal of environmental research and public health, *17*(13), 4677.

    https://doi.org/10.3390/ijerph17134677

Clay, J. M., & Parker, M. O. (2020). Alcohol use and misuse during the COVID-19

    pandemic: a potential public health crisis?. *The Lancet. Public health*, *5*(5), e259.

    https://doi.org/10.1016/S2468-2667(20)30088-8

Cohen, J. (1992). Statistical power analysis. *Current directions in psychological science*,

    1(3), 98-101. https://doi.org/10.1177/0164027506289723

Davis, C. G., Thake, J., & Vilhena, N. (2010). Social desirability biases in self-reported

    alcohol consumption and harms. *Addictive behaviors*, *35*(4), 302-311.

    https://doi.org/10.1016/j.addbeh.2009.11.001

De Jong Gierveld, J., & van Tilburg, T. G. (2006). A 6-item scale for overall, emotional, and

    social loneliness: Confirmatory tests on survey data. *Research on Aging, 28*(5), 582-

    598. https://doi.org/10.1177/0164027506289723

De Meneses-Gaya, C., Zuardi, A. W., Loureiro, S. R., & Crippa, J. A. S. (2009). Alcohol Use

    Disorders Identification Test (AUDIT): An updated systematic review of

psychometric properties. *Psychology & Neuroscience*, *2*(1), 83.

DOI: 10.3922/j.psns.2009.1.12

De Vroege, L. & van den Broek, A. (2022). Substantial impact of covid-19 on self-reported

mental health of healthcare professionals in the netherlands. *Frontiers in Public*

Health, 9, 796591. https://doi.org/10.3389/fpubh.2021.796591

Deutsche Welle. (2021, April 21). *Niederlande beenden Corona-Ausgangssperren.*

https://www.dw.com/de/niederlande-beenden-corona-ausgangssperren/a-57271553

Dir, A. L., Bell, R. L., Adams, Z. W., & Hulvershorn, L. A. (2017). Gender differences in risk

factors for adolescent binge drinking and implications for intervention and prevention.

Frontiers in psychiatry, *1*, 289. https://doi.org/10.3389/fpsyt.2017.00289

Engström, A., Luesink, M., & Boin, A. (2021). From creeping to full-blown crisis: Lessons

from the Dutch and Swedish response to COVID-19. In A. Boin, M. Ekengren, & M.

Rhinard (Eds.), *Understanding the creeping crisis* (pp. 105–130). Palgrave

MacMillan. https://doi.org/10.1007/978-3-030-70692-0_7

Entringer, T. M., & Gosling, S. D. (2021). Loneliness during a nationwide lockdown and the

moderating effect of extroversion. *Social Psychological and Personality Science.*

13(3), 769-780. https://doi.org/10.1177/19485506211037871

Fitzke, R. E., Wang, J., Davis, J. P., & Pedersen, E. R. (2021). Substance use, depression, and

loneliness among American veterans during the COVID-19 pandemic. *The American*

Journal on Addictions, *30*(6), 552-559.doi: 10.1111/ajad.13211

Flett, G. L., & Heisel, M. J. (2021). Aging and feeling valued versus expendable during the

COVID-19 pandemic and beyond: a review and commentary of why mattering is

fundamental to the health and well-being of older adults. *International Journal of*

Mental Health and Addiction, *19*(6), 2443-2469. https://doi.org/10.1007/s11469-020-

00339-4

Folkman, S., & Moskowitz, J. T. (2004). Coping: Pitfalls and promise. *Annu. Rev. Psychol.*, *55*, 745-774. https://doi.org/10.1146/annurev.psych.55.090902.141456

Gijzen, M., Shields-Zeeman, L., Kleinjan, M., Kroon, H., van der Roest, H., Bolier, L., Smit, F., & de Beurs, D. (2020). The Bittersweet Effects of COVID-19 on Mental Health: Results of an   Online Survey among a Sample of the Dutch Population Five Weeks after Relaxation of Lockdown Restrictions. *International Journal of Environmental Research and Public Health*, *17*(23). https://doi.org/10.3390/ijerph17239073

Gordon-Wilson, S. (2022). Consumption practices during the COVID-19 crisis. *International Journal of Consumer Studies*, *46*(2), 575-588. https://doi.org/10.1111/ijcs.12701

Government of the Netherlands. (2021, January 20). *Lockdown measures tightened in response to concerns about new variants of virus.* https://www.government.nl/latest/news/2021/01/20/lockdown-measures-tightened-in-response-to-concerns-about-new-variants-of-virus

Gubler, D. A., Makowski, L. M., Troche, S. J., & Schlegel, K. (2021). Loneliness and well-being during the Covid-19 pandemic: Associations with personality and emotion regulation. *Journal of Happiness Studies*, *22*(5), 2323-2342. https://doi.org/10.1007/s10902-020-00326-5

Guignard, R., Andler, R., Quatremère, G., Pasquereau, A., du Roscoät, E., Arwidson, P., ... & Nguyen-Thanh, V. (2021). Changes in smoking and alcohol consumption during COVID-19-related lockdown: a cross-sectional study in France. *European Journal of Public Health*, *31*(5), 1076-1083. https://doi.org/10.1093/eurpub/ckab054

Guo, J., Hawkins, J. D., Hill, K. G., & Abbott, R. D. (2001). Childhood and adolescent predictors of alcohol abuse and dependence in young adulthood. J*ournal of studies on alcohol*, *62*(6), 754-762. https://doi.org/10.15288/jsa.2001.62.754

Harrell, Z. A., & Karim, N. M. (2008). Is gender relevant only for problem alcohol behaviors? An examination of correlates of alcohol use among college students. *Addictive behaviors*, *33*(2), 359-365. https://doi.org/10.1016/j.addbeh.2007.09.014

Hawkins, J. D., Graham, J. W., Maguin, E., Abbott, R., Hill, K. G., & Catalano, R. F. (1997). Exploring the effects of age of alcohol use initiation and psychosocial risk factors on subsequent alcohol misuse. *Journal of studies on alcohol*, *58*(3), 280-290. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1894758/

Holmila, M., & Raitasalo, K. (2005). Gender differences in drinking: why do they still exist?. *Addiction*, *100*(12), 1763-1769. https://doi.org/10.1111/j.1360-0443.2005.01249.x

Horigian, V. E., Schmidt, R. D., & Feaster, D. J. (2021). Loneliness, mental health, and substance use among US young adults during COVID-19. *Journal of psychoactive drugs*, *53*(1), 1-9. https://doi.org/10.1080/02791072.2020.1836435

International Personality Item Pool (2022, February 21). *A Scientific Collaboratory for the Development of Advanced Measures of Personality and Other Individual Differences. https://ipip.ori.org/*

International Personality Item Pool (n. d.). *Converting IPIP Item Responses to Scale Scores.* https://ipip.ori.org/newScoringInstructions.htm

International Personality Item Pool (n. d.). *Big-Five Factor Markers.* https://ipip.ori.org/newBigFive5broadKey.htm#Extraversion

Jacob, L., Smith, L., Armstrong, N. C., Yakkundi, A., Barnett, Y., Butler, L., ... & Tully, M. A. (2021). Alcohol use and mental health during COVID-19 lockdown: A cross-sectional study in a sample of UK adults. *Drug and alcohol dependence*, *219*, 108488. https://doi.org/10.1016/j.drugalcdep.2020.108488

Juergens, J. (2021, October 20). *Alcoholism causes and risk factors*. AddictionCenter.

https://www.addictioncenter.com/alcohol/alcoholism-causes-risk-factors/#:~:text=Both%20internal%20and%20external%20factors,%2C%20education%2C%20and%20job%20status.

Kekäläinen, T., Hietavala, E. M., Hakamäki, M., Sipilä, S., Laakkonen, E. K., & Kokko, K. (2021). Personality traits and changes in health behaviors and depressive symptoms during the COVID-19 pandemic: a longitudinal analysis from pre-pandemic to onset and end of the initial emergency conditions in Finland. *International journal of environmental research and public health*, *18*(15), 7732. https://doi.org/10.3390/ijerph18157732

Kilian, C., O'Donnell, A., Potapova, N., López-Pelayo, H., Schulte, B., Miquel, L., Paniello Castillo, B., Schmidt, C. S., Gual, A., Rehm, J., & Manthey, J. (2022). Changes in alcohol use during the COVID-19 pandemic in Europe: A meta-analysis of observational studies. *Drug and alcohol review*, *41*(4), 918–931. https://doi.org/10.1111/dar.13446

Kilian, C., Rehm, J., Allebeck, P., Braddick, F., Gual, A., Barták, M., ... & European Study Group on Alcohol Use and COVID-19. (2021). Alcohol consumption during the COVID-19 pandemic in Europe: a large-scale cross-sectional study in 21 countries. *Addiction*, *116*(12), 3369-3380. https://doi.org/10.1111/add.15530

Levine, T. R., & Hullett, C. R. (2002). Eta squared, partial eta squared, and misreporting of effect size in communication research. *Human Communication Research*, *28*(4), 612-625. https://doi.org/10.1111/j.1468-2958.2002.tb00828.x

Li, W., Yang, Y., Liu, Z. H., Zhao, Y. J., Zhang, Q., Zhang, L., ... & Xiang, Y. T. (2020). Progression of mental health services during the COVID-19 outbreak in China. *International journal of biological sciences*, *16*(10), 1732. doi: 10.7150/ijbs.45120

LISS Panel. (n.d.). *About the Panel | LISS Panel Data*. https://www.lissdata.nl/about-panel

Mäkelä, P., & Maunu, A. (2016). Come on, have a drink: The prevalence and cultural logic of social pressure to drink more. *Drugs: Education, Prevention and Policy*, *23*(4), 312-321. https://doi.org/10.1080/09687637.2016.1179718

McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of personality*, *60*(2), 175-215. https://doi.org/10.1111/j.1467-6494.1992.tb00970.x

McWhirter, B. T. (1990) Loneliness: review of current literature, with implications for counseling and research. *Journal of Counseling and Development, 68*, 417-422. https://doi.org/10.1002/j.1556-6676.1990.tb02521.x

Neill, E., Meyer, D., Toh, W. L., van Rheenen, T. E., Phillipou, A., Tan, E. J., & Rossell, S. L. (2020). Alcohol use in Australia during the early days of the COVID-19 pandemic: initial results from the COLLATE project. *Psychiatry and Clinical Neurosciences*, *74*(10), 542-549. https://doi.org/10.1111/pcn.13099

Niedzwiedz, C. L., Green, M. J., Benzeval, M., Campbell, D., Craig, P., Demou, E., ... & Katikireddi, S. V. (2021). Mental health and health behaviours before and during the initial phase of the COVID-19 lockdown: longitudinal analyses of the UK Household Longitudinal Study. *Epidemiology Community Health*, *75*(3), 224-231. http://dx.doi.org/10.1136/jech-2020-215060

Nogueira-Arjona, R., Shannon, T., Kehayes, I. L., Sherry, S. B., Keough, M. T., & Stewart, S. H. (2019). Drinking to keep pace: A study of the moderating influence of extraversion on alcohol consumption similarity in drinking buddy dyads. *Addictive behaviors*, *92*, 69-75. https://doi.org/10.1016/j.addbeh.2018.12.023

Nolen-Hoeksema, S. (2004). Gender differences in risk factors and consequences for alcohol use and problems. *Clinical psychology review*, *24*(8), 981-1010. https://doi.org/10.1016/j.cpr.2004.08.003

Ori, A. P., Wieling, M., van Loo, H. M., & Lifelines Corona Research Initiative. (2022). Longitudinal analyses of depression and anxiety highlight greater prevalence during COVID-19 lockdowns in the Dutch general population and a continuing increase in suicidal ideation in young adults. *medRxiv*,1-16. https://doi.org/10.1101/2022.05.02.22273554

Pan, K. Y., Kok, A. A., Eikelenboom, M., Horsfall, M., Jörg, F., Luteijn, R. A., ... & Penninx, B. W. (2021). The mental health impact of the COVID-19 pandemic on people with and without depressive, anxiety, or obsessive-compulsive disorders: a longitudinal study of three Dutch case-control cohorts. *The Lancet Psychiatry*, *8*(2),121-129. https://doi.org/10.1016/S2215-0366(20)30491-0

Park, E., Cho, M., & Ki, C. S. (2009). Correct use of repeated measures analysis of variance. *The Korean journal of laboratory medicine*, *29*(1), 1-9. https://doi.org/10.3343/kjlm.2009.29.1.1

Pattyn, V., Matthys, J., & Hecke, S. V. (2021). High-stakes crisis management in the Low Countries: Comparing government responses to COVID-19. *International Review of Administrative Sciences*, *87*(3), 593-611. https://doi.org/10.1177/0020852320972472

Plata, A., Motoki, K., Spence, C., & Velasco, C. (2022). Trends in alcohol consumption in relation to the COVID-19 pandemic: A cross-country analysis. *International journal of gastronomy and food science*, *27*, 100397. https://doi.org/10.1016/j.ijgfs.2021.100397

Ramalho, R. (2020). Alcohol consumption and alcohol-related problems during the COVID-19 pandemic: a narrative review. *Australasian Psychiatry*, *28*(5), 524-526. https://doi.org/10.1177/1039856220943024

Rana, I. A., Bhatti, S. S., Aslam, A. B., Jamshed, A., Ahmad, J., & Shah, A. A. (2021).

COVID-19 risk perception and coping mechanisms: Does gender make a difference?. *International Journal of Disaster Risk Reduction*, *55*, 102096. https://doi.org/10.1016/j.ijdrr.2021.102096

Ray, L. A., McGeary, J., Marshall, E., & Hutchison, K. E. (2006). Risk factors for alcohol misuse: examining heart rate reactivity to alcohol, alcohol sensitivity, and personality constructs. *Addictive Behaviors*, *31*(11), 1959-1973. https://doi.org/10.1016/j.addbeh.2006.01.010

Rehm, J., Kilian, C., Ferreira-Borges, C., Jernigan, D., Monteiro, M., Parry, C. D., ... & Manthey, J. (2020). Alcohol use in times of the COVID 19: Implications for monitoring and policy. *Drug and alcohol review*, *39*(4), 301-304. https://doi.org/10.1111/dar.13074

Rindfleisch, A., Malter, A. J., Ganesan, S., & Moorman, C. (2008). Cross-sectional versus longitudinal survey research: Concepts, findings, and guidelines. *Journal of marketing research*, *45*(3), 261-279. https://doi.org/10.1509/jmkr.45.3.261

Ritchie, H., & Roser, M. (2018). Alcohol consumption. *Our world in data*. https://ourworldindata.org/alcohol-consumption

Salari, N., Hosseinian-Far, A., Jalali, R., Vaisi-Raygani, A., Rasoulpoor, S., Mohammadi, M., ... & Khaledi-Paveh, B. (2020). Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Globalization and health*, *16*(1), 1-11. https://doi.org/10.1186/s12992-020-00589-w

Scherpenzeel, A. (2011). Data collection in a probability-based internet panel: how the LISS panel was built and how it can be used. *Bulletin of Sociological Methodology/Bulletin de Méthodologie Sociologique*, *109*(1), 56-61. DOI: 10.1177/0759106310387713

Schmits, E., & Glowacz, F. (2022). Changes in alcohol use during the COVID-19 pandemic:

Impact of the lockdown conditions and mental health factors. *International journal of mental health and addiction*, *20*, 1147-1158. https://doi.org/10.1007/s11469-020-00432-8

Simons, A. M., Koster, A., Groffen, D. A., & Bosma, H. (2017). Perceived classism and its relation with socioeconomic status, health, health behaviours and perceived inferiority: the Dutch Longitudinal Internet Studies for the Social Sciences (LISS) panel. *International Journal of Public Health*, *62*(4), 433-440. https://doi.org/10.1007/s00038-016-0880-2

Singh, J., & Singh, J. (2020). COVID-19 and its impact on society. *Electronic Research Journal of Social Sciences and Humanities*, *2*(1). 168-172. Retrieved from https://www.researchgate.net/profile/ElectronicJournals/publication/340769976_COVID_-_19%27s_Impact_on_the_Society/links/5e9c7948a6fdcca789282c41/COVID-19s-Impact-on-the-Society.pdf

Skurvydas, A., Lisinskiene, A., Lochbaum, M., Majauskiene, D., Valanciene, D., Dadeliene, R., ... & Sarkauskiene, A. (2021). Did COVID-19 pandemic change people's physical activity distribution, eating, and alcohol consumption habits as well as body mass index?. *International journal of environmental research and public health*, *18*(23), 12405. https://doi.org/10.3390/ijerph182312405

Sohi, I., Chrystoja, B. R., Rehm, J., Wells, S., Monteiro, M., Ali, S., & Shield, K. D. (2022). Changes in alcohol use during the COVID-19 pandemic and previous pandemics: A systematic review. *Alcoholism, clinical and experimental research*, *46*(4), 498–513. https://doi.org/10.1111/acer.14792

Thompson, K., Dutton, D. J., MacNabb, K., Liu, T., Blades, S., & Asbridge, M. (2021). Original quantitative research-Changes in alcohol consumption during the COVID-19 pandemic: exploring gender differences and the role of emotional distress. *Health Promotion and Chronic Disease Prevention in Canada: Research, Policy and*

Practice, 41(9), 254. https://doi.org/10.24095/hpcdp.41.9.02

Vall-Roqué, H., Andrés, A., & Saldaña, C. (2021). The impact of COVID-19 lockdown on social network sites use, body image disturbances and self-esteem among adolescent and young women. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *110*, 110293. https://doi.org/10.1016/j.pnpbp.2021.110293

Van der Velden P. G., Hyland P., Contino C., von Gaudecker H. M., Muffels R., & Das. M (2021). Anxiety and depression symptoms, the recovery from symptoms, and loneliness before and after the COVID-19 outbreak among the general population: Findings from a Dutch population-based longitudinal study. *Plos one*, *16*(1), e0245057. https://doi.org/10.1371/journal.pone.0245057

Van Zyl, L. E. (2021). Social study resources and social wellbeing before and during the intelligent COVID-19 lockdown in The Netherlands. *Social indicators research*, *157*(1), 393-415. https://doi.org/10.1007/s11205-021-02654-2

Villanueva-Blasco, V. J., Villanueva Silvestre, V., Isorna, M., Motos, P., Blay, P., & Vázquez-Martínez, A. (2021). Changes in Alcohol Consumption Pattern Based on Gender during COVID-19 Confinement in Spain. *International Journal of Environmental Research and Public Health*, *18*(15), 8028. https://doi.org/10.3390/ijerph18158028

Volk, A. A., Brazil, K. J., Franklin-Luther, P., Dane, A. V., & Vaillancourt, T. (2021). The influence of demographics and personality on COVID-19 coping in young adults. *Personality and Individual Differences*, *168*, 110398. https://doi.org/10.1016/j.paid.2020.110398

Wallenburg, I., Helderman, J. K., Jeurissen, P., & Bal, R. (2022). Unmasking a health care system: The Dutch policy response to the Covid-19 crisis. *Health Economics, Policy and Law*, *17*(1), 27-36. doi:10.1017/S1744133121000128

Wessely, S., Tappiser, M., Eisenburger, N., Feddern, S., Gehlhar, A., Kilimann, A., ... & Joisten, C. (2022). Changes in alcohol consumption, eating behaviors, and body weight during quarantine measures: Analysis of the CoCo-Fakt study. *Obesity Facts*. 1-11. https://doi.org/10.1159/000524352

Wijngaards, I., Sisouw de Zilwa, S., & Burger, M. J. (2020). Extraversion moderates the relationship between the stringency of COVID-19 protective measures and depressive symptoms. *Frontiers in Psychology*, 2607. https://doi.org/10.3389/fpsyg.2020.568907

Wootton, R. E., Greenstone, H. S., Abdellaoui, A., Denys, D., Verweij, K. J., Munafò, M. R., & Treur, J. L. (2021). Bidirectional effects between loneliness, smoking and alcohol use: evidence from a Mendelian randomization study. *Addiction*, *116*(2), 400-406. https://doi.org/10.1111/add.15142

World Health Organization. (n.d.). *WHO Coronavirus (COVID-19) Dashboard*. https://covid19.who.int/

World Population Review. (2020). *Alcohol Consumption by Country 2022*. https://worldpopulationreview.com/country-rankings/alcohol-consumption-by-country

Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M., Gill, H., Phan, L., ... & McIntyre, R. S. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of affective disorders*, *277*, 55-64. https://doi.org/10.1016/j.jad.2020.08.001

Yerkes, M. A., André, S. C., Besamusca, J. W., Kruyen, P. M., Remery, C. L., van der Zwan, R., ... & Geurts, S. A. (2020). 'Intelligent'lockdown, intelligent effects? Results from a survey on gender (in) equality in paid work, the division of childcare and household work, and quality of life among parents in the Netherlands during the Covid-19 lockdown. *PloS one*, *15*(11). https://doi.org/10.1371/journal.pone.0242249

Appendix

Appendix A. Questionnaires

Alcohol use item (revised)

How often did you have a drink containing alcohol over the last 12 months?

1	2	3	4	5	6	7	8
Not at all over the last 12 months	Once or twice a year	Once every two months	Once or twice a month	Once or twice a week	Three of four days per week	Five or six days per week	Almost every day

IPIP by Goldberg (1999)

Subscale Extraversion (10-item scale)

1. Am the life of the party.

2. Feel comfortable around people.

3. Start conversations.

4. Talk to a lot of different people at parties.

5. Don't mind being the center of attention.

6. Don't talk a lot.

7. Keep in the background.

8. Have little to say.

9. Don't like to draw attention to myself.

10. Am quiet around strangers.

1	2	3	4	5

Very inaccurate	Moderately accurate	Neither inaccurate nor accurate	Moderately accurate	Very accurate

Loneliness scale by de Jong Gierveld & van Tilburgs (2006)

6-item version

1. I have a sense of emptiness around me

2. There are enough people I can count on in case of a misfortune

3. I know a lot of people that I can fully rely on

4. There are enough people to whom I feel closely connected

5. I miss having people around me

6. I often feel deserted

1	2	3
Yes	More or less	No

Appendix B. Correlations Table

Table 3

Pearson Correlations between variables for each year

	1	2	3	4
		2018		
1. Alcohol use				
2. Extraversion	.13**			
3. Loneliness	-.11**	-.32**		
4. Gender	-.19**	-.01	-.01	
		2019		
1. Alcohol use				
2. Extraversion	.13**			
3. Loneliness	-.10**	.01		
4. Gender	-.19**	.03	-.01	
		2020		
1. Alcohol use				
2. Extraversion	.09**			
3. Loneliness	-.09**	-.24**		
4. Gender	-.18**	.02	-.01	

2021

1. Alcohol use			
2. Extraversion	.11**		
3. Loneliness	-.12**	-.25**	
4. Gender	-.19**	.01	-.02

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

Appendix C. Acknowledgement LISS Panel

In this paper we make use of data of the LISS (Longitudinal Internet Studies for the Social

sciences) panel administered by Centerdata (Tilburg University, The Netherlands).