A Remote Questionnaire-Based Study to Compare Alcohol Use in 1030 Final-Year High School Students in Split-Dalmatia County, Croatia Before and During the National Lockdown Due to the COVID-19 Pandemic

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Background: The COVID-19 pandemic affected drinking behaviors among adolescents. This remote questionnaire-based study aimed to compare alcohol use in 1030 final-year high school students in Split-Dalmatia County (SDC), Croatia before and during the national lockdown due to the COVID-19 pandemic.

Material/Methods: An online self-reported questionnaire survey was conducted among 1030 final-year high school students (57.96% female; mean age 17.71 years, SD=0.66) in SDC. The data were collected from June 6 to July 20, 2020 and from October 12 to December 28, 2020. Differences in drinking habits between groups were detected with the chi-squared ($\chi^2$) test and before and during the COVID-19 lockdown using the Z test.

Results: Before the lockdown, 84.66% of students were consuming alcohol, most frequently with friends (78.64%) and “to feel better” (29.51%), while during the lockdown, 44.76% of them were drinking, most frequently with friends (34.37%) and due to boredom (17.48%). Drinking alone ($P<0.005$) and with family members ($P=0.003$) significantly increased during the lockdown. No difference in drinking between girls and boys was found before the lockdown, but boys were drinking more during the lockdown ($P<0.001$). There was no difference in drinking prevalence in different schools before the lockdown, but during the lockdown, more students from vocational schools were drinking ($P<0.001$) and with higher frequency ($P=0.002$). Among 53.98% of students during the lockdown, a reduction in frequency of drinking was found ($P<0.001$), most significantly on islands ($P=0.05$).

Conclusions: During the lockdown due to the COVID-19 pandemic, alcohol consumption by final-year high school students in SDC significantly decreased, particularly in girls and in gymnasium/private school students.

Keywords: Adolescent • Alcohol Drinking • COVID-19

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Background

In December 2019, the novel SARS-CoV-2 virus was discovered in Wuhan, China [1]. In the next few months, it spread worldwide and by the end of August 2021, 217 558 771 people had been infected and 4 517 240 people had died [2]. On March 11, 2020, the WHO declared the COVID-19 pandemic [WHO, 2020], which resulted in various kinds of restrictive measures in many countries around the world to prevent further spread of the infection. The Croatian government established a national lockdown from March 19 to May 10, 2020. During that period, all cultural, religious, and sports events were prohibited, as well as gatherings of more than 5 people in one place, restriction of close personal contact, closure of all shops (except grocery stores and pharmacies), schools, and public transport. Such a sudden and dramatic change in everyday activities had a significant impact on physical [3] and mental health [4].

Adolescence is an especially sensitive period, often characterized as a period of storm and stress [5]. Restriction and prohibition of social contact with friends, attending school online, fear of unknown and severe illness of COVID-19, and change in everyday circumstances and activities can affect the mental health of adolescents. Some studies have proved this, showing higher rates of anxiety, depression, and stress due to the pandemic [6,7]. During the lockdown, many adolescents were feeling sad and lonely and experienced sleeping difficulties and problems related to school closures [8]. School closures can have a negative impact on students, especially for adolescents with autism spectrum disorders and mental health issues [9]. Isolation in an abusive home could result in increased rates of child abuse, neglect, and exploitation [9]. Excessive screen time, smart phone use, internet addiction, alcohol consumption, COVID-19-related worries, online learning difficulties, and increased conflict with parents negatively affect their mental health [6,8]. Adolescents’ greatest concerns in the COVID-19 crisis were about the disruption of their social interactions and activities, while concerns about infection were very low [10].

A significant increase in depressive symptoms and anxiety and a decrease in life satisfaction during the pandemic were especially found among girls [7,10]. These factors are associated with higher risk for suicidal behavior [11]. Children and adolescents are more likely to experience high rates of anxiety and depression during and after the pandemic [12], so it is important to realize that, compared to adults, the COVID-19 pandemic may have increased long-term adverse consequences on adolescent mental health [12].

In some countries, social media promoted alcohol use, and online misinformation on its protective effects during the pandemic was also reported [13]. Some nations banned alcohol sales during the lockdown, while others declared it an essential commodity [13]. In Croatia, it was possible to buy alcohol beverages in grocery stores for everyone older than 18 years, the same as before the pandemic. Purchases in clubs and cafes were impossible because they were closed.

Changes in frequency of alcohol consumption among adults were different in many countries during the lockdown [13-22]. Some studies found significantly more drinking among young adults during the lockdown [19,20], while others reported a significantly greater decrease among this population compared to older adults [21,22]. Having at least 1 child younger than age 18 years, having more children at home, depression, less social connectedness, income loss or higher income, living alone, younger age, being a non-healthcare worker, and being technically unemployed increased the risk for drinking during the pandemic [16,17,23]. Boredom, loneliness, and loss of daily structure and conviviality were some reasons for drinking during the lockdown [17]. Online socializing, drinking, and drinking with a child present increased during the lockdown [23].

It was found that the perceived availability of alcohol among adolescents dramatically declined during the pandemic [24]. On the other hand, some parents began to allow their teenagers to drink during family meals or special occasions with them during the lockdown [25]. A few studies found an increase in frequency of alcohol consumption during the COVID-19 pandemic in adolescents [6,20,26]; others reported a significant decrease [7,27-32]; while some found no difference in drinking among adolescents before and during the pandemic [33,34]. Alcohol-related emergencies increased during the lockdown [13], while acute alcohol intoxication among adolescents decreased [35].

In Croatia, the number of adults who were not drinking and those who drank more than 7 drinks a week during the lockdown significantly increased [26]. We could not find any previously published study on alcohol consumption among Croatian adolescents, so the aim of the present study was to determine the prevalence and patterns of alcohol consumption among final-year high school students during the COVID-19 pandemic lockdown in Split-Dalmatia County (SDC), Croatia and to compare it with the pre-pandemic period.

Therefore, this remote questionnaire-based study aimed to compare alcohol use in 1030 final-year high school students in SDC before versus during the national lockdown due to the COVID-19 pandemic.

Material and Methods

Ethics Approval

The study was approved by the Ethics Committee of the School of Medicine, University of Split on June 5, 2020 (Class:
003-08/20-03/0005; File No: 2181-198-03-04-20-0069) and all study procedures were performed in accordance with the Helsinki Declaration of 1964 as revised in 2013. Participating in the questionnaire survey was voluntary, and the first page of the questionnaire contained information on study goals and the questionnaire itself and ended with a statement that participating in the survey was considered to indicate informed consent to participate in the study. Participant confidentiality and anonymity were ensured by the fact that only the authors had access to the survey data and the participants never gave their names. The anonymity of the respondents who wanted to participate in the prize drawing was ensured by their individual secret password which they had to provide at the end of the questionnaire.

Study Participants

SDC is situated in the central-southern part of Croatia. It has a population of 454,798 inhabitants [37]. In Croatia, students start high school when they complete 8 years of primary school, generally at age of 14 or 15. The duration of high school education is 3 to 4 years, depending on the school type and program. There are 49 high schools in the county. Most (33) are located in Split and nearby seaside towns and 16 are in rural parts of the county and on islands. There are 9 gymnasiums, 29 vocational, and 11 mixed schools (with both gymnasium and vocational programs). Among them, there are 5 private schools and 2 public law schools. A total of 4,347 final-year high students (3rd or 4th grade, depending on the duration of the school programs in different schools) attended these schools in the year 2020/2021. An online link for the questionnaire survey was sent to school principals and/or pedagogues of all 49 high schools and they forwarded it to all students who attended the final year of their high school education in their schools. A total of 1,263 students completed the survey (response rate 29.05%). Exclusion criteria were age <16 or >20 years, invalid answers (e.g., age 1000 years, gravyeard, and drug school), incoherent response pattern, and living outside SDC. The inclusion criteria were students in the last year of their high school education, aged 16 to 20 years, who attended high schools in SDC, agreed to participate in the study, and gave valid and coherent answers. After we excluded 233 of the respondents for not fulfilling the inclusion criteria, we included 1030 participants. To detect differences in drinking habits according to the school type, we divided them into 2 groups: (1) gymnasiums/private schools (includes students who attend gymnasiums, students from mixed schools who attend gymnasium programs, private and public law schools) and (2) vocational schools (including students from vocational schools and those who attend vocational programs in mixed schools). To detect differences according to school location, participants were divided into 3 groups: (1) Split and nearby seaside towns, (2) rural areas (>30 km distance from the seaside), and (3) islands.

Methods

Because of the epidemiological situation with the COVID-19 pandemic, our study was performed online. A questionnaire survey about alcohol consumption before and during the lockdown was sent online to all final-year high school students in all of the 49 high schools in SDC. The data were collected in 2 waves: from June 6 to July 20, 2020 and from October 12 to December 28, 2020. Before the study started, we sent an informative letter and contacted by phone and email school principals and/or school psychologists/pedagogues in all 49 high schools in SDC. We informed them about the study, including the aim and methods. After they gave us their consent, we sent them an online link which they had to forward to all of their final-year high school students to take the survey. Participants were able to access the online link in school websites, virtual classrooms, or other network groups (smartphone messaging applications). There was an informative letter at the top of the survey describing the aim and methods of the study. Access to the survey was voluntary and after reading the informative letter, starting to take the survey was considered as a providing consent for study participation. Students were only able to take the survey 1 time. To achieve a greater response and to make our results more representative and realistic, we rewarded 1 randomly chosen participant with 1000 Croatian kunas (HRK). The survey was anonymous, so the students who wanted to participate in the prize drawing had to enter a secret password at the end of the survey.

Study Questionnaire

We used Google Form to design a questionnaire survey. A summarized link to access the survey was sent to school principals and/or pedagogues to distribute it to students. This study was part of a larger study exploring prevalence and risk factors for risky behaviors (alcohol, nicotine, and substance use) among final-year high school students in SDC, and the results of the larger study will be published later. The survey contained 74 questions. The first part of the questionnaire explored sociodemographic variables: gender, age; school attendance and success; sports participation; living situation (place, living with parents or alone, having brothers/sisters); parents’ education, employment, marriage status, and alcohol/substance abuse; monthly allowance; working status and scholarship; religiosity; having a boyfriend/girlfriend; socialization habits; and depressive and suicidal thoughts. The other part of the questionnaire contained questions on: smoking and substance use habits; age and circumstances of first alcohol and drug use; types of preferred alcohol beverages; place where drinking most often occurs; quantity of beverages consumed; frequency of getting drunk and drunkenness consequences (being admitted and/or hospitalized for alcohol intoxication, getting into a fight and/or injured, risky sexual behavior under the influence of alcohol), and methods of obtaining alcohol drinks.
Drinking habits before the lockdown period were assessed with the following questions: 1. How often do you consume alcohol? with possible answers: a) every day, b) 3-6 times a week, c) 1-2 times a week, d) 2-3 times a month, e) ≤1 time per month, f) 4-11 times a year, g) 1-3 times a year, h) I do not consume alcohol; 2. For what reason do you most often consume alcohol? with possible answers: a) boredom, b) to „be cool”, c) not to be the only one who isn’t drinking, d) to feel better, e) from habit, f) for emotional reasons (sadness, anger, etc.), g) other... (the respondents could write down the answer), h) I do not consume alcohol; 3. Who do you most often consume alcohol with? with possible answers: a) alone, b) with family members, c) with a boyfriend/girlfriend, d) with friends, e) other... (the respondents could write down the answer, f) I have not consumed alcohol. The drinking habits during the lockdown were assessed with the same type of questions and answers (except for frequency of drinking when the answers f) 4-11 times a year and g) 1-3 times a year were not offered to respondents due to the short duration of the lockdown period in 1.5 months) but referred to the period of lockdown described as „during the prescribed national measures gathering banning more than 5 people, so-called „lockdown period” from March 19 to May 10, 2020". Participants were also asked to indicate alcohol consumption during the lockdown period compared to the period before by their own opinion, with possible answers: a) I have consumed alcohol more often than usual, b) I have consumed alcohol less than usual, c) I have consumed alcohol in the same way as usual, d) I wanted to consume alcohol, but I did not have the opportunity to get it, e) I did not consume alcohol during the pandemic even though I usually consume it, f) I consumed alcohol during a pandemic even though I do not consume it usually. The frequency of meeting with friends during the confinement period was also explored with the question: During the prescribed measures gathering banning of more than 5 people („lockdown period” from March 19, to May 10, 2020) how often did you hang out with your friends? with possible answers: a) never, b) ≤1 time per month, c) 2-3 times a month, d) 1-2 times a week, e) 3-6 times a week, f) every day.

Statistical Analysis

We used SPSS 25 (IBM, Armonk, New York; 2017) statistics software for statistical analyses. The study size was determined using a calculator for defining the study sample size with a power of 95%. Data are presented in tables and graphs. Numeric variables are shown with mean and standard deviation. The normality of distribution was previously tested by Kolmogorov-Smirnov test. The prevalence of defined drinking habits such as frequency, reasons, and social context of alcohol consumption are presented with absolute and percentage values. We used the χ² test to detect differences in examined variables between groups. We used the χ² test to detect possible associations between school type and location with changes in drinking habits during the lockdown to explore if there were any differences in drinking habits during the lockdown between gymnasium/private and vocational school students. The differences in changes of drinking habits during the lockdown between students in Split and surrounding areas, rural areas, and islands were detected with the same method. The differences in frequency of meeting with friends according to the school type, location, and gender were also examined. The frequency of meeting with friends was scored on a scale from 0 to 5, where the value 0 indicated “no meeting at all” and 5 indicated “meeting every day”. The Kruskal-Wallis test was used to detect differences in frequency of meeting with friends according to the location (an independent category variable). The difference in socializing with friends according to the school type and gender was detected with the Mann-Whitney U test. The conclusion about detected differences was made on the basis of cumulative values using cumulative percentage series “more than”, where a higher value indicates more frequent socializing. The Z test of differences in proportions of 2 independent variables was used to detect difference in drinking habits (frequency, reasons, and social context of drinking) before and during the COVID-19 lockdown. P value <0.05 was considered statistically significant.

Results

Characteristics of the Study Participants

Among the 1030 respondents who met the inclusion criteria, there were 433 (42.04%) boys and 597 (57.96%) girls. The mean age was 17.71±0.66 years. There were 425 (41.26%) students attending gymnasiums/private schools and 605 (58.74%) attending vocational schools in SDC; 826 students (80.19%) attended schools in Split and nearby seaside towns, while 204 (19.81%) attended schools on islands and rural parts of the SDC, 155 (15.05%) of them in rural areas and 49 (4.76%) on islands.

Characteristics of Alcohol Consumption Among Final-Year High School Students in SDC During the COVID-19 Pandemic Lockdown

During the COVID-19 pandemic lockdown, 269 (26.12%) of our respondents did not meet with their friends. On the other hand, 177 (17.18%) of them were meeting with their friends every day and 108 (10.49%) of them met with friends 3-6 times a week (P<0.001, χ²=93.36)

The majority of students (55.24%) did not consume alcohol at all during the lockdown, while 22 (2.14%) students were drinking alcohol every day (P<0.001) (Table 1). Students who consumed alcohol most frequently did it with their friends (34.37%) and because they were bored (17.48%). More details
about frequency, social context, and reasons for drinking during the COVID-19 lockdown are shown in Table 1.

**Differences in Alcohol Consumption Among Final-Year High School Students In SDC Before and During the National COVID-19 Pandemic Lockdown**

Before the lockdown, 84.66% of students were consuming alcohol, while during the lockdown, 44.76% of them were drinking ($P<0.001$). Before the lockdown, there was no gender difference in drinking prevalence (83.37% of boys and 85.59% of girls were drinking; $\chi^2=0.955; P=0.328$), while during the lockdown a significantly higher percentage of boys consumed alcohol than girls (51.04% vs 40.20%; $\chi^2=11.92; P<0.001$).

Before the lockdown, alcohol was most commonly consumed 2-3 times a month, while during the lockdown it was consumed ≤1 time a month ($P<0.001$). Figure 1A shows more details about frequency of alcohol consumption before and during the COVID-19 pandemic lockdown.

Drinking with friends significantly decreased during the lockdown (from 78.64% to 34.37%; $P<0.001$). On the other hand, there was a significant increase in alcohol consumption with family members (from 2.62% to 5.15%; $P=0.003$), alone (from 1.75% to 3.79%; $P=0.005$), and with more than 1 group (alone and with friends or alone with family members; from 0.00% to 0.48%; $P=0.025$), as shown in Figure 1B. There was no significant difference in drinking with girlfriend/boyfriend before and during the lockdown ($P=0.175$).

The most common reason for drinking before the lockdown was “to feel better” (29.51%). During the lockdown, the most common reason was “being bored” (17.48%). There was a significant decrease in most of the reasons for drinking: “to feel better” ($P<0.001$), “not to be the only one who isn’t drinking ($P<0.001$), from habit ($P<0.001$), for emotional reasons (sadness, anger, fear of disease etc.) ($P=0.006$), social event ($P=0.016$), “to be cool” ($P<0.001$), and other reasons ($P<0.001$), but we found no difference in drinking due to boredom before and during the lockdown ($P=0.408$). Figure 1C shows the distribution of reasons for drinking among

| Alcohol consumption | N   | %    | $\chi^2$ | $P$  |
|---------------------|-----|------|----------|------|
| Frequency           |     |      |          |      |
| Not once            | 569 | 55.24| 1218.30  | <0.001|
| ≤1 a month          | 196 | 19.03|          |      |
| 2-3 times a month   | 123 | 11.94|          |      |
| 1-2 times a week    | 82  | 7.96 |          |      |
| 3-6 times a week    | 38  | 3.69 |          |      |
| Every day           | 22  | 2.14 |          |      |
| Social context      |     |      |          |      |
| Did not drink       | 569 | 55.24| 1611.93  | <0.001|
| With friends        | 354 | 34.37|          |      |
| With family members | 53  | 5.15 |          |      |
| Alone               | 39  | 3.79 |          |      |
| With girlfriend/boyfriend | 10 | 0.97 |          |      |
| More than one group | 5   | 0.48 |          |      |
| Reason              |     |      |          |      |
| Did not drink       | 569 | 55.24| 2276.46  | <0.001|
| Being bored         | 180 | 17.48|          |      |
| To feel better      | 132 | 12.81|          |      |
| From habit          | 46  | 4.47 |          |      |
| From emotional reasons (sadness, anger, fear of disease etc.) | 32 | 3.11 |          |      |
| Other reasons       | 30  | 2.91 |          |      |
| Social event        | 24  | 2.33 |          |      |
| To not to be the only one who isn’t drinking | 14 | 1.36 |          |      |
| To be ‘cool’        | 3   | 0.29 |          |      |
participants of the study in absolute numbers before and during the pandemic.

Among 53.98% of students, the frequency of drinking significantly decreased during the lockdown ($P<0.001$), but for 15.63% of them it increased ($\chi^2=231.24; P<0.001$).

Students indicated they believed that alcohol consumption significantly decreased during the lockdown ($P<0.001$). Among students who used to drink before, 33.98% did not drink at all during the lockdown and 26.41% were drinking less than usual (Table 2).

**Differences in Alcohol Consumption Before and During the Lockdown Among Final-Year High School Students In SDC According to School Type and Location**

Before the lockdown, alcohol was most frequently consumed on islands ($P=0.007$), while during the lockdown, consumption was the highest in rural areas ($P<0.001$). Before the lockdown, there was no significant difference in drinking among students in gymnasiums/private schools and vocational schools ($P=0.751$), while during the lockdown, alcohol consumption was higher in vocational schools ($P<0.001$). Table 3 shows more details of alcohol consumption according to the school type and location.

![Bar chart A](image1)

![Bar chart B](image2)
There was significantly greater reduction in drinking frequency during the lockdown among students in gymnasiums/private schools than in vocational schools ($P=0.002$) and among those who were attending schools on islands ($P=0.050$). The most significant increase was found among students on islands and in vocational schools (Table 4).

**Frequency of Socializing with Friends During the Lockdown**

Students attending vocational schools met with their friends significantly more frequently during the lockdown than did students in gymnasiums/private schools ($Z=7.52; P<0.001$), as well as students from rural parts compared to those in Split and on islands ($H=10.84; P=0.044$). Boys also socialized with friends significantly more during the lockdown compared to girls ($Z=20.39; P<0.001$) (Table 5).

**Discussion**

Our study found a significant reduction of alcohol consumption among final-year high school students in SDC during the COVID-19 lockdown, especially among girls and students in gymnasiums/private schools. The decrease in percentage of drinkers was the greatest in Split and surrounding areas, and the decrease in frequency of drinking was greatest on islands.
To the best of our knowledge, this is the first study to explore changes of alcohol consumption during the COVID-19 lockdown among adolescents in Croatia and differences in drinking habits according to location and school type.

The results of our study showed a high prevalence of drinking among final-year high school students before the lockdown (84.66%). These results are similar to the ESPAD 2019 report (90% among Croatian adolescents) [38] and an Australian study (between 76.6% and 85.4% of Australian adolescents) [32], and are much higher than in a Brazilian study (17.72%), but their participants were younger [29]. It has been shown that drinking is most common among older high school students [7,39]; therefore, we examined drinking habits of students older than age 16 years.

The percentage of alcohol drinkers among our respondents decreased from 84.66% before to 44.76% during the lockdown. One study reported a decreased percentage of alcohol users, but an increase in frequency of consumption [27]. Results of our study showed not only reduced prevalence of drinking but also a significant decrease in frequency of alcohol consumption. Over half (53.98%) of our respondents decreased their drinking frequency. In contrast, Sen et al reported that 53.4% of Indonesian adolescents increased their drinking during the COVID-19 pandemic lockdown [26]. An Australian study found a 17% reduction in overall consumption (frequency×quantity) among their participants [32].

Our study did not find a difference in alcohol consumption between boys and girls before the pandemic lockdown, similar to another study in this area [39]. During the lockdown, boys in SDC were drinking more than girls, possibly because they were more frequently meeting with their friends and might on these occasions consume alcohol. An Indonesian study reported increased alcohol consumption among boys during the lockdown [26], while others showed an increased frequency of drinking among girls during the pandemic [27]. Some other studies found no significant difference between boys and girls [7,14,29,32].

The lockdown resulted in a 2.2-fold decrease in drinking with friends among our respondents. This could be the most important reason for such a significant decrease in alcohol consumption among our respondents during the pandemic. Because alcohol is most commonly consumed with friends, restriction of social contact during the COVID-19 pandemic led to decreased alcohol consumption among adolescents, as shown in some other studies [31,32]. On the other hand, the results of our study found a nearly 2-fold increase in drinking with family

### Table 3. Prevalence of alcohol consumption among final-year high school students in Split-Dalmatia County (SDC) before and during the national COVID-19 lockdown period (from March 19 to May 10, 2020), according to location and type of school attended (N=1030).

| Alcohol consumption (%) | Split and seaside towns | Islands | Rural parts | χ²  | P   |
|-------------------------|-------------------------|---------|-------------|-----|-----|
| Before the lockdown     | 82.93                   | 93.88   | 90.97       | 9.86| 0.007|
| During the lockdown     | 41.65                   | 44.90   | 61.29       | 20.37| <0.001|

### Table 4. Changes in frequency of alcohol consumption among final-year high school students in Split-Dalmatia County (SDC) during the COVID-19 pandemic lockdown (from March 19 to May 10, 2020) compared to before the lockdown, according to the school type and location (N=1030).

| Decrease | The same | Increase | χ² | P  |
|----------|----------|----------|----|----|
| School type | Gymnasiums/private schools | 60.00% | 28.00% | 12.00% | 12.318 | 0.002 |
|           | Vocational schools      | 49.75% | 32.07% | 18.18% |
| Location | Split and surrounding   | 54.96% | 30.27% | 14.77% | 9.413 | 0.050 |
|           | Rural parts             | 45.81% | 35.48% | 18.71% |
|           | Islands                 | 63.27% | 16.33% | 20.41% |
members. Other studies reported even higher prevalence of substances use with parents (27.8% vs 5.15% among our respondents) [27]. A 2.2-fold increase in solitary drinking was also found among adolescents in our study, as in some studies among adults [13]. Canadian adolescents were more frequently drinking alone (20.8%) than with friends (13.4%) during the pandemic [27], while our respondents were drinking more with friends (34.37%) than alone (3.79%). There was a significant reduction in drinking for emotional reasons during the lockdown among our participants, although some studies reported higher risks for increased alcohol consumption among some groups of adolescents during the pandemic [30, 40]. A Canadian study reported that 8% of school-aged youth used alcohol to cope with COVID-19-related changes [41]. This type of behavior was significantly higher among girls [41]. Our results possibly indicate that the pandemic lockdown did not have as strong a negative effect on mental health of adolescents in SDC as in other countries, but this needs to be explored in further studies.

The most common reason for drinking during the pandemic among our respondents was boredom (17.48%). An Australian study found boredom was the most frequent reason for increased alcohol consumption among their participants (78%) [32]. The most common reason for decreased consumption in their study was “fewer opportunities to be with people/

Table 5. Frequency of meeting with friends during the national COVID-19 pandemic lockdown (from March 19 to May 10, 2020) among final-year high school students in Split-Dalmatia County (SDC), according to: location of school attendance, type of school, and gender (N=1030).

| Frequency of socializing | Islands | FP | Rural | FP | Split | FP |
|-------------------------|---------|----|-------|----|-------|----|
| Not once                | N       | %  | n     | %  | N     | %  |
| 1-2 times a week        | 5       | 10.20 | 33    | 21.29 | 147   | 17.80 |
| 2-3 times a week        | 6       | 12.24 | 20    | 12.90 | 98    | 11.86 |
| Every day               | 12      | 24.49 | 43    | 27.74 | 122   | 14.77 |

Kruskall-Wallis test; H=10.48; p=0.044.

| Frequency of socializing | Gymnasiums/private schools | FP | Vocational schools | FP |
|-------------------------|-----------------------------|----|-------------------|----|
| Not once                | N                           | %  | N                 | %  |
| 1-2 times a week        | 61                           | 14.35 | 63                 | 10.41 |
| 2-3 times a week        | 66                           | 15.53 | 119                | 19.67 |
| Every day               | 39                           | 9.18   | 138                | 22.81 |

Mann-Whitney U test; Z=7.52; p<0.001.

| Frequency of socializing | Boys | FP | Girls | FP |
|-------------------------|------|----|-------|----|
| Not once                | N    | %  | N     | %  |
| 1-2 times a week        | 62   | 14.32 | 105   | 17.59 |
| 2-3 times a week        | 59   | 13.62 | 65    | 10.89 |
| Every day               | 49   | 11.32 | 59    | 9.88  |

Mann-Whitney U test; Z=20.39; p<0.001.
go out to drink” (91.2%) [32]. That is also in agreement with our results, where reducing drinking with friends resulted in overall reduction of drinking.

Our study showed that changes in drinking habits were associated with school type and place. Before the lockdown, students from gymnasiums/private schools and vocational schools were drinking with the same prevalence and frequency, while during the lockdown, a higher percentage of students from vocational schools were drinking. There was also a larger increase in frequency of alcohol consumption (18.18%) in vocational schools, while the frequency of drinking among students from gymnasiums/private schools decreased more (60.00%). This could be the result of significantly more frequent socializing with friends among students from vocational schools during the lockdown. It has been found that keeping moderate/high COVID-19 social distancing among adolescents resulted in lower alcohol use among them than among those who kept low social distancing [31]. Roges et al also found that students attending vocational and educational training schools had higher risk for hazardous alcohol drinking than other students, and that they had 1.87-fold higher risk of worsening substance use patterns during the lockdown [28].

In our study, the highest percentage of alcohol users before the lockdown was on islands, while during the lockdown, it was in the rural areas. The greatest reduction in frequency of drinking was on islands (63.27%). Interestingly, the greatest increase in drinking frequency was also on islands (20.41%). These results can probably be explained by the fact that the students from rural areas and on islands spent significantly more time socializing with their friends during the lockdown than those in Split and surrounding areas.

Although we did not examine changes in perceived availability of alcohol drinks during the lockdown, we assume it was reduced and also resulted in decreased alcohol consumption. Adolescents were spending more time at home under their parents’ supervision and less frequently socializing with their friends due to the lockdown restriction measures. Clubs and café bars were closed and grocery stores were also closed earlier than before. The results of our study indicate that reduction in alcohol consumption among adolescents was a side effect of the strict measures during the COVID-19 pandemic. One Italian study showed a significant increase in severe alcohol intoxications after the lockdown ended compared to during the lockdown [42]. To assess the overall impact of the COVID-19 pandemic and lockdown, further studies are needed to explore its impact on adolescents’ mental wellbeing and drinking habits after the lockdown among adolescents in SDC.

**Limitations of the Study**

Our study design may have caused some bias because it was an online self-reported questionnaire. The link was sent online to all students, but only those who were willing to participate in the study and wanted to complete the entire survey questionnaire were included, so the results possibly do not represent the general population. However, we had a large sample of 1030 respondents (approximately 24% of all final-year high school students in SDC), and all invalid and incoherent answers were excluded from the study. The questionnaire was self-reported, so we had to rely on the sincerity of the participants’ answers. Due to the epidemiological situation, an online survey was the only option. The data on alcohol consumption before and during the lockdown were collected at the same time and after the lockdown (from June to July 2020 and October to December 2020, while the lockdown lasted from March to May 2020), so we had to rely on students’ memory of their behaviors during that time. Also, the lockdown lasted only 1.5 months. Still, to the best of our knowledge, this is the first study to include all schools in SDC and to explore differences between drinking behaviors among adolescents according to the school type and location. To the best of our knowledge, this is also the first study of alcohol consumption among adolescents during the COVID-19 pandemic lockdown in Croatia. Due to the large number of participants and the fact that the study covered a wide area, as well as the fact that the restrictive measures were the same in all parts of the country, we can possibly generalize these results to all Croatian adolescents, but further studies are needed.

**Conclusions**

During the COVID-19 pandemic lockdown, alcohol consumption by final-year high school students in SDC significantly decreased, particularly in girls and in gymnasium/private school students.

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**Declaration of Figures’ Authenticity**

All figures submitted have been created by the authors, who confirm that the images are original with no duplication and have not been previously published in whole or in part.
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