Adolescents’ Alcohol Use and Related Expectancies before and during the Early COVID-19 Pandemic: Evidence from the Nationwide MyLife Study

Jasmina Burdzovic Andreas, Geir Scott Brunborg

Keywords
Adolescence · Hazardous alcohol use · Alcohol expectancies · COVID-19 pandemic

Abstract
Introduction: We examined a range of alcohol use indicators among Norwegian adolescents before and during the early COVID-19 pandemic. Methods: We examined two cohorts of Norwegian 16-year-olds from the nationwide MyLife study who entered high school in fall 2020 (i.e., COVID-19 pandemic cohort; n = 915) and fall 2019/18 (i.e., prepandemic cohort; n = 1,621). Through e-surveys, adolescents reported their past year drinking frequencies and quantities (generating the Alcohol Use Disorders Identification Test-Concise; AUDIT-C scores) and completed Social Facilitation (SF) and Tension Reduction (TR) subscales of the Alcohol Outcome Expectancies Scale. Cohort differences across these outcomes were examined with linear and modified Poisson regression models. Results: There were no cohort differences in the proportion of adolescents who reported drinking in the past year or in drinking/binge drinking frequencies. However, alcohol quantities consumed on a typical drinking day were 1/3 of a drink greater in the COVID-19 cohort than in the prepandemic cohort; aIRR (95% CI) = 1.13 (1.02–1.25). These consumption differences compounded into significantly greater AUDIT-C scores (aIRR [95% CI] = 1.16 [1.02–1.32]) and positive AUDIT-C screens (31.2% vs. 26.4%; aRR [95% CI] = 1.21 [1.07–1.36]) in the COVID-19 cohort. In terms of alcohol-related expectancies, there were no SF differences, but the COVID-19 cohort reported significantly greater TR expectancies; b (95% CI) = 0.11 (0.02–0.20). Conclusion: Despite the 2020 lockdown, Norwegian adolescents who started high school during the first pandemic year did not differ from their prepandemic peers in terms of how many of them drank, how often they drank, or in prosocial expectations they had of alcohol use. However, they consumed greater alcohol quantities per drinking day, had greater AUDIT-C scores, and reported greater tension reduction expectations of alcohol use. These results underscore the value of examining adolescents’ alcohol-related behaviors during the COVID-19 pandemic above and beyond the basic drinking prevalence and frequencies.

Introduction
The COVID-19 pandemic and the accompanying measures profoundly altered the lives and affected multiple domains of adolescents’ health and adjustment, in-
cluding their alcohol use [1–9]. Indeed, the emerging research paints a complex picture of adolescent alcohol use during the early course of the pandemic [8, 10], including evidence of no substantial changes, but also of both the declines and increases across diverse alcohol-related outcomes. Similar complexities of alcohol-related behaviors were observed among young adults and college students following pandemic-specific disruptions and campus closures [11–14]. Thus, understanding how adolescents’ alcohol-related behaviors may have changed during the pandemic remains a public health priority [15, 16], especially as such an exogenous shock during sensitive developmental periods may precipitate critical transitions and shape subsequent alcohol use trajectories [17].

Consequently, this study aimed to examine a range of alcohol-related outcomes in two cohorts of Norwegian adolescents: one assessed before and one assessed during the pandemic. First, while there is some evidence that the random conditions were associated with changing drinking patterns of Norwegian adults, it remains less clear whether this was the case, and if so, how, for Norwegian youth as well. For example, while most national studies observed minimal or no population-level changes in alcohol use in Norway during the initial pandemic [18–20], more (hazardous) drinking was nevertheless reported by adults experiencing greater worries, quarantine, or work from home orders [21], and by those characterized by greater prepandemic alcohol consumption, including heavy drinking [19, 20, 22]. Still, despite the clear developmental relevance [23–25], only a handful of non-Norwegian studies focused specifically on adolescents [5] or examined their hazardous alcohol use during the COVID-19 period [4, 6]. Second, recent research also suggests that at least some of the observed changes in substance use during the pandemic may be accompanied by changes in expectations and motivations for use both among adults and youth [9, 11, 13, 22], but research on adolescents is still somewhat lacking. Adolescents’ positive alcohol-related cognitions – such as the expectations that alcohol will help improve social experiences or negative moods, for example – are especially developmentally pertinent as they relate to various aspects of alcohol use over time [26–29]. Detecting pandemic-related differences, if any, in such salient precursors of (problem) alcohol use may thus be relevant to understanding alcohol-related behaviors in youth during, but possibly also after, the pandemic period. Consequently, in addition to basic epidemiological indicators of adolescent alcohol use (i.e., prevalence and frequency), we also examined their more complex alcohol use patterns (i.e., hazardous drinking) and their alcohol use expectancies in relation to early pandemic conditions in Norway.

Specifically, we examined if there were pandemic-related differences across multiple indicators of alcohol use and alcohol expectations among adolescents in Norway – the first country to impose a strict nationwide lockdown on March 12, 2020 [30, 31]. In addition to physical closures of all educational institutions and all businesses/services save for grocery stores, pharmacies, and gas stations; cancellations and/or strict limitations on social, cultural, sports, and religious gatherings; and restrictions of both domestic and international travel throughout first half of 2020 [30, 31], this lockdown also entailed regulations on serving of alcohol [18]. Specifically, alcohol-serving venues such as bars and restaurants were closed during early 2020 under the umbrella shutdown of all nonessential services. Although the nationwide lockdown was eased and replaced with local control strategies as of May–June 2020 [30, 31], limitations on serving of alcohol – including serving at dining tables only and no later than 11:00 p.m. – largely remained in place as part of national guidelines well into spring 2022. High school graduation ceremonies traditionally accompanied by an extensive partying period were principally canceled or held “digitally” at the end of spring 2020 semester. Both the activities and the amount of time spent with peers were also likely substantially transformed due to the rules regulating both the nature and size of all gatherings.

In sum, the initial pandemic year marked by school closures, work from home orders for working parents, and strict restrictions on nightlife, entertainment, and get-togethers fundamentally re-shaped the lives and experiences of Norwegian youth during this period. How these conditions may have shaped various aspects of their alcohol use was the main question investigated in this study. To answer this question, we examined how alcohol use, hazardous alcohol use, and alcohol expectations may have differed across two temporally adjacent but otherwise sociodemographically comparable adolescent cohorts; i.e., between the prepandemic (2018/2019) and COVID-19 (2020) cohorts of grade 11 students from Norway.

Methods

Study Design and Procedures
We analyzed data from the ongoing MyLife longitudinal study of adolescent development and substance use [32]. MyLife was initiated in 2017 (T1 baseline), and it aimed to enroll all students in grades 8, 9, and 10 from 33 middle schools throughout Norway. The study was approved by the Norwegian Data Protection Au-
COVID-19 and Alcohol Use in Norwegian Youth

DOI: 10.1159/000526584

The National Committee for Research Ethics in the Social Sciences and Humanities (reference No.: 2016/137). Because at the time of enrollment all potential participants were minors, parental consent was sought prior to data collection; students eventually provided their assent through study participation.

All eligible students – that is, those for whom parental consent was obtained – were invited for annual participation involving e-surveys completion during school hours while in middle school (i.e., grades 8–10) and individually once in high school (i.e., grades 11–13). Baseline T1 assessment was completed in fall 2017, when 2,975 of the eligible 3,512 students participated. Follow-up longitudinal assessments were completed during the fall semesters of 2018 (T2; \(n = 2,875\)), 2019 (T3; \(n = 2,651\)), and 2020 (T4; \(n = 2,323\)). Adolescents were reimbursed for their time through a 1,000 NOK (EUR 100) contribution to their class savings account while in middle school and through individual gift cards valued 200–250 NOK (EUR 20–25) once in high school. Participation remains entirely voluntary, and all participants are free to withdraw from the study at any time. Study protocol and core cohort were described in detail elsewhere [32, 33]. Because the MyLife study utilized accelerated longitudinal design [34] and assessed three adolescent cohorts/school grades over time, the study assessment waves, adolescent cohorts/grades, and secular period of interest (i.e., before- vs. during the pandemic) could be examined separately. Grade 11 was selected for all analyses because the youngest baseline cohort entered high school (i.e., grade 11) in August, while the two older cohorts entered high school in the two preceding years. Identical analytical approaches were used in previous reports from these data to examine adolescent mental and physical health in relation to the COVID-19 pandemic [33].

Sample

We analyzed two sociodemographically comparable cohorts of Norwegian adolescents who started grade 11 in high school either during fall 2020 (i.e., the COVID-19 pandemic cohort, \(n = 915\)) or during fall 2019 and 2018 (combined into the single prepandemic cohort for ease of analyses, \(n = 1,621\)). Because school enrollment in Norway is largely determined by the birth year, most students start high school (11th grade) during the fall of the year of their 16th birthday. Consequently, our sample included two cohorts of 16-year-old adolescents and the developmental period traditionally associated with both the onset and escalation of alcohol use in Norway [35, 36].

Measures

Adolescents completed comprehensive e-surveys during the fall semester of their first year in high school.

Alcohol Use

Students reported frequency of drinking and binge drinking (i.e., consuming 5 or more alcoholic drinks in 1 day). The original response categories ranging from “none”; “1–2 days”; to “every day or almost every day” were dichotomized to obtain estimates of any alcohol use during previous year; that is, of past year drinking prevalence. They were also recoded into the actual number of drinking and binge drinking days for those who did drink using the mid-point method. For example, those reporting using alcohol 2–3 days/month were assigned the value of 30 drinking days (i.e., 2.5 days × 12 months) in the past year. Finally, drinkers reported typical alcohol quantities; that is, the usual number of drinks consumed on a drinking day.

Hazardous Alcohol Use

The three items above also constitute the slightly adjusted AUDIT-C screener for hazardous alcohol use, which is a concise version of the Alcohol Use Disorders Identification Test (AUDIT) [37]. AUDIT-C has been successfully used to identify problem drinking among various youth populations, including those from the Nordic region [38–40]. The response options of the above frequency and quantity items were recoded to align with the AUDIT-C scoring, and the resulting sum scores ranged from 0 to 12. Internal consistency of the short scale was \(\alpha \geq 0.77\) at all study assessments. We also dichotomized AUDIT-C scores into negative (AUDIT-C scores < 3) and positive screeners (AUDIT-C scores ≥ 3) following the established international and Nordic cut-off values for identification of binge drinkers in adolescent samples [38–40].

Alcohol Expectancies

All students completed the 6-item Social Facilitation and the 3-item Tension Reduction subscales from the Alcohol Outcome Expectancies Scale (AOES) [41], indicating what they think happens when/if they drink. Both the subscales tap into the positive expectations resulting from alcohol use, such as “I am more sociable” (Social Facilitation subscale, SF) and “It takes away my negative moods and feelings” (Tension Reduction subscale, TR). The original response options were slightly modified to reflect a 5-point scale, ranging from 1 = “definitely not” to 5 = “definitely.” The corresponding SF and TR scores were computed as averages of the respective subscale items; both had strong internal consistency (Cronbach’s \(\alpha\geq0.88\) for SF and Cronbach’s \(\alpha = 0.90\) for TR) at all study assessments. Identical or comparable screeners have been successfully utilized in adolescent samples [42, 43], including those from the Nordic region [26, 29].

Covariates

Because our cohorts were recruited from the same middle schools, they were by design sociodemographically comparable except for the initial COVID-19 pandemic period. Nevertheless, we accounted for possible sociodemographic differences.

Sociodemographic Characteristics

At study baseline, participants reported their gender, whether their parents live together (proxy for family structure), and the language spoken at home (proxy for immigrant background if not Norwegian only). In addition, participants completed the adolescent version of the MacArthur Scale of Subjective Social Status [44], comparing their families’ social status to other families in their neighborhoods on a 1–10 scale. T1 and T2 reports were averaged and then categorized to reflect three levels of adolescents’ subjective social status: low (scores up to 4.5), average (4.5–7.5), and high (8–10).

Analyses

Missing values on all covariates were low and classified into the dummy “unknown” category which was included as such in all models to prevent data loss. The cohort differences test the risk associated with the COVID-19 pandemic conditions. The outcomes were examined using either linear (for continuous variables) or modified Poisson (for count and binary variables) regression models, as this approach is suitable for both dichotomous and count outcomes [45] while providing easily interpretable estimates in the
form of relative risks (RR). Specifically, we fit a set of nested models for each outcome where we first estimated a crude model (model 0 = unadjusted) and then a model adjusted for demographics (model 1 = model 0 + adolescent gender, family structure, subjective social status, and immigrant background). Identical models were estimated for the entire sample and then for drinkers only to assess if these estimates may be driven by (a) the differences in drinking prevalence, if any, between the two cohorts or (b) differences in alcohol expectancies between drinkers and nondrinkers.

All analyses were conducted in Stata v.15 [46]. The school-level nesting was accounted for by cluster-robust standard errors and the \texttt{vce} (cluster) option in Stata [47]. Predicted probabilities, means, and counts were obtained using the \texttt{margins} command in Stata and were estimated at the average values of the remaining covariates. The hypotheses were not preregistered, and the results should be considered exploratory.

## Results

### Sample Characteristics

Characteristics of both cohorts are shown in Table 1.

### Adolescent Drinking Frequencies and Quantities before and during the First Pandemic Year

Table 2 shows the regression estimates from both crude and adjusted models for all drinking outcomes. Shown first are the estimates for the entire sample, followed by drinkers only. We observed no significant cohort differences in the proportion of adolescents who engaged in any drinking or in the frequency (i.e., number of days) of drinking or binge drinking previous year.

The only significant difference was observed in the usual quantity of alcohol consumed on a drinking day. On average, the COVID-19 cohort consumed an additional 1/3 of a drink per drinking day than drinkers from the pre-pandemic cohort.

### Adolescent Hazardous Drinking before and during the First Pandemic Year

Table 3 shows the regression estimates from both crude and adjusted models for all AUDIT-C outcomes. Unlike the drinking frequency estimates, hazardous drinking was elevated in the COVID-19 cohort as evidenced both by the significantly greater AUDIT-C aver-
Table 2. Alcohol use in pre- and COVID-19 adolescent cohorts from Norway

| Alcohol use                  | Prepandemic cohort | COVID-19 cohort | Estimate (95% CI) | p value |
|-----------------------------|--------------------|----------------|-------------------|---------|
| Any alcohol use             |                    |                |                   |         |
| Model 0: unadjusted         | %                  | %              | RR 1.005 (0.93–1.09) | 0.91 |
| Model 1: demographics       | 53.0               | 53.4           | 1.01 (0.93–1.09)   | 0.82 |
| Entire sample (N = 2,536)   | n = 1,621          | n = 915        |                   |         |
| Drinking days,\(a\)         | M (SE)             | M (SE)         | IRR                | p value |
| Model 0: unadjusted         | 10.61 (0.75)       | 10.97 (0.96)   | 1.03 (0.85–1.26)   | 0.74 |
| Model 1: demographics       | 10.29 (0.81)       | 10.92 (0.98)   | 1.06 (0.85–1.31)   | 0.58 |
| Typical number of drinks,\(b\) | M (SE)             | M (SE)         | IRR                | p value |
| Model 0: unadjusted         | 2.47 (0.11)        | 2.76 (0.20)    | 1.12 (1.02–1.25)   | 0.03 |
| Model 1: demographics       | 2.42 (0.12)        | 2.76 (0.20)    | 1.13 (1.02–1.25)   | 0.02 |
| Binge days,\(c\)            | M (SE)             | M (SE)         | IRR                | p value |
| Model 0: unadjusted         | 5.57 (0.61)        | 6.21 (0.87)    | 1.11 (0.89–1.39)   | 0.33 |
| Model 1: demographics       | 5.38 (0.61)        | 6.12 (0.88)    | 1.14 (0.90–1.42)   | 0.27 |
| Drinkers only (n = 1,347)   | n = 860            | n = 487        |                   |         |
| Drinking days,\(a\)         | M (SE)             | M (SE)         | IRR                | p value |
| Model 0: unadjusted         | 19.83 (1.11)       | 20.41 (1.17)   | 1.03 (0.88–1.20)   | 0.71 |
| Model 1: demographics       | 19.42 (1.19)       | 20.43 (1.17)   | 1.05 (0.85–1.31)   | 0.55 |
| Typical number of drinks,\(b\) | M (SE)             | M (SE)         | IRR                | p value |
| Model 0: unadjusted         | 4.68 (0.09)        | 5.17 (0.12)    | 1.10 (1.05–1.16)   | <0.001 |
| Model 1: demographics       | 4.62 (0.09)        | 5.12 (0.12)    | 1.11 (1.06–1.18)   | <0.001 |
| Binge days,\(c\)            | M (SE)             | M (SE)         | IRR                | p value |
| Model 0: unadjusted         | 10.45 (0.94)       | 11.59 (1.07)   | 1.11 (0.93–1.32)   | 0.24 |
| Model 1: demographics       | 10.07 (0.90)       | 11.37 (1.07)   | 1.13 (0.94–1.35)   | 0.19 |

Shown are the unstandardized risk ratio (RR) estimates for dichotomous outcomes and incidence risk ratios (IRR) for count outcomes; all with corresponding 95% CI and estimated marginal probabilities/means/counts. All tests reflected comparisons between the pre-COVID-19 versus COVID-19 cohort of Grade 11 students. Sociodemographic covariates included gender, immigrant background, parental cohabitation, and subjective social status evaluation; all were assessed at T1 2017 baseline, save for the subjective social status (T1/2017–T2/2018 average). All models accounted for nesting by schools of origin. \(^a\)Number of drinking days in past 12 months. \(^b\)Usual number of alcoholic drinks consumed on a drinking day. \(^c\)Number of binge drinking days (i.e., 5 or more alcoholic drinks) in past 12 months.

Age scores (fully adjusted model 1; \(M_{COVID-19} = 2.31\) [0.19] vs. \(M_{PRE-COVID-19} = 1.99\) [0.11]; incidence RR [95% CI] = 1.16 [1.02–1.32], \(p = 0.02\); absolute difference = 0.32) and the proportion of adolescents scoring positive on the AUDIT-C screener (fully adjusted model 1; 31.2% vs. 26.4%; RR [95% CI] = 1.21 [1.07–1.36], \(p = 0.002\); absolute difference = 4.8%). Identical pattern of results was observed among drinkers-only (bottom of Table 3), such that the greater proportion of adolescents from the COVID-19 cohort scored positive on the AUDIT-C screener compared with the pre-COVID-19 cohort (i.e., 59.8% vs. 50.3%).

Adolescent Drinking Expectancies before and during the First Pandemic Year

Table 4 shows the regression estimates from both crude and fully adjusted models for SF and TR drinking expectancy outcomes. We observed no significant SF differences between cohorts. However, TR expectancies were significantly greater in the COVID-19 cohort than in the pre-COVID-19 cohort in the entire sample (\(M_{COVID-19} = 2.96\) [0.04] vs. \(M_{PRE-COVID-19} = 2.85\) [0.04]; \(b\) [95% CI] = 0.11 [0.018–0.20], \(p = 0.02\)) but not among drinkers-only (Table 4 bottom).
Table 3. Hazardous alcohol use in pre- and COVID-19 adolescent cohorts from Norway

| AUDIT-C | Prepandemic cohort | COVID-19 cohort | Estimate (95% CI) |
|---------|-------------------|----------------|------------------|
| Entire sample \((N = 2,536)\) | \(n = 1,621\) | \(n = 915\) | \(p\) value |
| AUDIT-C (full scale) | M (SE) | M (SE) | IRR \(\pm\) | \(p\) value |
| Model 0: unadjusted | 2.02 (0.11) | 2.32 (0.19) | 1.14 (1.004–1.29) | 0.04 |
| Model 1: demographics | 1.99 (0.11) | 2.31 (0.19) | 1.16 (1.02–1.32) | 0.02 |
| AUDIT-C (cut-off ≥3) | % | % | RR | \(p\) value |
| Model 0: unadjusted | 27.05 | 32.2 | 1.19 (1.05–1.35) | 0.007 |
| Model 1: demographics | 26.4 | 32.1 | 1.21 (1.07–1.36) | 0.002 |

| Drinkers only \((n = 1,347)\) | \(n = 860\) | \(n = 487\) | Estimate (95% CI) |
| AUDIT-C (full scale) | M (SE) | M (SE) | IRR | \(p\) value |
| Model 0: unadjusted | 3.79 (0.11) | 4.31 (0.14) | 1.14 (1.05–1.23) | 0.001 |
| Model 1: demographics | 3.76 (0.11) | 4.32 (0.14) | 1.15 (1.06–1.25) | 0.001 |
| AUDIT-C (cut-off ≥3) | % | % | RR | \(p\) value |
| Model 0: unadjusted | 50.6 | 59.9 | 1.18 (1.08–1.29) | <0.001 |
| Model 1: demographics | 50.3 | 59.8 | 1.19 (1.09–1.30) | <0.001 |

Shown are the unstandardized risk ratio (RR) estimates for dichotomous outcomes and incidence risk ratios (IRR) for count outcomes; all with corresponding 95% CI and estimated marginal probabilities and means/counts. All tests reflected comparisons between the pre-COVID-19 versus COVID-19 cohort of Grade 11 students. Sociodemographic covariates included gender, immigrant background, parental cohabitation, and subjective social status evaluation; all were assessed at 2017 T1 baseline, save for the subjective social status (T1/2017–T2/2018 average). All models accounted for nesting by schools of origin.

Table 4. Alcohol expectancies in pre- and COVID-19 adolescent cohorts from Norway

| Alcohol expectancies | Prepandemic cohort | COVID-19 cohort | Estimate (95% CI) |
|----------------------|-------------------|----------------|------------------|
| Entire sample \((N = 2,536)\) | \(n = 1,621\) | \(n = 915\) | \(p\) value |
| Social Facilitation (SF) | M (SE) | M (SE) | \(b\) | \(p\) value |
| Model 0: unadjusted | 2.58 (0.04) | 2.63 (0.06) | 0.05 (−0.05 to 0.14) | 0.33 |
| Model 1: demographics | 2.58 (0.04) | 2.63 (0.06) | 0.05 (−0.04 to 0.15) | 0.28 |
| Tension Reduction (TR) | M (SE) | M (SE) | \(b\) | \(p\) value |
| Model 0: unadjusted | 2.85 (0.04) | 2.96 (0.04) | 0.11 (0.012–0.20) | 0.028 |
| Model 1: demographics | 2.85 (0.04) | 2.96 (0.04) | 0.11 (0.018–0.20) | 0.02 |
| Drinkers only \((n = 1,347)\) | \(n = 860\) | \(n = 487\) | Estimate (95% CI) |
| Social Facilitation (SF) | M (SE) | M (SE) | \(b\) | \(p\) value |
| Model 0: unadjusted | 2.95 (0.03) | 3.03 (0.05) | 0.09 (−0.03 to 0.21) | 0.14 |
| Model 1: demographics | 2.95 (0.03) | 3.04 (0.05) | 0.10 (−0.03 to 0.23) | 0.18 |
| Tension Reduction (TR) | M (SE) | M (SE) | \(b\) | \(p\) value |
| Model 0: unadjusted | 3.22 (0.04) | 3.33 (0.05) | 0.11 (−0.04 to 0.26) | 0.16 |
| Model 1: demographics | 3.21 (0.04) | 3.33 (0.05) | 0.11 (0.018–0.20) | 0.12 |

Shown are the unstandardized regression coefficient estimates \((b)\) with corresponding 95% CI and estimated marginal means. All tests reflected comparisons between the pre-COVID-19 versus COVID-19 cohort of Grade 11 students. Sociodemographic covariates included gender, immigrant background, parental cohabitation, and subjective social status evaluation; all were assessed at 2017 T1 baseline, save for the subjective social status (T1/2017–T2/2018 average). All models accounted for nesting by schools of origin.
Discussion

This is the first study to examine multiple aspects of alcohol use and associated expectancies among Norwegian adolescents during and before the COVID-19 pandemic. Using the up-to-date information from an accelerated longitudinal design study, we were able to examine drinking prevalence, drinking frequencies and quantities, hazardous drinking, and alcohol-related expectancies in two cohorts of 16-year-olds differentiated only by the pandemic (non)-exposure; i.e., before and during a global “experiment by nature” [48].

Our results show that the Norwegian adolescents who started high school during the first pandemic year did not differ from their prepandemic peers in terms of how many of them drank, how often they drank, or in their prosocial expectations of alcohol use. This was the case despite the restrictions imposed on social gatherings and alcohol-serving venues, suggesting that the adolescents’ access to alcohol – but not necessarily their drinking patterns, contexts, or motivations – likely remained unchanged during the initial pandemic year. Indeed, the COVID-19 cohort consumed significantly greater alcohol quantities per drinking day, had significantly greater AUDIT-C scores indicative of hazardous drinking, and reported significantly greater tension reduction expectations of alcohol use when compared with their demographically identical peers from one and 2 years prior. In short, we observed complex shifts in the nature of Norwegian adolescents’ relation with drinking and alcohol during the initial COVID-19 period. These findings are largely consistent with drinking patterns observed among Norwegian adults during the same period, characterized by minimal population-level changes in overall alcohol consumption but also by meaningful shifts in hazardous drinking and drinking motivations in certain groups [19–22].

Our results further suggest that some basic aspects of alcohol use among high school-aged adolescents from Norway were not necessarily affected by the 2020 pandemic conditions. Despite the limitations imposed on social gatherings and alcohol venues, as many 16-year-olds from our COVID-19 cohort managed to obtain alcohol and to (binge) drink as frequently during 2020 as did the 16-year-olds from our prepandemic cohort. It appears that the newly imposed regulations of alcohol sales in bars and restaurants did not necessarily disrupt adolescents’ access to alcohol, which was likely reliant on informal sources even before the pandemic. Indeed, the regulation of alcohol sales in grocery stores (i.e., beer) and state monopolies (i.e., beer, vine, and liquor) remained largely intact [18]. In fact, alcohol sales through these outlets precipitously increased and reached all-time records during the first pandemic year [49, 50].

Our overall results underscore the value of examining adolescents’ alcohol-related behaviors during the pandemic above and beyond the basic estimates of drinking prevalence and frequencies, as evident in the pandemic cohort’s elevated hazardous drinking and alcohol expectancies. Specifically, increases in hazardous drinking in this cohort were not generated by their more frequent drinking but by their consumption of greater alcohol quantities on the days when they did drink. That is, drinkers from the COVID-19 cohort reported consuming an additional half a drink per drinking day, such that the average typical alcohol intake exceeded 5 drinks per drinking day in that group. This change placed these drinking patterns within the definition heavy episodic drinking [36] and 6 out of 10 drinkers from the COVID-19 cohort within the AUDIT-C diagnostic criteria for adolescent hazardous drinking [38, 39].

Finally, the nature of adolescents’ relation with alcohol also appeared to be fundamentally altered during the early pandemic period, such that they increasingly expected alcohol to help alleviate stress and negative emotions. This shift was not evident in the prosocial expectations and was not generated by drinkers alone as in other studies examining pandemic-related changes in drinking motivations among young drinkers [13]. In fact, the greater tension-reduction expectations in our COVID-19 cohort appear to be driven primarily by nondrivers. This suggests that adolescent nondrinkers from our samples increasingly expected alcohol to aid in the management of stress and negative moods – be it their own or others’ – during the initial pandemic year. Why this may be the case is not yet clear, but these cohort differences could reflect a number of possibilities, including the adolescent nondrinkers’ observations of altered drinking patterns, contexts, and motivations among drinkers (including possibly their own parents) during the early pandemic [1, 3, 9, 11, 14, 22].

How these cohort differences in hazardous drinking and alcohol-related expectancies may shape both the current and future alcohol use among all adolescents – and not drinkers alone – cannot be inferred from these results and should be investigated further. Nevertheless, it is conceivable that Norwegian adolescents who entered high school during the pandemic period may be at greater risk for future alcohol problems, as hazardous patterns of alcohol consumption during this sensitive developmental...
period are associated with multiple adverse outcomes over time [23–25, 40]. Similarly, positive drinking expectations in general and positive social/relaxation expectancies in particular are both early emerging and strongly associated with (problem) alcohol use in later years [27, 28]. For example, a long-term longitudinal investigation reported that positive alcohol expectancies at age of 16 years – the same ages as in our adolescent sample – predicted multiple negative alcohol-related outcomes 20 years later even after accounting for gender, family SES, age of drinking onset, early delinquency, and school test scores [27]. Even though we did not have longitudinal data, these findings may be relevant in the context of adolescents’ prolonged pandemic-related stress, the emerging evidence for the use of substances as a means of coping with such stress [9, 11], and the long-term sequelae of positive alcohol expectancies [27, 28].

**Methodological Considerations and Study Limitations**

These results should be interpreted in relation to the specific social and political context of the COVID-19 pandemic in Norway – a sparsely populated Nordic country characterized by a generous welfare system and currently ranking #1 in the Human Development Index. Even though the initial pandemic period was marked by a strict lockdown, its effects were to a certain degree buffered by accompanying economic packages. Ultimately, these measures were evaluated as successful [30], with Norway recording relatively low COVID-19 incidence and no excess mortality in 2020 [51, 52].

Further, the results should be interpreted in the context of our study design, including a relatively short-term pandemic exposure (spring 2020–fall 2020) and exclusion of schools from the capital city (Oslo) in the original MyLife sampling strategy. Even though the pandemic conditions in Norway varied both in terms of geography and timing [53], how such variations may have affected adolescents’ alcohol outcomes was beyond the scope of this report. While other metropolitan areas were represented in our nationwide sample, it should be noted that the capital was disproportionately affected by the pandemic and had perhaps been subjected to the strictest control measures. Further, self-reports are vulnerable to measurement error because of socially desirable responding, misunderstanding, imperfect memory, and biased recall – a general set of concerns in all studies utilizing self-reports. However, presence of such biases would have the impact primarily on the overall over- or under-reporting of drinking behaviors, not necessarily on the cohort differences which were of substantive interest in this study. Finally, some of our key measures (such as the Alcohol Outcome Expectancies Scale [AOES] [41]) have not been extensively used in Norwegian samples. That is, even though we did observe shifts in alcohol expectancies in our study, it is not known how representative or normative they may be of Norwegian youth.

**Conclusions**

Norwegian adolescents who started high school during the first pandemic year did not differ from their prepandemic peers in terms of how many of them drank, how often they drank, or in prosocial expectations they had of alcohol use during previous year. However, they consumed more alcohol per drinking day, had greater hazardous drinking as evidenced in greater AUDIT-C scores, and reported greater tension reduction expectations of alcohol use. These results underscore the value of nuanced examinations of adolescents’ alcohol-related behaviors and cognitions during the COVID-19 pandemic above and beyond the simple drinking prevalence and frequencies, as well as the need for future studies addressing these questions using prospective longitudinal designs. Future research should examine the putative mechanisms through which various pandemic conditions may have altered adolescents’ drinking expectations, drinking patterns, and – possibly – subsequent alcohol use trajectories.

**Acknowledgments**

We extend our gratitude to all adolescents and their families who participated in the MyLife study.

**Statement of Ethics**

The original study protocol was evaluated by The National Committee for Research Ethics in the Social Sciences and the Humanities (reference No.: 2016/137) and approved by the Norwegian Data Protection Authority (DPA) (reference No.: 15/01495). Written parental consent was obtained for all adolescent participants before baseline data collection, while adolescents provided their assent through survey participation.

**Conflict of Interest Statement**

The authors have no conflicts of interest to declare.

**Funding Sources**

The study received no external funding.
COVID-19 and Alcohol Use in Norwegian Youth

Author Contributions

Dr. J. Burdzovic Andreas: concept and design; acquisition, analysis, and interpretation of data; and drafting of the manuscript. Dr. G.S. Brunborg: concept and design; acquisition, analysis, and interpretation of data; and revision of the manuscript.

Data Availability Statement

Study participants did not agree for their data to be shared publicly, so supporting data are not available. Further inquiries can be directed to the corresponding author.

References

1. Dumas TM, Ellis W, Litt DM. What does adolescent substance use look like during the COVID-19 pandemic? Examining changes in frequency, social contexts, and pandemic-related predictors. J Adolesc Health. 2020;67(3): 354–61.

2. Chaffee BW, Cheng J, Couch ET, Hoef F, Halpern-Feldsher B. Adolescents’ substance use and physical activity before and during the COVID-19 pandemic. JAMA Pediatr. 2021;175(7):715–22.

3. Maggs JL, Cassinat JR, Kelly BC, Mustillo SA, Whitman SD. Parents who first allowed adolescents to drink alcohol in a family context during Spring 2020 COVID-19 emergency shutdowns. J Adolesc Health. 2021;68(4): 816–8.

4. Masonbrink AR, Middlebrooks L, Gooding HC, Abella M, Hall M, Burger RK, et al. Substance use disorder visits among adolescents at children’s hospitals during COVID-19. J Adolesc Health. 2022;70(4):673–6.

5. Pelham WE III, Tapert SF, Gonzalez MR, McCabe CJ, Lisdahl KM, Alzueta E, et al. Early adolescent substance use before and during the COVID-19 pandemic: a longitudinal survey in the ABCD study cohort. J Adolesc Health. 2021;69(3):390–7.

6. Graupensperger S, Fleming CB, Jaffe AE, Rhew IC, Patrick ME, Lee CM. Changes in young adults’ alcohol and marijuana use, norms, and motives from before to during the COVID-19 pandemic. J Adolesc Health. 2021;68(4):658–65.

7. Maggs JL, Cassinat JR, Kelly BC, Mustillo SA, Whitman SD. Parents who first allowed adolescents to drink alcohol in a family context during Spring 2020 COVID-19 emergency shutdowns. J Adolesc Health. 2021;69(3):390–7.

8. Pigeaud L, de Veld L, van Hoof J, van der Lely AL. Substance use among youth during the COVID-19 pandemic: comparison between Asian and European cohorts. Addiction. 2018;113(10):1811–20.

9. Enstad F, Evans-Whipp T, Kjeldsen A, Toumbourou JW, von Soet E. Predicting hazardous drinking in late adolescence/young adulthood from early and excessive adolescent drinking: a longitudinal cross-national study of Norwegian and Australian adolescents. BMC Public Health. 2019 Jun 21;19(1):790.

10. Layman HM, Thorisdottir IE, Hallldorsdottir T, Sigfusdottir ID, Allegrante JP, Kristjansson AL. Substance use among youth during the COVID-19 pandemic: a systematic review. Curr Psychiatry Rep. 2022 Apr 27;24(6):307–24.

11. Bollen Z, Pabst A, Creuepalandt C, Fontesse S, Lannoy S, Pinon N, et al. Prior drinking motives predict alcohol consumption during the COVID-19 lockdown: a cross-sectional online survey among Belgian college students. Addict Behav. 2021 Apr;115:106762.

12. Bonar EE, Parks MJ, Gunlicks-Stoessel M, Lyden GR, Mehus CJ, Morrell N, et al. Binge drinking before and after a COVID-19 campus closure among first-year college students. Addict Behav. 2021 Jul;118:106879.

13. Graupensperger S, Fleming CB, Jaffe AE, Rhew IC, Patrick ME, Lee CM. Changes in young adults’ alcohol and marijuana use, norms, and motives from before to during the COVID-19 pandemic: a longitudinal survey in the ABCD study cohort. J Adolesc Health. 2021;68(4):658–65.

14. Jackson KM, Merrill JE, Stevens AK, Hayes KL, White HR. Changes in alcohol use and drinking context due to the COVID-19 pandemic: a multimethod study of college student drinkers. Alcohol Clin Exp Res. 2021;45(4):752–64.

15. Pigeaud L, de Veld L, van Hoof J, van der Lely AL. Acute alcohol intoxication in Dutch adolescents before, during, and after the COVID-19 lockdown. J Adolesc Health. 2021;69(3):390–7.

16. Surve D, Welsh JW. Adolescent substance use: challenges and opportunities related to COVID-19. J Subst Abuse Treat. 2021 Mar;122:108212.

17. Schulenberg JE, Maggs JL. A developmental perspective on alcohol use and heavy drinking during adolescence and the transition to young adulthood. J Stud Alcohol Suppl. 2002; (14):54–70.

18. Måkelå P, Rossov I, Moan IS, Bye EK, Kilian C, Raitasalo K, et al. Measuring changes in alcohol use in Finland and Norway during the COVID-19 pandemic: comparison between data sources. Int J Methods Psychiatr Res. 2021;30(4):e1892.

19. Rossov I, Bartack M, Bloomfield K, Bradrick F, Bye EK, Kilian C, et al. Changes in alcohol consumption during the COVID-19 pandemic: are adolescent drinking patterns stable? Addiction. 2015 Jan;110(1):71–9.

20. Montes KS, Wikliewitz K, Andersson C, Fossos-Wong N, Pace T, Berglund M, et al. Trajectories of positive alcohol expectancies and drinking: an examination of young adults in the US and Sweden. Addict Behav. 2017 Oct;73;74–80.
30 Christensen T, Lægreid P. Balancing governance capacity and legitimacy: how the Norwegian Government handled the COVID-19 crisis as a high performer. Public Adm Rev. 2020;80(5):774–9.

31 Regieringen (The Government of Norway). Tidslinje: myndighetenes håndtering av koronasituasjonen (Timeline for news and press releases from Norwegian Ministries about the Coronavirus disease COVID-19). 2021. https://www.regieringen.no/no/tema/Koronasituasjonen/tidslinje-koronasituasjonet/id2692402/.

32 Brunborg GS, Scheffels J, Tolkle R, Buvik K, Kvaavik E, Burdzovic Andreas J, Monitoring young lifestyles (MyLife): a prospective longitudinal quantitative and qualitative study of youth development and substance use in Norway. BMJ Open. 2019;9(10):e031084.

33 Burdzovic Andreas J, Brunborg GS. Self-reported mental and physical health among Norwegian adolescents before and during the COVID-19 pandemic. JAMA Netw Open. 2021;4(8):e2121934.

34 Duncan SC, Duncan TE, Hops H. Analysis of longitudinal data within accelerated longitudinal designs. Psychol Methods. 1996;1(3):236–48.

35 Skogen JC, Knudsen AK, Hysing M, Wold B, Sivertsen B. Trajectories of alcohol use and association with symptoms of depression from early to late adolescence: the Norwegian longitudinal health behaviour study. Drug Alcohol Rev. 2016;35(3):307–16.

36 ESPAD (European School Survey Project on Alcohol and other Drugs). Alcohol Consumption among 15-16-Year-Olds in EU Countries & Norway: Summary of KEY FINDINGS from the latest ESPAD REPORT. 2021.

37 Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol use disorders identification test. Arch Intern Med. 1998 Sep 14;158(16):1789–95.

38 Cortés-Tomás M-T, Giménez-Costa J-A, Motos-Sellès P, Sancerni-Beitia M-D. Different versions of the Alcohol Use Disorders Identification Test (AUDIT) as screening instruments for underage binge drinking. Drug Alcohol Depend. 2016;158:52–9.

39 Liskola J, Haravuori H, Lindberg N, Niemelä S, Karlsson L, Kiviruusu O, et al. AUDIT and AUDIT-C as screening instruments for alcohol problem use in adolescents. Drug Alcohol Depend. 2018 Jul;188:266–73.

40 Liskola J, Haravuori H, Lindberg N, Kiviruusu O, Niemelä S, Karlsson L, et al. The predictive capacity of AUDIT and AUDIT-C among adolescents in a one-year follow-up study. Drug Alcohol Depend. 2021 Jan 1;218:108424.

41 Leigh BC, Stacy AW. Alcohol outcome expectancies: scale construction and predictive utility in higher order confirmatory models. Psychol Assess. 1993;5(2):216–29.

42 Catanzaro SJ, Laurent J. Perceived family support, negative mood regulation expectancies, coping, and adolescent alcohol use: evidence of mediation and moderation effects. Addict Behav. 2004 Dec;29(9):1779–97.

43 Urbán R, Kókényei G, Demetrovics Z. Alcohol outcome expectancies and drinking motives mediate the association between sensation seeking and alcohol use among adolescents. Addict Behav. 2008 Oct;33(10):1344–52.

44 Goodman E, Adler NE, Kawachi I, Frazier AL, Huang B, Colditz GA. Adolescents’ perceptions of social status: development and evaluation of a new indicator. Pediatrics. 2001;108(2):e31.

45 Zou G. A modified poisson regression approach to prospective studies with binary data. Am J Epidemiol. 2004;159(7):702–6.

46 StataCorp. Stata: release 15. Statistical software. College Station, TX: StataCorp LP; 2017.

47 Williams RL. A note on robust variance estimation for cluster-correlated data. Biometrics. 2000;56(2):645–6.

48 Craig P, Cooper C, Gunnell D, Haw S, Lawson K, Macintyre S, et al. Using natural experiments to evaluate population health interventions: new Medical Research Council guidance. J Epidemiol Community Health. 2012;66(12):1182–6.

49 Statistisk sentralbyrå (Statistics Norway). Alkoholomsetning (Alcohol transactions). 2021. https://www.ssb.no/varehandel-og-identifikasjon/varehandel/statistikk/alkoholomsetning.

50 Nikel D. Norway’s Vinmonopolet Smashes Alcohol Sales Record in 2021. Life in Norway 2022. https://www.lifennorway.net/alcoholsales-record-in-norway/.

51 Raknes G, Strom MS, Sulo G, Øverland S, Rotlands M, Julisson PB. Lockdown and non-COVID-19 deaths: cause-specific mortality during the first wave of the 2020 pandemic in Norway: a population-based register study. BMJ Open. 2021 Dec 14;11(12):e050525.

52 Yarmol-Matsiuk EA, Cipriano LE, Strange S. A comparison of COVID-19 epidemiological indicators in Sweden, Norway, Denmark, and Finland. Scand J Pub Health. 2021;49(1):69–78.

53 Burdzovic Andreas J, Brunborg GS. Individual, family, and community characteristics associated with COVID-19: specific worry and lack of worry among Norwegian High School students in first pandemic year. JAMA Netw Open. 2022;5(2):e220337.