

Alcohol use among NTNU students 2007–19

ORIGINAL ARTICLE

MATHILDE HERNHOLM

mathilde.hernholm@hotmail.com

Department of Obstetrics

Levanger Hospital

Author contribution: data collection, analysis/interpretation of data, drafting of manuscript and approval of submitted version.

Mathilde Hernholm, specialty registrar in obstetrics and gynaecology.

The author has completed the ICMJE form and declares no conflicts of interest.

VERONICA KRISTIANSEN

Department of Psychiatry

Østfold Hospital Trust

Author contribution: data collection, analysis/interpretation of data, revision of manuscript and approval of submitted version.

Veronica Kristiansen, specialist in psychiatry and senior consultant.

The author has completed the ICMJE form and declares no conflicts of interest.

MELANIE SIMPSON

Department of Public Health and Nursing

Norwegian University of Science and Technology (NTNU)

Author contribution: analysis/interpretation of data, revision of manuscript and approval of submitted version.

Melanie Simpson, MD, associate professor and medical studies programme director.

The author has completed the ICMJE form and declares no conflicts of interest.

GEIR BRÅTHEN

Department of Neurology and Clinical Neurophysiology St Olav's

University Hospital, Trondheim

and

Department of Neuromedicine and Movement Science

Norwegian University of Science and Technology (NTNU)

Author contribution: design, analysis/interpretation of data, revision of manuscript and approval of submitted version.

Geir Bråthen, senior consultant and head of division.

The author has completed the ICMJE form and declares no conflicts of interest.

TORE WERGELAND MEISINGSET

Department of Neurology and Clinical Neurophysiology

St Olav's University Hospital, Trondheim

and

Norwegian Centre for Headache Research (NorHEAD),

Norwegian University of Science and Technology (NTNU)

Author contribution: design, analysis/interpretation of data, drafting manuscript and approval of submitted version.

Tore Wergeland Meisingset, senior consultant and associate professor in neurology.

The author has completed the ICMJE form and declares the following conflicts of interest: he has received fees from TEVA, Lundbeck and Roche.

BACKGROUND

Alcohol consumption is widespread in student environments. The objective of the study was to examine alcohol use among students at the Norwegian University of Science and Technology (NTNU) in a twelve-year perspective.

MATERIAL AND METHOD

The study is cross-sectional, based on two questionnaire surveys conducted in lecture breaks at NTNU in 2007 and 2019. Participation was voluntary and anonymous. The questionnaire surveyed background variables and alcohol use, and included questions from the Alcohol Use Disorders Identification Test (AUDIT). The respondents were categorised into risk profiles based on their results. An AUDIT score of ≥ 8 was used as the threshold value for risky/potentially harmful alcohol use.

RESULTS

The study included 2,247 students: 857 from 2007 and 1,390 from 2019. The proportion of women was 42.3 % in 2007 and 54.9 % in 2019. The average age was 21.5 years (2007) and 22.5 years (2019). The average AUDIT score was 10.7 in 2007 and 8.5 in 2019. A total of 937 students (67.6 %) consumed alcohol two

to four times per month or more in 2019, a reduction of 9.8 % from 2007. Altogether 885 students (67.8 %) consumed five or more alcohol units on a typical drinking day in 2019, a reduction of 12.8 % from 2007.

INTERPRETATION

A considerable one-fifth reduction in the proportion of students with risky alcohol use occurred from 2007 to 2019. However, the alcohol use of more than half of the students may still pose a long-term risk.

Main findings

The proportion of NTNU students with risky/potentially harmful alcohol use decreased by 18.8 % from 2007 to 2019.

Among students in 2019, 67.8 % consumed a quantity of alcohol on a typical drinking day that corresponds to binge drinking, which is a reduction of 12.8 % compared to 2007.

In 2019, 55.9 % of students faced a potential long-term risk due to their alcohol consumption.

Alcohol consumption is a major challenge for global public health and a risk factor for years of healthy life lost (1, 2). Harmful alcohol use is defined as alcohol consumption that leads to health and social consequences, while risky alcohol use is defined as a drinking pattern that increases the risk of such consequences to an extent that necessitates involvement and advice from healthcare personnel (3, 4). Norwegians' drinking habits vary with age and sex. The tendency is for older people to spread their alcohol intake over several episodes, while younger people drink less frequently but consume more units of alcohol each time. On average, men drink a greater amount and more frequently than women (5).

The student environment is a subculture in which alcohol consumption seems to be tolerated and facilitated to a greater extent than in the rest of society (6). Buddy weeks, festivals and a flexible timetable enable alcohol habits to be formed that are otherwise difficult to maintain in a daily life with work and family obligations. Starting higher education is associated with increased alcohol consumption (7). A study of students in Bergen found an association between increasing alcohol consumption and students who were single, male, childless, non-religious, extroverted or unconscientious (8).

The students' alcohol use is largely characterised by frequent episodes of binge drinking (9). Binge drinking is defined as drinking five or more units of alcohol for men and four or more units for women on the same occasion (10). Several scientific articles use the definition of five or more units on the same occasion for both sexes (8, 11, 12). In 2018, a national student survey showed that the total alcohol consumption of 57 % of students in Norway was equivalent to binge drinking (13), and a survey in 2022 reported similar findings (14). Studies have shown that frequent binge drinking increases the risk of negative

alcohol-related consequences, including injuries, alcohol-induced amnesia, physical violence, sexual assault and health problems, or death as a result of injuries. Frequent binge drinking can also lead to reduced academic performance (15).

Student surveys indicate that the alcohol use of 44–53 % of students in Norway is classified as risky and potentially harmful (8, 13). The corresponding figure for the general population during the same period was 15 % (5). The objective of this study was to examine alcohol use trends among students at the Norwegian University of Science and Technology (NTNU) in a twelve-year perspective.

Method

The study is cross-sectional and is based on data from two questionnaire surveys conducted at NTNU in 2007 and 2019. Participation was voluntary and anonymous. Three inclusion criteria were used: student status, having studied for a minimum of 0.5 years, and having studied for a maximum of 10 years.

Questionnaire

The questionnaire consisted of 41 questions: 26 compulsory questions for all students and 15 additional questions. It mainly consisted of predefined response alternatives, with certain sections allowing respondents to provide further details using free text. The questionnaire took approximately 10 minutes to complete and included background variables such as sex, age and number of years as a student, in addition to 13 questions about alcohol use. To standardise the self-reporting, one unit of alcohol was defined at the start of the questionnaire. Additional questions about geographical origin and faculty affiliation were included in the 2019 survey. In order to maintain the basis for comparison, none of the original questions were changed. A complete overview of the questionnaires can be found in Appendix 1 (in Norwegian only).

Alcohol use was assessed using the Alcohol Use Disorders Identification Test (AUDIT), which maps alcohol intake, dependence symptoms and alcohol-related problems. Respondents are categorised into different risk levels based on their score: low risk (< 8), risky/potentially harmful (8–15), high risk/harmful (16–19) and very high risk/probable alcohol dependence (20–40) (3). An AUDIT score ≥ 8 is the most widely used and best-validated threshold value between low-risk and risky/potentially harmful alcohol use (3, 16).

Data collection

The data were collected in spring 2007 and autumn 2019. The data collection and processing methods were the same in both surveys. The surveys were conducted during breaks from well-attended lectures at NTNU at various times of the day. Students were recruited from all faculties at NTNU in Trondheim. Oral and written information about the study was provided, and students had the option to either complete the questionnaire in the lecture hall or at a later time. Completed questionnaires were submitted anonymously in a post box

situated in the auditorium or by post. After submission, the questionnaires were scanned using the TeleForm program (OpenText, v20.3). Information that the program had difficulty interpreting was verified manually.

Statistical analyses

Statistical analyses were performed using SPSS Statistics (IBM, v29). Background variables were described descriptively, with frequencies and percentages or mean and standard deviation (SD). Descriptive statistics and significance testing were used to analyse alcohol use, including sex-based differences. Statistical testing encompassed independent *t*-tests, chi-square tests and the Mantel-Haenszel test for trend. The statistical significance level was set at $p < 0.05$. Where a question had not been answered, the respondent was only excluded from the analysis of the variable in question. For the calculation of AUDIT scores, all relevant questions had to be answered for the respondent to be included in the analysis.

Ethics

The Regional Committees for Medical and Health Research Ethics pre-approved each data collection separately (ref. 4.2006.794 and ref. 2018/2149). All responses were anonymous. Completing the questionnaire implied consent to participate and for anonymous information to be stored.

Results

In 2007, 858/889 (96.5 %) distributed questionnaires were answered and returned, and 1,436/1,500 (95.7 %) were returned in 2019. Of a total of 2,294 respondents, 2,247 met the inclusion criteria and were included in further analyses (Figure 1). Respondents from all Norwegian counties and all faculties at NTNU were represented in the 2019 data, but geographical origin and faculty affiliation were not captured in 2007. Descriptive characteristics of the study population are presented in Table 1. The proportion of female participants was higher in 2019 than in 2007.

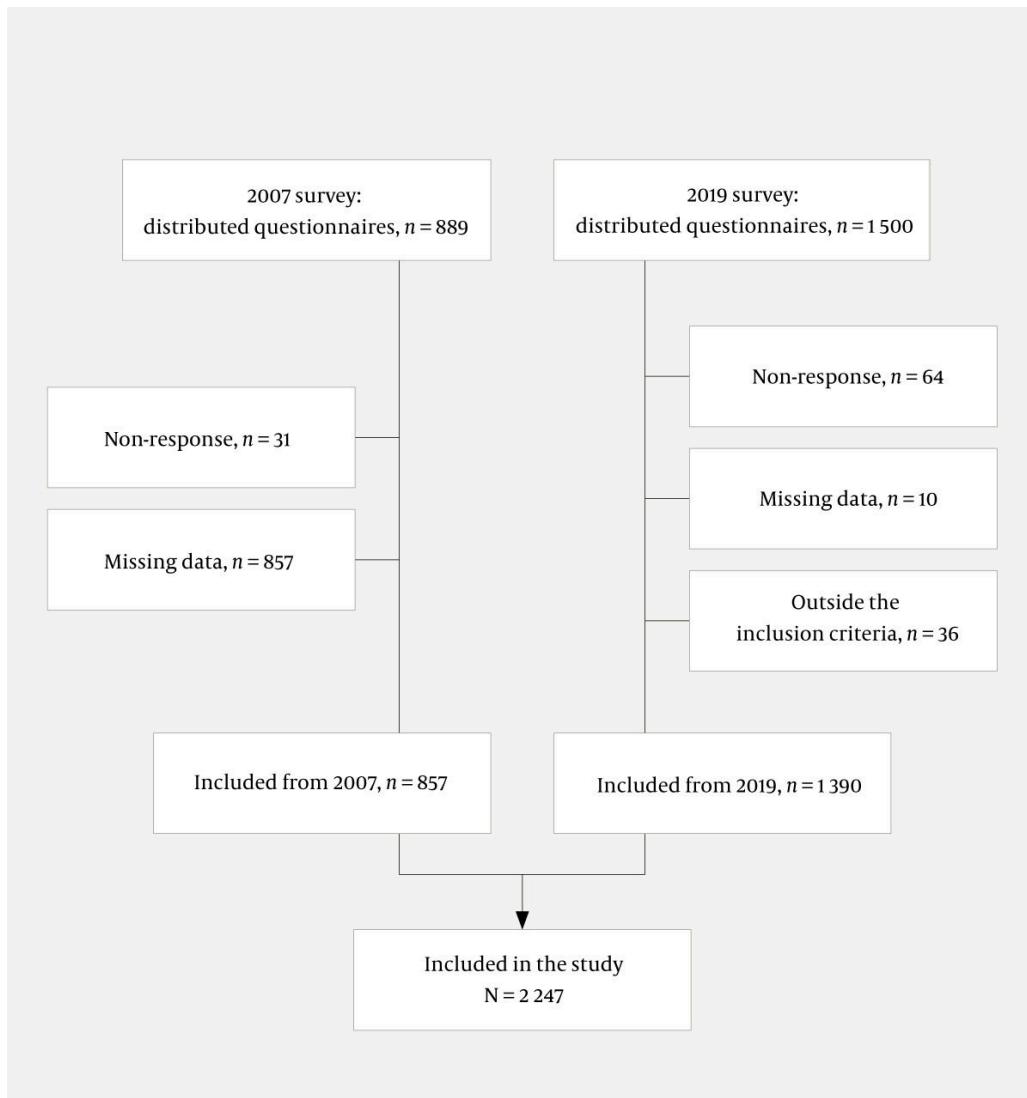


Figure 1 Flowchart of the study population.

Table 1

Descriptive characteristics of the study population: students recruited during breaks in well-attended lectures at NTNU in 2007 and 2019. Mean and standard deviation unless otherwise specified.

Variables	2007 (n = 857)	2019 (n = 1,390)
Women, n (%)	363 (42.3)	758 (54.9)
Age	21.5 (2.4)	22.5 (2.7)
No. of years studied	2.1 (1.3)	2.8 (1.7)
Age started drinking alcohol	15.2 (2.2)	16.3 (1.8)
No. of units of alcohol in last drinking episode ¹	7.4 (4.5)	6.0 (4.1)
AUDIT score		
Women	9.9 (4.3)	8.2 (4.8)
Men	11.2 (5.0)	8.9 (5.2)
Total	10.7 (4.7)	8.5 (5.0)

¹Students who do not drink alcohol were excluded, n=41 in 2007 and n=90 in 2019

In the surveys, 41/857 (4.8 %) students from 2007 and 90/1,385 (6.5 %) students from 2019 reported being completely abstinent (chi-square test, $p < 0.001$). In 2019, 937/1,385 (67.6 %) students drank alcohol 'two to four times a month' or more frequently. This represented a reduction from 2007 of 9.8 % (chi-square test, $p < 0.001$). Correspondingly, the proportion who drank 'once a month or less' increased by 7.9 % (Figure 2). This shift was statistically significant (Mantel-Haenszel test for trend, $p < 0.001$).

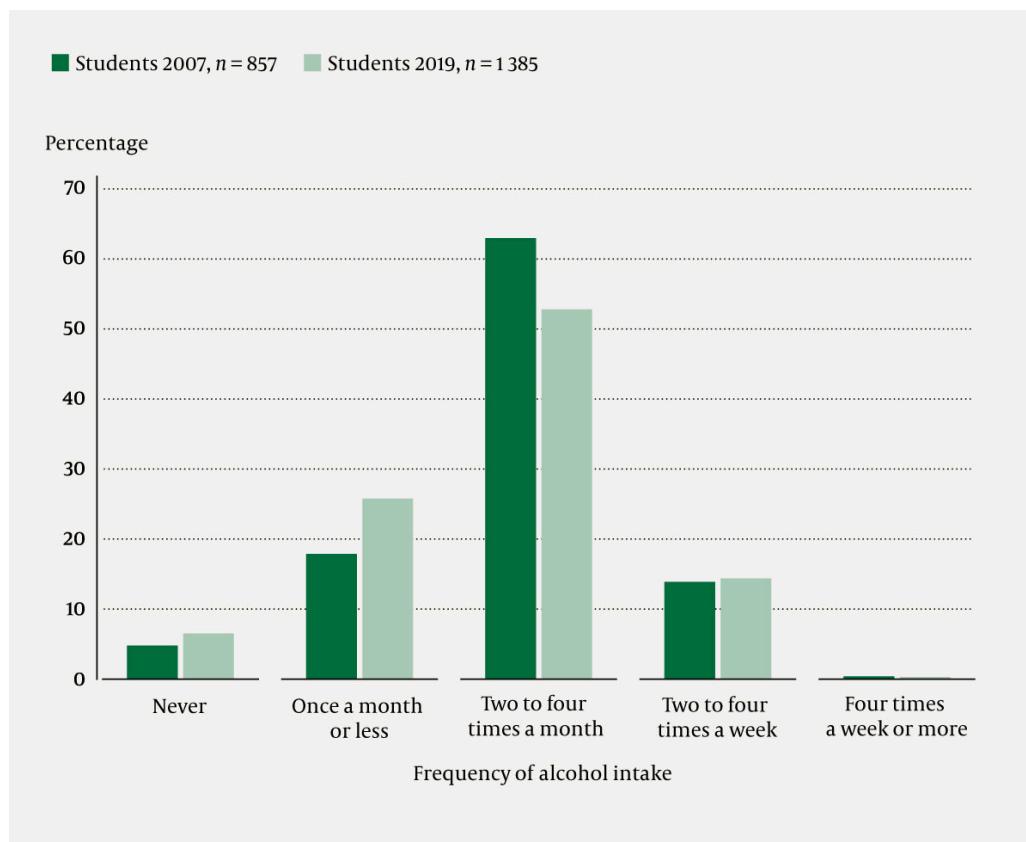


Figure 2 Percentage distribution and comparison of how often NTNU students drank alcohol. n = 857 (2007), n = 1,385 (2019).

In the surveys, 655/814 (80.5 %) students in 2007 and 885/1,386 (67.8 %) students in 2019 drank five units of alcohol or more on a typical drinking day (classified as binge drinking (10)). Over the time period in question, there has been an absolute reduction of 12.8 % in this category (chi-square test, $p < 0.001$). Figure 3 illustrates the significant leftward shift in students' alcohol consumption from 2007 to 2019 (Mantel-Haenszel test for trend, $p < 0.001$). The largest reduction occurred in the category '10 or more units', with a 15.5 % lower prevalence among students in 2019, followed by a 10.1 % reduction in the category '7–9 units' compared to 2007. There was a corresponding increase in the lower categories 1–6 units. The leftward shift in alcohol consumption was observed for both sexes (Table 2, Mantel-Haenszel test for trend, $p < 0.001$).

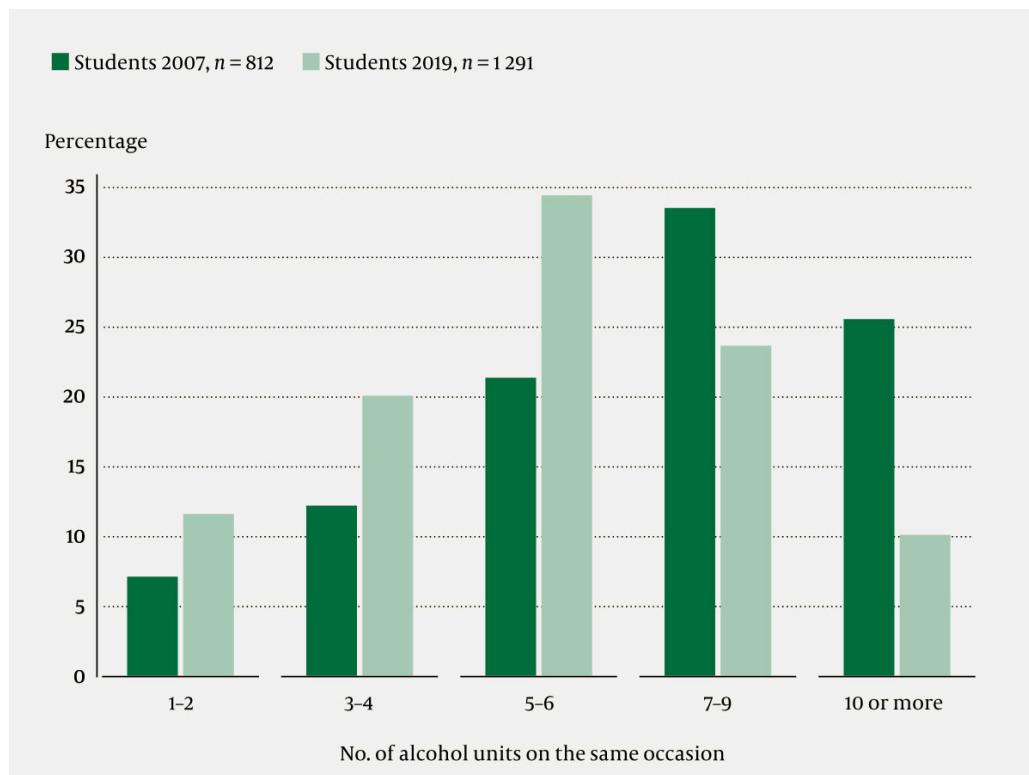


Figure 3 Comparison of number of alcohol units consumed on a 'typical' drinking day by NTNU students in 2007 and 2019 (Mantel-Haenszel test for trend, $p < 0.001$). n = 812 students (2007), n = 1,291 students (2019). Students who do not drink alcohol were excluded.

Table 2

Amount of alcohol consumed on the same occasion among NTNU students in 2007 and 2019, by sex. Students who do not drink alcohol were excluded from the analyses.

Figures are presented as absolute numbers (%). The sex-based differences in number of alcohol units were statistically significant in both 2007 and 2019 (chi-square test, $p < 0.001$). The development in alcohol intake in both the male and female categories in the period 2007–19 was statistically significant (Mantel-Haenszel test for trend, $p < 0.001$).

Alcohol units on same occasion	2007			2019		
	Women (n = 351)	Men (n = 461)	Total (n = 812)	Women (n = 719)	Men (n = 562)	Total (n = 1,281)
1-2 units	22 (6.3)	36 (7.8)	58 (7.1)	99 (13.8)	51 (9.1)	150 (11.7)
3-4 units	62 (17.7)	37 (8.0)	99 (12.2)	164 (22.8)	91 (16.2)	255 (19.9)
5-6 units	111 (31.6)	63 (13.7)	174 (21.4)	288 (40.1)	154 (27.4)	442 (34.5)
7-9 units	120 (34.2)	153 (33.2)	273 (33.6)	142 (19.7)	163 (29.0)	305 (23.8)
10 units or more	36 (10.3)	172 (37.3)	208 (25.6)	26 (3.6)	103 (18.3)	129 (10.1)

In 2019, an average of 6.0 alcohol units ($SD = 4.2$) were consumed in the last drinking episode among students who drank alcohol. This represented an absolute reduction of 1.4 alcohol units from 2007 (independent t-test, $p < 0.001$). In 2019, men drank an average of 7.2 units of alcohol ($SD = 4.9$) in the last drinking episode, compared to 8.5 units ($SD = 5.0$) in 2007. For women, the corresponding figures were 5.1 units ($SD = 3.2$) in 2019 and 6.0 units ($SD = 3.2$) in 2007. The sex-based differences were statistically significant (independent t-test, $p < 0.001$).

Students' mean AUDIT score was 10.7 ($SD = 4.7$) in 2007 and 8.5 ($SD = 5.0$) in 2019 (independent t-test, $p < 0.001$). In 2019, 766/1,370 (55.9 %) students had an AUDIT score ≥ 8 , which represents a shift from low-risk to risky/potentially harmful consumption. In 2007, the corresponding figure was 599/802 (74.7 %) students. The proportion of students with risky alcohol use was significantly reduced by 18.8 % from 2007 to 2019 (chi-square test, $p < 0.001$), while an increase was observed in the low-risk group. Reductions were observed in both high-risk groups (Figure 4, chi-square test, $p < 0.001$). In 2007, 37/802 students (4.6 %) had an AUDIT score corresponding to very high risk/probable alcohol dependence (chi-square test, $p < 0.001$), compared to 41/1,370 (3.0 %) students in 2019.

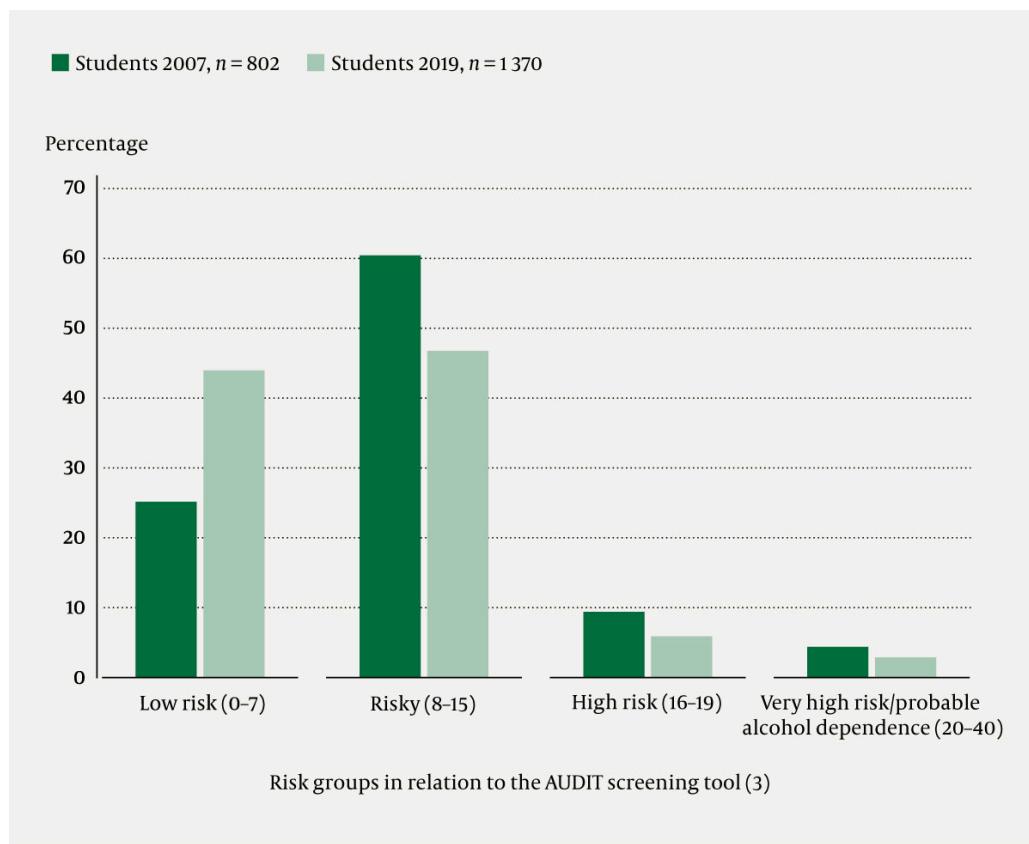


Figure 4 Percentage distribution and comparison of NTNU students in AUDIT-defined risk groups (3). $n = 802$ students (2007), $n = 1,370$ students (2019). The differences are statistically significant (chi-square test, $p < 0.001$).

Discussion

The objective of this study was to examine alcohol use trends among NTNU students in a twelve-year perspective. We identified moderate reductions in the frequency of alcohol intake, the quantity of alcohol consumed, and the occurrence of binge drinking among students in the period 2007–19. The proportion of students with risky alcohol use as determined by the AUDIT scores fell by as much as 19 % between 2007 and 2019, but the alcohol use of over half of the students still poses a long-term risk.

Consuming five or more units of alcohol on the same occasion is classified as binge drinking (10). Frequent binge drinking increases the risk of negative alcohol-related consequences, including injuries, physical violence and sexual assault (15). The reduction in binge drinking trends found in this study is therefore positive from a public health perspective. Our findings related to binge drinking show that this is more common at NTNU (68 %) than among students in Bergen (61 %) (8) and students nationwide (student health and satisfaction survey, the SHoT study; 57 %) (13, 14). The difference must be viewed in the context of the higher average age of students in the Bergen study (24.9 years), as well as the lower proportion of male participants in both studies (8, 13). Previous studies have shown that the tendency to binge drink decreases with increasing age, and that men drink larger quantities and more frequently than women (5, 8, 11, 13).

The high proportion of students with risky alcohol use in our study is consistent with results from previous studies showing a high prevalence of risky alcohol use among students in Norway (8, 12, 13). Erevik et al. found that the prevalence of risky alcohol use among students in Bergen in 2015 was 53 % (8), while the SHoT survey in 2018 reported risky alcohol use in 43 % of students nationwide (13). In our data, the proportion was somewhat higher, at 56 % in 2019. Caution should be exercised when interpreting the difference in results between NTNU and Bergen students due to the variations in average age and sex distribution. The prevalence of risky alcohol use among students is considerably higher than in the general population, where 15 % have risky alcohol use according to a survey by the Norwegian Institute of Public Health. In the segment of the general population most comparable to the student population (16–24 years), the proportion was 34 % (5).

Based on the data from the SHoT study, Heradstveit et al. examined the extent and development of risky alcohol use among Norwegian students in the period 2010–18. Their results showed that the prevalence of risky/potentially harmful alcohol use has been stable over the past eight years (12). This is in contrast to our study, where the proportion of NTNU students with risky alcohol use fell significantly, by 19 % in the period 2007–19 (Figure 3).

Data from the Nord-Trøndelag Health Study (HUNT3) have shown that alcohol intake varies throughout the year, with the highest consumption in the summer and early autumn (17). It is reasonable to assume that there may also be a similar seasonal variation among students, as the autumn semester includes an

introduction programme for new students (buddy week) and (in odd-numbered years) Norway's largest cultural festival 'UKA'. The survey in 2007 was conducted in the spring, while in 2019 the data were collected in the autumn. Assuming a seasonal variation with increased alcohol consumption in the autumn semester, the reduction in alcohol consumption among NTNU students may be greater than observed in this study. The timing of the data collection for the SHoT surveys also differed: autumn 2010 and spring 2018. This reverse seasonal variation may also have resulted in a smaller relative difference between the samples [\(12\)](#).

In the SHoT survey from 2010, two-thirds of the students reported problematic high alcohol consumption levels in student environments and called for more alcohol-free options. This proportion was lower in the SHoT survey from 2018 [\(13\)](#), which may suggest that this data also reflects a change in students' drinking habits and attitudes that is consistent with the trends observed in our study. Our results indicate that the prevalence of risky alcohol use among NTNU students, just like minors and the general adult population, has fallen over the last decade [\(5, 18\)](#). The reasons for this shift are unclear, as national measures such as taxation and reduced availability have remained the same. Changing attitudes in the student community and the correspondingly stronger focus on alcohol-free options may have contributed to the reduction.

The data from the SHoT survey in 2018 represent the most comprehensive survey of Norway's student population, with over 50,000 participating students, but the response rate was low (31 %) [\(13\)](#). Our study includes only 3.9 % of NTNU's student population in 2019 but has a high response rate (96 %). The difference in response rate is probably a result of methodological differences; the SHoT survey is conducted online, while the NTNU survey was via a printed questionnaire, which generally leads to higher participation [\(19\)](#).

The SHoT survey has the capability to capture the entire student population since it is conducted online, but its low response rate makes it vulnerable to sample bias. For example, selection bias can result in an overrepresentation of students with low to moderate alcohol consumption, as these may be more likely to respond. This represents a subgroup in our dataset that has changed little between the survey periods. Our own study only captures students who attend lectures. Our measures to ensure a representative sample among these students included attendance at various faculties and at different times of the day. Our study has a high response rate and demographic diversity. It is therefore reasonable to assume that a representative sample across the student population has been achieved.

The use of only two measurement points is a major methodological limitation in the study that restricts the opportunities for commenting on ongoing trends during the time period in question. Relevant findings therefore need to be interpreted with caution.

Conclusion

Our results suggest a moderate reduction in alcohol consumption among NTNU students and a significant decrease in the proportion engaging in risky alcohol use from 2007 to 2019. However, the prevalence of risky/potentially harmful alcohol use among students is still high compared to that of the general population. Based on this, there is a clear need to investigate the long-term consequences of students' alcohol consumption and whether drinking habits formed as students have implications for future health.

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