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Published in:
Scandinavian Journal of Public Health

DOI:
10.1177/1403494821993724

Publication date:
2022

Document version:
Accepted manuscript

Citation for published version (APA):
Pisinger, V. S. C., Thorsted, A., Jezek, A. H., Jørgensen, A., Christensen, A. I., Tolstrup, J. S., & Thygesen, L. C. (2022). The Danish National Youth Study 2019: study design and participant characteristics. *Scandinavian Journal of Public Health*, 50(3), 323-332. <https://doi.org/10.1177/1403494821993724>

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The Danish National Youth Study 2019: Study design and participant characteristics

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DRAFT

Abstract

Aim: To present the study design, study population, and questionnaire content of the Danish National Youth Study 2019, and to describe the differences between participants and non-participants regarding demographic and socioeconomic characteristics.

Method: The Danish National Youth Study 2019 is a nationwide web-survey among high school students in Denmark. Data was collected from January to April 2019 through a self-administered questionnaire in the classroom. The questionnaire included 120 questions on e.g. physical and mental health, health behaviour and well-being. Data collection took place at 50 general high schools, 32 preparatory high schools, 15 commercial high school and 19 technical high schools.

Results: A total of 29,086 students participated (20,287 general high school students, 2,113 preparatory higher school students, 4,027 commercial high school students and 2,659 technical high school students) corresponding to 66% of the students in the 88 participating schools (31% of invited schools). Among students, 55% were female and the mean age was 17.8 years. Participants were more likely to be female, to be younger, to be of Danish origin, and have family disposable income in the highest quartile compared to non-participants.

Conclusions: The Danish National Youth Study 2019 contributes to knowledge on high school students' health, health behaviour and well-being that can support health planning and prioritizing, through identification of specific risk groups at both local and national level. The study also offers great opportunities for future research as it provides possibility of linkage to various Danish national registers.

Keywords: cross-sectional study; study design; data collection; high school students; youth; health behaviour; health survey.

DRAFT

Background

Adolescence and early adulthood is an age-period characterized by physical, psychological and social changes often accompanied by changes in health behaviour, such as increased use of alcohol and tobacco ¹⁻⁴. However, adolescence and early adulthood is also an age-period where there the individual acquires the physical, cognitive, emotional, social, and economic resources that are the foundation for later life, health, and wellbeing ⁵ and therefore a critical period for health promotion.

Most Danish adolescents continue to high school after finishing basic schooling around age 16-17⁶. Students spend approximately 30 hours at school each week and much of their social life revolves around school. High schools thereby constitute an important social and environmental arena for the establishment and continuation of health behaviour.

It is important to obtain information on physical and mental health and health behaviour among adolescents to establish an evidence-based foundation for identification of risk factors and emerging health challenges. This information will support targeted prevention and health promotion efforts. Health surveys are essential as they provide information that cannot be obtained through official statistical registers, e.g. information on self-rated health, health symptoms, attitudes, social relations, well-being and health behaviour. The Danish National Youth Study 2019 describes health, health behaviour and well-being among Danish high school students. It is an independent follow-up to the Danish National Youth Study 2014⁷. The survey covers key aspects of high school students' lives, such as physical and mental health, alcohol, tobacco, and cannabis use, sleep, diet, sexual behaviour, social relationships, school life, and digital

media use. The study provides a foundation for monitoring health and health behaviour among high school students, for planning and prioritizing health promotion, and for future research. There is great potential for future research projects, including hypotheses generating cross-sectional studies, multilevel studies of important high school factors, and longitudinal studies of associations between health, health behaviour and well-being in adolescence and prospective health and socio-economic outcomes. Data linkage to national registers allows for epidemiological studies and enrichment of a wide range of data including socioeconomic, criminal, labour market and health data.

In this paper we present the study design, study population, questionnaire content, and describe the differences between participants and non-participants regarding demographic and socioeconomic characteristics.

Material and methods

Setting

In Denmark, 72% of students finishing primary school in 2019 applied for general upper secondary education (referred to as high school)⁶. Among them, 59% applied for upper secondary school leaving examination (referred to as general high school), 20% for higher commercial examination (referred to as commercial high school), 10% higher preparatory examination (referred to as preparatory high school) and 10% for higher technical examination (referred to as technical high school), while around 1% applied for international baccalaureate or 2-year upper secondary school leaving examination⁶. High school is generally a three year-programme, except preparatory high school that is a two-year programme. All high school educations are preparatory and qualifying for higher education in Denmark, the different educations offer a different combination of courses

that qualify for different types of higher educations (e.g. University bachelor (Science/Art/Health/Technical etc.), Business school, and University college).

Recruitment

All schools in Denmark (n=287) offering general high school, preparatory high school, commercial high school or technical high school examination were invited to participate. All schools received the invitation by mail, and those who did not respond within a week received a reminder mail and then a phone call from the research group. High schools were promised a school report on health behaviour and well-being among their students to give them an incentive to participate. General high schools that participated in the Danish National Youth study 2014⁷ were resend their school report from 2014 along with the invitation to give them the opportunity of monitoring their students' health behaviour and well-being and give them an impression of the use of data. All school classes were invited to participate. Two schools only participated with 1st year students. Reasons for not participating was lack of time and resources, competition from other governmental monitoring (especially the mandatory National Well-being survey and an evaluation of a new high school reform), and insecurity and nervousness about schools' legal foundation to participate under the new EU general data protection regulation that was introduced in May 2018.

Data collection

Data collection took place from 14 January 2019 to 1 April 2019. The initial data collection took place from 14 January to 1 March 2019, followed by a reminder procedure from 2 March to 1 April 2019. Schools were required to assign a coordinator to

plan the data collection and allocate a 45-minute lesson for each school class to complete the questionnaire with a teacher present during the completion. The coordinator received all information and guidance material including a link to the project website. In class students accessed the electronic questionnaire by going to the project website and using their UNI-Login to sign into their personal site where the questionnaire was available. UNI-Login is used as an identification solution for a wide range of digital services in the field of education, such as the national tests, exams and the National well-being survey. Students aged 15-30 were able to participate. The reminder procedure consisted of emails or phone calls to school coordinators to remind school classes, where no or very few students had answered, to fill in the questionnaire. There were no individual reminders directly to students who had not answered initially. All reminders were through the school coordinator. We have no information on reasons for non-participation on an individual level. School coordinators reported that some school classes felt burdened by too many questionnaires and some students felt the questions were too personal and therefore rejected to participate. Some school coordinators also failed to allocate a lesson for all school classes to participate, and participation in those schools were therefore relatively low.

The questionnaire

The Danish National Youth Study 2019 questionnaire included several questions under the following themes: socioeconomic and demographic factors, physical and mental health, alcohol intake, smoking habits, cannabis- and drug use, diet and meals, sleep, physical activity, sexual behaviour, body image, social relations, school life and digital

media use (Table 1). It contained 120 questions. Participants could skip questions they did not wish to answer. Jumps were automatically performed as the questions were answered to prevent participants from filling in irrelevant questions. The questionnaire in Danish can be made available upon request. Most questions were repeated from the Danish National Youth Study 2014⁷ to be able to monitor developments in general high school students' health behaviour and well-being. Important indicator questions were chosen in collaboration with the Steno Diabetes Center Copenhagen, who collected data on vocational school students' health and well-being in the same time period (The Health-Vet 2019⁸). This was to enable comparison between high school students and vocational school students in 2019. Some questions came from larger existing national and international surveys^{4, 9, 10} to enable comparison. Lastly, questions on gaming and digital media use were developed specifically for the Danish National Youth Study 2019, which was done in close collaboration with Danish researchers in the field. Questions on alcohol intake constituted a relatively large proportion of the questionnaire as these provided baseline data of high school students' alcohol use before the introduction of an intervention project aimed at reducing excessive drinking among general high school students (the 'High schools High on Life' study^{11, 12}).

Linkage to registers

Through information from UNI-Login all students in participating schools have been linked to their unique personal identification number (CPR) which enables linkage to national registers. In cooperation with Statistics Denmark, a linked research database has been established where data is stored, which is regulated under Danish law. Statistics

Denmark have high security and confidentiality requirements, which include that CPR-numbers are pseudonymised, several steps of log-in procedures for researchers, researchers are educated in data security and privacy requirements, all activities are logged, and only aggregated data can be published. Students in participating schools were linked to the Danish Civil Registration System¹³, the educational register¹⁴ and the income register¹⁵ to investigate socioeconomic differences between students who did not fill in the questionnaire (non-participants) and those who did (participants).

Measures in non-participation analysis

We analyzed if participating students had a different socioeconomic and demographic composition than non-participants. Sex, age, and immigration status (Danish/ Immigrant/ Descendant) came from the Danish Civil registration system¹³. Family equivalent disposable income came from the Income Statistic register, which contains information on the income of everyone residing in Denmark who are liable to pay Danish taxes¹⁵. Family income was categorized into quartiles based on both participants and non-participants in year 2018. Information on parents' highest educational level attained was obtained through linkage with the Population's Education Register¹⁴. Educational level was categorized into basic schooling, high school, vocational training, higher education 1-2 years, higher education 3-4 years, and higher education <4 years and were also based on information from 2018.

Statistical analysis

All statistical analysis and data processing were performed in STATA 16. Multilevel logistic regression was used to analyze if participating students had a different socioeconomic and demographic composition than non-participants. Participants were nested within schools (n=88) and multilevel models were used to account for dependency among participants within the same school. All estimates in the non-participation analysis were mutually adjusted for the other demographic and socioeconomic factors. We present total number and percentages in all descriptive tables and odds ratios (OR) and 95% confidence intervals in the analysis of non-participation.

Ethics

Data collection was approved by the local Data Protection Agency at the University of Southern Denmark (J.no. 10.130). Prior to the data collection schools were sent information about the aim of the study and the legal foundation to share with teachers, students and parents. At the beginning of the questionnaire participants had to read and accept an informed consent form that clearly expressed that participation was voluntary and that individual data would be kept confidential and that their data would only be used for research. The local Data Protection Agency at the Southern Denmark University also approved the linking of data to registers within the purpose of the study based on the EU general data protection regulation and ensured that all local confidentiality and privacy requirements were met.

Results

Participating schools and educations

An overview of participation in the Danish National Youth Study 2019 is shown in Table 2. All high schools in Denmark were invited to participate (287 schools) and a total of 88 schools agreed to participate (31%). According to the Ministry of Education, a total of 142,138 students attended a high school in 2019. A total of 43,961 students attended a high school that agreed to participate and among these, 29,086 students filled in the questionnaire, corresponding to a participation proportion of 20% among students in invited schools (compared to enrolled students in 2018) and 66% among students in participating schools (table 2). Participation ranged from 11% to 98 % at school level. At school level 50 (33%) general high school, 32 (28%) preparatory high school, 15 (28%) commercial high school and 19 (35%) technical high school educations participated (Table 3). Some schools offered more than one type of education, so the number of participating high schools does not correspond to the number of participating educations. Student level participation was highest among general high schools (73%) and lowest among students at preparatory high school students (51%).

Participant characteristics

Table 4 shows the distribution of participants by sex, age, school year, and region. A total of 29,086 high school students participated in the Danish National Youth Study 2019 of which 20,287 (70%) were general high school students, 2,113 (7%) were preparatory high school students, 4,027 (14%) were commercial high school students and 2,659 (9%) were technical high school students. More females attended general high school (60%) and preparatory high school (63%), while more males attended commercial high school (58%) and technical high school (67%). The mean age of the participants was 17.8 years,

with students at preparatory high school being older and having a higher proportion of students aged 22-30 years (14%) compared to the other educations (<1%). More students in 1st year (38%) participated compared to 2nd (33%) and 3rd (29%) year. The highest proportion of students was from the Capital Region of Denmark (33%) and the lowest from North Denmark Region (5%). No commercial high school students participated from North Denmark Region and only 48 (1%) commercial high school students participated from the Capital Region of Denmark, as no commercial high schools participated in North Denmark Region and only one commercial high school participated from the Capital Region of Denmark. Compared to the national distribution in 2019 from the Ministry of Education¹⁶ (supplementary table 4a), participants in all educations were somewhat older and the regional distribution differed with a higher proportion of participants from Region of Southern Denmark and a lower number from the Capital Region of Denmark and North Denmark Region at preparatory high schools, commercial high schools and technical high schools participant. Participants in all educations had similar distributions of sex, school year, parents' highest educational level achieved, and immigration status to the national distribution.

Non-participation

The non-participation analysis showed that participating students within participating schools were more likely to be female than male (OR=1.21 95% CI [1.16-1.27]), and to have higher family disposable income (for example income in the highest quartile OR=1.11 95% CI [1.03-1.19], compared to the lowest quartile). Participation decreased with increasing age (for example, 20-30 years OR=0.49 95% CI [0.44-0.55] compared to

15-16 years), and participants were also less likely to be immigrant (OR=0.92 95% CI [0.78-1.08]) or descendant (OR=0.86 95% CI [0.78-0.94]) compared to Danish. There were no association with parents' highest achieved educational level (Table 5).

Comparison with the national sample in 2019

There were no large gender or age differences between participants in the Danish National Youth Study 2019 and the national sample of high school students in 2019 (Table 6).. Participants were more likely to attend general high school (70% vs. 59%) and attend a high school in the Region of Southern Denmark (28% vs. 22%) compared to the national sample of high school students in 2018. Participants in the Danish National Youth Study 2019 were less likely to attend preparatory high school (7% vs. 12%), commercial high school (14% vs. 17%) and attend a high school in the North Denmark Region (5% vs. 9%) compared to the national sample of high school students in 2018.

Discussion

The Danish National Youth Study 2019 contributes to new and important knowledge on key factors that influence high school students' health and well-being. It includes questionnaire information of 29,086 high school students corresponding to 66% of the students in the 88 participating schools (31% of invited schools). The questionnaire includes the following themes: socioeconomic and demographic factors, physical and mental health, alcohol, smoking, cannabis- and drug use, diet and meals, sleep, physical activity, sexual behaviour, body image, social relations, school life and digital media use. The large study population, local ownership and results at the local level and the wide

range of questionnaire themes create a foundation for monitoring health and health behaviour among high school students, for planning and prioritizing health promotion, and for future research. The information should be of interest to all professionals and researchers working within the educational, social and health sector.

Participation proportion

The participation proportion at school (31%) and student level (66%) in the present study was lower than in the Danish National Youth Study 2014 (school level participation: 87% and student level 85%)⁷ and somewhat lower than in the Danish high school study from 1996-97 survey (school level participation: 59% and students level participation: 65%)¹⁰ as well as other school based health surveys among high school students and slightly younger adolescents¹⁷⁻²⁰. There can be several reasons for the lower participation proportion in 2019 compared to 2014. First, the participation proportion in the Danish National Youth 2014 may have been exceptionally high, as it was the first of its kind (in a long time), and at the time high school principals were eager to get data on their students' health and wellbeing. Second, the 2014 study only included general high school students (and preparatory high school students at schools also offering general high school), which also had the highest response proportion in 2019 (73% on student level) compared to the other educations. Third, there is a general trend in declining participation proportion in health surveys over the past 20-30 years²¹⁻²³, that might also affect high school based surveys. Besides that, we explain the lower participation proportion in the present study to be a results of questionnaire fatigue among school principals and students partly due to data collection at the same time as the mandatory National Well-being survey organized

by the Ministry of Education in addition to nervousness about the newly introduced EU general data protection regulation.

Representativeness

According to the Ministry of Education, a total of 142,138 adolescents were enrolled in Danish high schools in 2019¹⁶. The Danish National Youth Study 2019 included approximately 20% of these students. Participants in the Danish National Youth Study 2019 were more likely to attend general high schools, and had a slightly different regional distribution with more students from the Region of Southern Denmark and Capital Region of Denmark and fewer from the North Denmark Region compared to the national sample of high school students in 2019. No commercial high schools from the North Denmark Region and only 1% from the Capital Region of Denmark participated in the study. Although differences were small, as in most health surveys, the non-response analysis showed that participants were more likely to be female, to be younger, to be Danish and to have parents with higher income compared to non-participants²³. The differences were similar to what was found in the Danish National Youth study 2014⁷.

The study population was limited to adolescents attending high schools. The study did not include students attending international baccalaureate or 2-year general upper secondary education corresponding to approximately 1% of high school students⁶ or students in vocational schools. Neither were young people outside the educational system included. The population is therefore not representative of all young people in Denmark. Readers should be aware of regional differences from the national sample and socioeconomic differences between participants and non-participants. However, based on

the systematic collection of data, reasonable response proportion, fairly high coverage across sociodemographic characteristics and no large systematic difference between responders and non-responders, we assume that results from The Danish National Youth Study 2019 can be regarded as representative of Danish high school students and be applicable for descriptive studies of high school students' health and well-being. . Representativeness is critical when data is used for descriptive purposes²⁴ thus for monitoring of health and health behaviour one should be aware of possible selection bias from the lower participation proportion of 66% and that non-participation was not completely at random. Especially when looking at trends in high school students' health behaviour and well-being over time one needs to be aware of differences in study populations, that needs to be taken into consideration. Representativeness might be less crucial in association analyses²⁵, depending on the association under study, as previous studies have shown that the increase in non-participation does not always affect exposure-outcome associations or point estimates^{26,27}. We therefore believe that the Danish National Youth Study 2019 is very well suited for longitudinal studies exploring central factors in high school students lives of importance for future health and well-being. Thus, depending on the research question, possible selection bias should be taken into consideration.

Perspectives

New knowledge and monitoring

The Danish National Youth Study 2019 contributes to new and important information on a variety of factors among high school students. Approximately 10% questions were

included from the High school study in 1997¹⁰, and 50% question came from the Danish National Youth Study 2014⁷. In addition, 41 (82%) of the (50) general high schools that participated in Danish National Youth Study 2019 also participated in Danish National Youth Study 2014. The present study therefore follows up on the development in general high school students' health and well-being and makes it possible to look at trends from 1997-2019. However, differences in populations needs to be considered in order to monitor developments.

All participating schools have received a school report on their students and a national report has been published²⁸. This enables schools to monitor their own students' health, health behaviour and well-being and compare with the national level. The collaboration with the Steno Diabetes Center Copenhagen on indicator questions in The Health-Vet 2019⁸ also enables comparisons between high school students' and vocational school students' health, health behaviour and well-being. This information is important in identifying emerging health and health behaviour challenges and in the planning of future health promoting interventions in this age group.

Future research perspectives

There is great potential for future research projects of international importance based on data from the Danish National Youth Study 2019. One project was already by design embedded within the Danish National Youth Study 2019 (the 'High schools High on Life' study¹¹, clinicaltrials.org Protocol Record NCT03906500). Efficient use of data is important, as data collection is timely and expensive. Secondly, the cross-sectional study design offers a platform for generation of new hypotheses about associations between

health and behavioural factors in high school students' lives. Thirdly, the linked research database provides a unique opportunity for future longitudinal studies²⁹. It gives access to a variety of historical and prospective information, including socioeconomic situation of the participants and their families (e.g. education, income and labour market participation), family situation (e.g. parents, siblings, cohabitation and location of home), school and education information (e.g. dropouts, grades and initiation of tertiary education), and health and medical data (e.g. use of prescription medication and diagnoses, hospitalizations). The Danish National Youth Study 2019 thereby is a unique starting point for identification of central factors in high school students lives of importance for future health and well-being.

Conclusion

In conclusion, the Danish National Youth Study 2019 contributes to knowledge on high school students' health behaviour, health and well-being that can support health planning, through identification of specific risk groups at both local and national level. The study also offers great opportunities for future research projects as it provides possibility of linkage to various national registers through the Danish Civil Registration System.

Acknowledgements

We wish to thank all schools and students who participated in the Danish National Youth Study 2019. Furthermore, acknowledgements are made to the teachers and school managers who helped coordinate the data collection. We also wish to acknowledge the research group working on the data collection of Danish National Youth Study 2014 of

which the Danish National Youth Study 2019 build upon in terms of existing knowledge, questionnaire content, communication material and report format.

Funding

This work was supported by the Danish Cancer Society.

Authors Contribution

VP wrote the first draft of the manuscript. VP coordinated the data collection in collaboration with AHJ and AJ. LCT and AT linked data to register information. VP and AT made the analyses. AIC and LCT advised and supervised the data collection and AIC, LCT and JST advised the reporting of data. All authors read, revised and approved the final manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

Availability of data and material

The datasets generated and analyzed during the current study are not publicly available due to sensitivity of the data but are available from the corresponding author on reasonable request.

Table 1: Questionnaire content in the Danish National Youth Study 2019

Themes	Questions regarding
Socioeconomic and demographic factors	Education, school year, future educational expectations, job, cohabitation, financial strains in the family.
Alcohol	Alcohol consumption (quantity, frequency), age of first intoxication, binge drinking, alcohol consumption at school party, negative experiences and knowledge of school alcohol policies, parents' attitudes to alcohol use.
Smoking	Smoking status, tobacco quantity, age of debut, intentions for cessation, smoking during school hours, use of snuff, hookah and e-cigarettes.
Drugs	Cannabis use (frequency, quantity), age of debut and use of amphetamine, ecstasy/MDMA, cocaine or other drugs.
Diet and meals	Intake of breakfast, fresh fruit, fast food, soda and energy drinks.
Sleep	Sleep quantity, tiredness, causes of sleep deprivation.
Physical activity	Leisure time physical activity and active transport.
Sexual behaviour	Sexual experience, contraceptives and use of emergency pills.
Body and health	Self-rated health, physical symptoms, physical and mental long-term disorders, self-reported weight and height, body satisfaction and body image.
Well-being	Life satisfaction, the Warwick-Edinburgh Mental Well-being scale, self-esteem, loneliness, stress, psychological symptoms, self-reported eating disorder, self-harm, suicidal thoughts, suicide attempt.
Social relations	Contact with friends and trustful communication with friends and parents.
School life	School satisfaction, classmate and teacher support, participation in social community, unity in class, importance of grades, and frequency of non-attendance
Digital media use	Use of social media and emotional reactions.
Other	Sunbed use. Gaming (frequency, reasons).

Table 2: Participation in the Danish National Youth Study 2019

	Total
Invited schools [N]	287
Participating schools [N]	88
School participation [%]	31%
Students in invited school classes ^a [N]	142,138
Students in participating schools [N]	43,961
Participating students [N]	29,086
Student participation [%], among students in invited schools	20%
Student participation [%], among students in participating schools	66%

^aInformation was obtained from the Ministry of Education and correspond to the number of students enrolled in General high school, Preparatory high school, Commercial high school, or Technical high school, between 15-30 years in 2019¹⁶

Table 3: Participation in the Danish National Youth Study 2019 by educations

	General high school	Preparatory high school	Commercial high school	Technical high school	Total
Invited educations ^a [N]	150	114	54	54	372
Participating educations ^a [N]	50	32	15	19	116
Participating educations ^a [%], among invited educations	33 %	28 %	28 %	35 %	31 %
Students in invited schools [N]	27,922	4,107	6,933	4,999	43,961
Participating students [N]	20,287	2,113	4,027	2,659	29,086
Student participation [%], among students in participating schools	73 %	51%	58%	53%	66%

^aSome schools offer more educations and therefore is the number of educations higher than the number of schools.

Table 4: Distribution of participants in the Danish National Youth Study 2019 by educations, and sex, age, school year, and region (N=29,086)

	General high school	Preparatory high school	Commercial high school	Technical high school	Total
Total	20,287 (100%)	2,113 (100%)	4,027 (100%)	2,659 (100%)	29,086 (100%)
Sex					
Male	8,078 (40%)	784 (37%)	2,329 (58%)	1,781 (67%)	12,972 (45%)
Female	12,209 (60%)	1,329 (63%)	1,698 (42%)	878 (33%)	16,114 (55%)
Age					
15-16 years	3,240 (16%)	55 (3%)	522 (13%)	382 (14%)	4,199 (14%)
17 years	6,252 (31%)	379 (18%)	1,213 (30%)	747 (28%)	8,591 (30%)
18 years	6,431 (32%)	617 (29%)	1,287 (32%)	870 (33%)	9,205 (32%)
19 years	3,611 (18%)	390 (18%)	789 (20%)	514 (19%)	5,304 (18%)
20 years	656 (3%)	222 (11%)	185 (5%)	111 (3%)	1,174 (4%)
21 years	52 (<1%)	144 (7%)	23 (1%)	22 (1%)	214 (<1%)
22-30 years	45 (<1%)	306 (14%)	8 (<1%)	13 (<1%)	372 (1%)
Mean age in years	17.6	19.2	17.8	17.8	17.8
School year^a					
1 st	7,339 (36%)	1,249 (59%)	1,468 (36%)	987 (37%)	11,043 (38%)
2 nd	6,443 (32%)	864 (41%)	1,396 (35%)	808 (30%)	9,511 (33%)
3 rd (4 rd)	6,505 (32%)	0 (0%)	1,163 (29%)	864 (32%)	8,532 (29%)
Region					
North Denmark Region	1,306 (6%)	122 (6%)	0 (0%)	105 (4%)	1,533 (5%)
Central Denmark Region	3,946 (19%)	352 (17%)	333 (8%)	1,091 (41%)	5,722 (20%)
Region of Southern Denmark	4,016 (20%)	891 (42%)	2,499 (62%)	685 (26%)	8,091 (28%)
Region Zealand	2,284 (11%)	423 (20%)	1,147 (28%)	380 (14%)	4,234 (15%)
Capital Region of Denmark	8,735 (43%)	325 (15%)	48 (1%)	398 (15%)	9,506 (33%)

^a12 Higher preparatory examination-students are placed in 2nd school year as they by mistake was coded as 3rd school year.

Table 5: Participating and non-participating students within participating schools in the Danish National Youth Study 2019, OR (95% CI) for participating in the study

	Participants N (%)	Non-participants ^a N (%)	OR (95% CI) ^c
Total	29,086 (100%)	14,875 (100%)	
Sex			
Male	12,972 (45%)	7,793 (52%)	1
Female	16,114 (55%)	7,082 (48%)	1.21 (1.16-1.27)
Age			
15-16 years	4,199 (14%)	1,648 (11%)	1
17 years	8,591 (30%)	3,778 (25%)	0.80 (0.74-0.86)
18 years	9,205 (32%)	4,812 (32%)	0.64 (0.59-0.69)
19 years	5,304 (18%)	3,068 (21%)	0.58 (0.53-0.63)
20-30 years	1,787 (6%)	1,569 (11%)	0.49 (0.44-0.55)
Immigration status			
Danish	26,379 (91%)	12,948 (87%)	1
Immigrant	696 (2%)	455 (3%)	0.92 (0.78-1.08)
Descendant	2,011 (7%)	1,427 (9%)	0.86 (0.78-0.94)
Parents' highest educational level achieved			
Basic school	1,059 (4%)	709 (5%)	1
High school	749 (3%)	439 (3%)	1.00 (0.83-1.19)
Vocational training	8,608 (30%)	4,596 (31%)	0.95 (0.84-1.07)
Higher education 1-2 years	2,156 (7%)	1,160 (8%)	0.97 (0.84-1.12)
Higher education 3-4 years	8,783 (30%)	4,441 (30%)	0.99 (0.87-1.12)
Higher education >4 years	7,513 (26%)	3,366 (23%)	0.96 (0.85-1.10)
Missing information	218 (1%)	164 (1%)	
Family equivalent disposable income in quartiles^b			
Q1 (lowest)	6,763 (23%)	4,228 (28%)	1
Q2	7,352 (25%)	3,638 (24%)	1.07 (1.00-1.15)
Q3	7,376 (25%)	3,614 (24%)	1.09 (1.01-1.17)
Q4 (highest)	7,595 (26%)	3,395 (23%)	1.11 (1.03-1.19)

^a Non-participants are students enrolled in participating school classes that did not fill in the questionnaire.

^b Family equivalent disposable income considers the number of family members. Quartiles were based on both participants and non-participants.

^c All estimates are mutually adjusted for the other demographic and socioeconomic factors.

Table 6: Participants in the Danish National Youth Study 2019 and Danish high school students in 2019 by sex, age, education and region

	Participants	Participants and non-participants in the Danish National Youth Study 2019	Danish high school students 2019
Total	29,086 (100%)	43,961 (100%)	142,138 (100%)
Sex			
Male	12,972 (45%)	20,765 (47%)	65,500 (46%)
Female	16,114 (55%)	23,196 (53%)	76,638 (54%)
Age			
Mean age	17.8	17,9	17.5
Education			
General high school	20,287 (70%)	27,922 (64%)	82,714 (58%)
Higher preparatory examination	2,113 (7%)	4,107 (9%)	17,465 (12%)
Commercial high school	4,027 (14%)	6,933 (16%)	27,761 (20%)
Technical high school	2,659 (9%)	4,999 (11%)	14,207 (10%)
Region			
North Denmark Region	1,533 (5%)	1,946 (4%)	13,142 (9%)
Central Denmark Region	5,722 (20%)	7,361 (17%)	32,731 (23%)
Region of Southern Denmark	8,091 (28%)	12,968 (30%)	30,455 (21%)
Region Zealand	4,234 (15%)	6,955 (16%)	21,124 (15%)
Capital Region of Denmark	9,506 (33%)	14,731 (34%)	44,462 (31%)
Missing information	0 (0%)	0 (0%)	224 (<1%)

^a Information was obtained from the Ministry of Education^{16, 30}.

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