



BMJ Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjopen.bmj.com>).

If you have any questions on BMJ Open's open peer review process please email [info.bmjopen@bmj.com](mailto:info.bmjopen@bmj.com)

# BMJ Open

## **Alcohol use disorder among youths Not in Education, Employment, or Training (NEET) – A nationwide register-linkage study with 485 839 Swedish youths**

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-032888
Article Type:	Research
Date Submitted by the Author:	11-Jul-2019
Complete List of Authors:	Manhica, Helio; Karolinska Institute, Department of Public Health Sciences Lundin, Andreas Danielsson, Anna-Karin
Keywords:	Alcohol use disorder, NEET, Youth, Labour market, Longitudinal study

SCHOLARONE™  
Manuscripts

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Alcohol use disorder among youths Not in Education, Employment, or Training (NEET) – A nationwide register-linkage study with 485 839 Swedish youths**

Hélio Manhica<sup>1\*</sup>, Andreas Lundin<sup>1 2</sup> and Anna-Karin Danielsson<sup>1</sup>

<sup>1</sup> Karolinska Institutet, Department of Public Health Sciences, Stockholm, Sweden

<sup>2</sup> Centre for Epidemiology and Community Medicine, Region Stockholm, Stockholm, Sweden

\*Corresponding author

Karolinska Institutet

Department of Public Health Science (PHS)

SE-171 77 Stockholm, Sweden

[helio.manhica@ki.se](mailto:helio.manhica@ki.se)

**Total word count:** 2907

**Running head:** NEET and alcohol use disorder

**Key words:** NEET, labour market, youth, alcohol use disorder, longitudinal study.

## ABSTRACT

**Objective:** To investigate to what extent being outside education, employment, or training after completed secondary education in Sweden might affect the risk of subsequent alcohol use disorders, with sociodemographic indicators, such as sex, domicile, and origin, taken into account.

**Design:** Population register-based cohort study with 485 839 Swedish youths.

**Setting:** Sweden.

**Participants:** All youths who were born between 1982 and 1991 and were aged between 19 and 24 years when they completed secondary education in Sweden, between 2005 and 2009.

**Primary outcome measure:** Cox regression models were used to estimate the hazard ratio (HR) of first record of entry into alcohol-related medical care with a diagnosis of an alcohol use disorder, by level of labour market attachment, from 1 January 2009 to 31 December 2016.

**Results:** About 4% of the youth population were outside education, employment, or training and 25% were in insecure workforce after they completed secondary education. The risk of alcohol use disorder was higher among youths in insecure workforce, HR 1.40 (1.30–1.50), and among those outside education, employment, or training, HR 1.30 (1.11–1.51), compared with youths within the core workforce, also after adjusting for age, domicile, sex, and origin. Being in education was associated with lower HR of alcohol use disorder, HR = 0.84 (0.78–0.90).

**Conclusion:** Youths who are in insecure workforce and outside education, employment, or training are at higher risk of alcohol use disorder. Targeted policy actions are needed to support a successful school-work transition to secure equal opportunities for young people.

### Strengths and limitations of this study

- The longitudinal study was based on data from a combination of national registers covering the entire youth population living in Sweden.
- The indicator of levels of labour market participation was constructed using information on all possible income sources.
- The small population sizes for specific countries of origin in the migrant population did not allow conducting analyses separated by specific origin.
- Essential confounder variables, which could account for the different patterns of labour market attachment and alcohol-related behaviours, were not available in our data.

INTRODUCTION

The harmful use of alcohol is a major concern for public health. In 2016, alcohol was responsible for about 3 million deaths (5.3% of all deaths) globally and 5.1% of the total global burden of disease, with the prevalence being highest in the WHO European region: 10.1% of all deaths and 10.8% of the total burden of disease.[1]

In Western countries, a number of studies have shown that alcohol-related mortality and alcohol use disorder (AUD) are more likely to occur among socioeconomically disadvantaged populations.[2-4] However, this association is not sufficiently understood. While some scholars argue that poor labour market attachment, in terms of unemployment, lower levels of income, or low occupational status, is associated with increased risk of excessive alcohol use (*social causation*),[5-7] others have suggested the opposite – that is, heavy use of alcohol is a risk factor for poor labour market outcomes (*social selection*).[8, 9] In fact, Boden and colleagues[10] found support for both the social causation and the social selection theory, reporting unemployment to play a causal role in substance misuse (including alcohol), but also the opposite, whereby substance misuse increased the risk of unemployment.

In general, young people are more affected than adults by both labour market disengagement[11, 12] and excessive use of alcohol.[1] Still, previous studies within this field have mainly focused on adult populations. A recent pilot study[13] found that job security perception was associated with depression, anxiety, tobacco smoking, and alcohol abuse. However, this study did not examine possible age differences.

Against this background, it is of interest to investigate whether being outside education, employment, or training contributes to increased risk of subsequent AUD in youths who are in the process of establishing themselves on the labour market.

Youths and labour market attachment

The transition from school to successful labour market integration can be a challenge in young people’s lives. In fact, the transition often involves moving between different employment statuses, temporary working contracts, and other precarious types of employment with low salaries.[12] These challenges tend to be more pronounced among youths with foreign background than their native peers.[14] The high labour market vulnerability facing youths with a migrant background is currently the focus of the policy debate in Sweden and

many other European countries, due to the growth of this population caused by a high influx of refugees and asylum seekers. For instance, in 2015, one in five youths aged 15 to 34 years residing in the EU had a migrant background (either being foreign-born or having foreign-born parents). During the same period, about 41% of all new immigrants to Sweden were youths aged 15 to 29 years.

The concept NEET – Not in Education, Employment, or Training – has been widely used as an indicator for capturing the extent of young people's multifaceted disadvantage in the labour market. It emerged in the UK in the late 1980s, and has been used as an instrument to inform youth-oriented policies in the European Union.[15] This concept covers all young people who are unemployed and inactive, i.e., not enrolled in any formal or non-formal education, as well as those who suffer from long-term sickness or are otherwise unable to work or not available for work.[11] As in many OECD countries, the rates of NEETs in Sweden are higher among youths with low education (i.e., lacking secondary education) than those with tertiary education.[16] Moreover, youths with a migrant background are overrepresented among NEETs compared with their native peers with comparable education levels. Still, obtaining a secondary education has been found to be protective against the risk of being NEET among all youths, regardless of origin.[17]

Some previous studies have shown that NEET youths are more likely to have poor mental health, including poor self-reported health, substance use (including alcohol), and delinquent behaviours.[18-21] However, opposing findings, i.e., that NEET status does not lead to poor mental health and substance use, have also been reported.[22] Thus, results from previous studies are inconsistent and have some methodological limitations, such as relying solely on self-reported data, applying cross-sectional designs, with relative small sample sizes, and having unclear durations of the NEET period.

Many prior studies have focused on the association between unemployment and later hospitalisation or death due to alcohol.[5, 6, 23] To our knowledge, no study has investigated the association between being outside education, employment, or training and AUD in the total youth population of Sweden.

Therefore, the main objective of this study was to investigate to what extent being NEET in Sweden might affect the risk of subsequent AUD. In addition, we aimed to examine to what extent these possible associations differed with regard to sociodemographic indicators, such as sex, domicile, and origin.

**METHODS**

**Study population**

The study population comprised all youths who were born between 1982 and 1991 and were alive and residing in Sweden between January 2006 and December 2012, according to the Register of the Swedish Total Population. The dataset allowed us to identify a total of 485 839 youths who were aged between 19 and 24 years old when they completed secondary education in Sweden, between 2005 and 2009. Youths with previous AUD and those who did not complete a secondary degree during the follow-up period were excluded from the analyses. The information regarding level of education and year of graduation was obtained from Statistics Sweden’s Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA). The information regarding origin of birth of the study population was obtained from the Multi-Generation Register.

**Exposure variable**

We created an indicator of labour market attachment based on information on income sources, for the three years consecutively following the year of graduation from secondary school.

**Labour market attachment**

The exposure variable was primarily defined based on a model created by Eurostat for estimating the prevalence of labour market vulnerability among young people. The model was built using data from the EU Labour Force Survey. It defines NEETs as all youths who remained outside education, employment, or training for 6 months or more during the preceding 12 months. In this article, we used an indicator of labour market attachment that has been applied in several studies.[17, 24] This indicator was based on information on social assistance, parental leave, disposable income, and other sources of income, for the three years consecutively following the year for which information on secondary education was retrieved (between 2005 and 2009). Four categories of labour market attachment were conceptualised as follows:

*Core workforce:* This category comprises all individuals who can support themselves by means of labour market income. This includes persons with earnings of at least 3.5 price base amounts (PBA) during a year. The PBA is a concept used by the Swedish government to calculate benefits in social insurance programmes. The PBA is calculated based on changes in the general price level, in accordance with the National Insurance Act. This also includes

income from social insurance that is linked to employment, such as sickness allowances and payments from the parental insurance system. It excludes income sources such as unemployment benefits, student allowances, and disability pensions.

*Education:* All persons with annual earnings of less than 0.5 PBA, or who have been registered as students in any type of education, or have been in some kind of labour market activation programme for at least 100 days, but not in the NEET category.

*Insecure workforce:* All persons with a lower attachment to the labour market; with a labour market income of at least 3.5 PBA for no more than one year, and less than 0.5 PBA for no more than two years. Individuals receiving unemployment insurance for at least two of the three years are also included in this category.

*NEET:* All individuals with annual earnings of at most 0.5 PBA, who have received unemployment insurance benefits, incomes from sickness or part-time disability pensions, full disability pension, or social assistance.

## Outcome

The outcome variable was retrieved from the Swedish national inpatient and outpatient register. It referred to the first register entry on alcohol-related medical care with a diagnosis of AUD, from 1 January 2009 to 31 December 2016. This included acute intoxication, harmful use, dependence, toxic effects, and liver disease (F10:00–F10.99), in accordance with definitions in the tenth edition of the World Health Organization International Classification of Disorders (ICD-10).

## Covariates

We characterised the study population into three categories based on *origin*, as given in the Multi-Generation Register. *Youth migrants* were defined as youths born outside Sweden with both parents born abroad. *Youth offspring of migrants* comprised all Swedish-born youths with at least one parent born abroad. *Native Swedish youth* comprised all youths born in Sweden with both parents born in Sweden.

Sociodemographic indicators such as age, sex, and domicile were retrieved from the LISA register. The variable *domicile* indicated the place of residence at the beginning of the follow-up period. This was classified into three categories, in accordance with the Swedish Association of Local Authorities and Regions, which is a politically run organisation that represents and advocates for local government in Sweden: *Big city* referred to the



metropolitan areas of Sweden’s three largest cities: Stockholm, Gothenburg, and Malmo. *Town* covered other predominately urban municipalities in or near medium-sized towns, and *rural* covered smaller towns/urban areas and rural municipalities.[25] *Age* was age in years when secondary education was completed between 2005 and 2009. This ranged from 19 and 24 years. *Sex* indicated whether the person was female or male.

**Statistical analyses**

The analyses were based on person-time measured from January 2009 to whichever of the following that occurred first: death, the first recorded hospital admission due to AUD, or the end of the follow-up period on 31 December 2016.

We estimated the incidence of the first record of hospital care due to AUD by the degree of labour market attachment, sex, age, domicile, and origin during the follow-up period. Thereafter, we used Cox proportional hazards models to estimate the difference in hazard ratios (HRs) of first record of hospital care due to AUD, between the categories of labour market attachment, i.e., core workforce, education, insecure workforce, and NEET. In the Cox regression models, the category of “core workforce” was seen as the reference category. In Model 2, we adjusted for sex and age. Domicile was adjusted for in Model 3 and, lastly, origin was adjusted for in Model 4.

We carried out interaction analyses of sex, domicile, and origin in relation to the risk of AUD. We found no or non-substantial interaction effects of sex and origin on the outcome. Nevertheless, there was an interaction between domicile and AUD; therefore, we have presented the stratified analyses by domicile in Appendix 1. The proportional hazard assumption was tested using Schoenfeld residuals. The results suggested that the proportional hazard assumption was not violated. All analyses were made using STATA 15.

**Ethic and Patient and Public Involvement**

The datasets are anonymous and the researchers have no access to any personal information that could identify individuals included in the datasets. The Swedish national registers are protected by special legislation, which makes it possible for researchers to collect certain information without personal consent. The Regional Ethics Committee in Stockholm approved the study before any records were linked (decision number: 2016/987-32).

## RESULTS

About 4% of the youth population were NEET and 25% were in insecure workforce (Table 1). The majority of youths (77.3%) were native Swedish, 15% were offspring of migrants and 7.6% born abroad. The majority of the youths lived in medium-sized towns (42.5%), while fewest lived in smaller towns/rural areas (23%). About 96% of the youth population graduated at the age of 19 or 20 years.

**Table 1. Distribution of sociodemographic characteristics in the study population.**

<b>Sociodemographic characteristics</b>	<b>N = 485 839 Population %</b>
<b><u>Labour market attachment</u></b>	
Core workforce	34.4
Education	36.6
Insecure workforce	25.4
NEET*	3.6
<b><u>Origin</u></b>	
Native Swedish	77.4
Migrants' offspring	15.0
Youth migrant	7.6
<b><u>Sex</u></b>	
Male	51.1
Female	48.9
<b><u>Age at graduation from secondary school (years)</u></b>	
19	85.3
20	11.4
21	2.2
22	0.7
23	0.2
24	0.1
<b><u>Domicile</u></b>	
Large cities	34.5
Medium-sized towns	42.5
Smaller towns/rural areas	23.0

NEET\* (Not in Education, Employment, or Training)

The incidence rate of AUD (Appendix 1) was higher among youths in insecure work (217.7), followed by NEETs (171.8), those in the core workforce (155.5), and in education (127.9) (Table 2). In general, AUD rates were higher among males than females. The incidence rates were higher in migrants' offspring and native Swedes than in youth migrants. AUD increased

with age of graduation from secondary education, and were higher among youths living in the metropolitan areas of Sweden’s three largest cities, Stockholm, Gothenburg and Malmo.

The risk of AUD was higher among youths in insecure workforce and NEET compared with youths in the core workforce (Table 2). The hazard ratios (HRs) of AUD was 1.39 (1.20–1.50) among youths in insecure workforce and 1.28 (1.09–1.50) among NEET youths, after adjustment for age, sex, and domicile. The HR of AUD increased slightly to 1.40 (1.30–1.50) and 1.30 (1.11–1.51) respectively, when adjusting for origin. The risk of AUD was lower among youths in education, also after adjustments for the sociodemographic indicators.

**Table 2. Cox regression models for first hospital admission/first visit to specialist care due to AUD, by level of employment attachment among youths (male and female) between 2009 and 2016. N = 485 839.**

			HR 95% CI	HR 95% CI	HR 95% CI
Labour market attachment	N	AUD	Model 2	Model 3	Model 4
Core workforce	166 817	1 547	ref	ref	ref
Education	177 464	1 338	0.87 (0.81–0.94)	0.83 (0.77–0.90)	0.84 (0.78–0.90)
Insecure workforce	123 917	1 561	1.39 (1.29–1.49)	1.39 (1.30–1.50)	1.40 (1.30–1.50)
NEET	17 641	178	1.08 (0.92–1.26)	1.28 (1.09–1.50)	1.30 (1.11–1.51)

AUD: Alcohol use disorder; CI: Confidence interval; HR: Hazard ratio; N: Population; NEET: Not in Education, Employment, or Training.  
Model 2: adjusted for sex and age  
Model 3: adjusted for sex, age, and domicile  
Model 4: adjusted for sex, age, domicile, and origin

Stratified analyses by domicile (Appendix 2) suggested that, regardless of the characteristics of domicile, the HR of AUD was higher among youths in insecure workforce when compared with those of the core workforce. NEET youths were more likely to have higher risk of AUD if they resided in medium-sized towns.

**DISCUSSION**

Our register-based follow-up study suggested that there was a positive and significant association between being in insecure workforce or outside education, employment, or training, and subsequent AUD. In contrast, being in education was associated with lower risk of AUD.

Across the OECD countries, youths face greater challenges in the labour market compared with adults.[15] Youths often experience multiple periods of unemployment and/or inactivity or move between different employment statuses, with part-time working contracts, temporary contracts, and low salaries.[12, 15] The disadvantage has for instance been explained by the fact that youths lack working experience and skills, and, as a consequence, employers lack willingness to hire them.[12, 16] In this study, we found that about 4% of youths were NEET and 25% were in insecure workforce. This suggests that some youths, despite having graduated from secondary education, may have problems in transiting from school to further education and the core workforce.

Our findings showed that compared with the core workforce, youths in insecure workforce and NEETs have higher risk of AUD. These findings are in line with previous studies showing that labour market disengagement might increase psychological distress and poor mental health.[26, 27] These psychological responses, in turn, could lead to excessive use of alcohol for, e.g., self-medication or as a coping strategy to deal with feelings of distress.[28] Our results underscore the effects of job insecurity and involuntary disengagement from the labour market on psychological health and health risk behaviours.[29, 30]

The fact that the risk was somewhat higher in youths living in medium-sized towns, and smaller towns/rural areas, than in those in larger cities, calls for further investigations. One potential explanation for the geographical differences could be differences in local labour market (e.g., local youth labour market programmes) and selection into labour market participation. Because the outcome variable, AUD, reflects help-seeking behaviours in relation to alcohol problems, one can speculate that youths in larger cities might face significant barriers to seeking treatment for alcohol problems or have difficulties accessing treatment.

### **Strengths and limitations**

A major strength of this longitudinal study was that it was based on data from a combination of national registers covering the entire youth population living in Sweden. We were, therefore, able to study a national cohort of youths after they had completed secondary education in Sweden and were transiting from school to labour market. Furthermore, we were able to create an indicator of levels of labour market participation, using information on all possible income sources. This study uses a definition of NEET in line with that proposed by Eurostat in 2016,[11] albeit with a longer reference period. We used three consecutive years,

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

capturing those who experienced long-term disadvantages. A further strength of this study is that we excluded all individuals who had a diagnosis of AUD before the beginning of the follow-up period, thus reducing the risk of reverse causality.

This study also had some limitations. First, because of the small population sizes for specific countries of origin in the migrant population, it was not possible to split this category into smaller units and conduct analyses separated by more specific origin. Second, we did not consider information about other possible psychiatric health problems. Therefore, caution must be used in drawing definitive conclusions about the association between labour market engagement and AUD. Third, essential confounder variables, such as cultural values, social support, and experiencing discrimination, which could account for the different patterns of labour market attachment and alcohol-related behaviours, were not available in our data.

To summarise, compared with youths in the core workforce, youths who are in insecure workforce and outside education, employment, or training were at higher risk of AUD. In contrast, youths in education had lower risk of AUD.

**Funding:** This study was supported by grants provided by the Research Council for Health Working Life and Welfare (Forte: 2016-07108).

**Authors' contributions:** HM, AL, and AKD contributed to the study design. HM, carried out the statistical analyses (supported by AL), drafted the initial manuscript, reviewed and revised the manuscript. HM and AKD conceptualized and drafted the initial manuscript. AL and AKD revised the draft of the manuscript as well as the interpretation of the results. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

**Ethics approval:** The Regional Ethics Committee in Stockholm approved the study before any records were linked (decision number: 2016/987-32).

**Declaration of interest:** None.

**Data sharing statement:** The datasets analysed during the current study are not publicly available due to the Swedish data protection laws that restrict public sharing of data.

REFERENCES

1. WHO. Global status report on alcohol and health 2018. World Health Organization 2018: Geneva.

2. Katikireddi S V, Whitley E, Lewsey J, et al. Socioeconomic status as an effect modifier of alcohol consumption and harm: analysis of linked cohort data. *Lancet Public Health* 2017;2:267-276.

3. Budhiraja, M and Landberg J. Socioeconomic Disparities in Alcohol-Related Mortality in Sweden, 1991-2006: A Register-Based Follow-Up Study. *Alcohol and Alcoholism* 2016;51:307-14.

4. Erskine S, Maheswaran R, Pearson T, et al. Socioeconomic deprivation, urban-rural location and alcohol-related mortality in England and Wales. *BMC Public Health* 2010;10:99.

5. Backhans M, Balliu N, Lundin A, et al. *Unemployment Is a Risk Factor for Hospitalization Due to Alcohol Problems: A Longitudinal Study Based on the Stockholm Public Health Cohort (SPHC)*. *J Stud Alcohol Drugs* 2016; 77:936-942.

6. Lundin A, Backhans M, and Hemmingsson T. Unemployment and hospitalization owing to an alcohol-related diagnosis among middle-aged men in Sweden. *Alcohol Clin Exp Res* 2012;36:663-9.

7. Popovici I, and French M, Does Unemployment Lead to Greater Alcohol Consumption? *Industrial Relations: A Journal of Economy and Society* 2013;52:444-466.

8. Johansson E, Alho H, Kiiskinen U, et al. The association of alcohol dependency with employment probability: evidence from the population survey 'Health 2000 in Finland'. *Health Econ* 2007;16:739-54.

9. MacDonald Z. and Shields M. Does problem drinking affect employment? Evidence from England. *Health Econ* 2004.13:139-55.

10. Boden JM, Lee JO, Horwood LJ, et al. Modelling possible causality in the associations between unemployment, cannabis use, and alcohol misuse. *Social science & medicine* 2017;175:127-134.

11. Eurofound. Exploring the diversity of NEETs. *Publications Office of the European Union* 2016: Luxembourg.

12. Quintini G, Martin JP, Martin S. The Changing Nature of the School-to-Working Transition Process in OECD Countries(2007). *WDA-HSG Discussion Paper No. 2007-2*

13. Bert F, Gualano M, Thomas R, et al. Exploring the possible health consequences of job insecurity: a pilot study among young workers. *Gaceta sanitaria* 2018.

14. OECD/EU. Indicators of Immigrant Integration 2015: Settling In. *OECD Publishing* 2015:Paris/EU, Brussels <https://doi.org/10.1787/9789264234024-en>.



15. Eurofound. NEETs: Young people not in employment, education or training: Characteristics, costs and policy responses in Europe. *Publications Office of the European Union* 2012:Luxembourg.
16. OECD. Investing in Youth: Sweden. *OECD Publishing* 2016:Paris.  
<https://doi.org/10.1787/9789264267701-en>.
17. Manhica H, Berg L, Almquist YB, et al. Labour market participation among young refugees in Sweden and the potential of education: a national cohort study. *Journal of Youth Studies* 2018;1-8.
18. Dea B, Glozier N, Purcell R, et al. A cross-sectional exploration of the clinical characteristics of disengaged (NEET) young people in primary mental healthcare. *BMJ Open* 2014;4:e006378.
19. Henderson JL, Hawke LD, and Chaim G. Not in employment, education or training: Mental health, substance use, and disengagement in a multi-sectoral sample of service-seeking Canadian youth. *Children and Youth Services Review* 2017; 75:138–145.
20. Catherine H, Stewart PB, Dunja P, et al. Cancer-related health behaviours of young people not in education, employment or training ('NEET'): a cross-sectional study. *BMC Cancer* 2017; 17:165.
21. Benjet C, Hernández-Montoya D, Borges G, et al. Youth who neither study nor work: mental health, education and employment. *Salud pública de México* 2012;54:410-417.
22. Baggio S, Iglesias K, Deline S, et al. Not in Education, Employment, or Training status among young Swiss men. Longitudinal associations with mental health and substance use. *J Adolesc Health* 2015;56:238-43.
23. Just-Østergaard E, Mortensen EL, and Flensborg-Madsen T. Major life events and risk of alcohol use disorders: a prospective cohort study. *Addiction* 2018;113:25-33.
24. Bäckman, O. and Nilsson A. Long-term consequences of being not in employment, education or training as a young adult. Stability and change in three Swedish birth cohorts. *European Societies* 2016;18:136-157.
25. S.K.L. The Swedish Association of Local Authorities and Regions (SALAR).2019.  
<https://skl.se/tjanster/englishpages.411.html> (accessed 2019 20 /05).
26. Meltzer H, Bebbington P, Brugha T, et al. Job insecurity, socio-economic circumstances and depression. *Psychological medicine* 2010;40:1401-1407.
27. Kim TJ, and Von Dem Knesebeck O. Perceived job insecurity, unemployment and depressive symptoms: a systematic review and meta-analysis of prospective observational studies. *International archives of occupational and environmental health* 2016;89:561-573.



1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

28. Bolton JM, Robinson J, and Sareen J. Self-medication of mood disorders with alcohol and drugs in the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of affective disorders* 2009;115:367-375.

29. Ashford SJ, Lee C, and Bobko P. Content, cause, and consequences of job insecurity: A theory-based measure and substantive test. *Academy of Management journal* 1989;32:803-829.

30. Coles B, Hutton S, Bradshaw J, et al. Literature review of the costs of being" not in education, employment or training" at age 16-18. *Social Policy Research Unit, University of York*.2002: Research Report No 347.

For peer review only

**Appendix 1. Incidence rates of first hospital admission/first visit to specialist care due to AUD among youths, between 2009 and 2016. N = 485 839.**

Labour market attachment	N	AUD	Core workforce	Education	Insecure workforce	NEET
			IR 95% CI	IR 95% CI	IR 95% CI	IR 95% CI
			155.5 (147.9–163.4)	127.9 (121.2–135.1)	217.7 (207.1–228.7)	171.8 (148.3–198.9)
Core workforce	166 817	1 547				
Education	177 464	1 338				
Insecure workforce	123 917	1 561				
NEET	17 641	178				
<b>Origin</b>						
Native Swedish	375 667	3 478	149.8 (141.7–158.4)	123.8 (116.3–131.9)	214.1 (202.1–226.9)	185.0 (155.8–219.6)
Migrants' offspring	73 202	835	205.7 (181.6–233.0)	143.3 (126.3–162.5)	262.7 (235.2–293.5)	173.9 (124.3–243.4)
Youth migrant	36 804	310	128.9 (101.3–164.1)	134.9 (113.1–160.8)	164.9 (136.4–199.3)	98.7 (57.3–169.9)
<b>Sex</b>						
Male	248 390	2 581	167.6 (157.7–178.2)	136.1 (125.6–147.4)	236.2 (220.8–252.7)	218.6 (181.7–263.1)
Female	237 449	2 043	136.1 (124.9–148.3)	122.1 (113.5–131.2)	199.4 (185.3–214.5)	125.9 (99.0–160.4)
<b>Age* (years)</b>						
19	414 106	3 577	142.5 (134.6–150.7)	118.7 (111.9–125.9)	198.6 (187.5–210.5)	149.6 (124.9–179.1)
20	55 653	802	221.7 (196.5–250.3)	215.9 (187.4–248.7)	291.5 (260.7–326.1)	230.9 (169.9–313.6)
21	10 882	158	256.7 (198.4–331.9)	181.4 (122.6–268.4)	273.2 (214.3–348.4)	223.4 (120.2–415.2)
22	3 505	50	210.7 (124.8–355.8)	143.9 (68.6–302.1)	381.4 (255.1–548.9)	231.6 (86.9–617.5)
23	1 108	20	226.1 (94.1–543.3)	109.3 (27.3–437.1)	379.7 (187.6–729.8)	844.3 (316.9–2 249.5)
24	585	13	418.5 (174.2–1 005.5)	256.9 (64.2–1 027.2)	483.1 (201.1–1 160.7)	359.2 (50.6–2 549.7)
<b>Domicile</b>						
Large cities	157 456	2 039	229.9 (213.7–247.5)	160.8 (148.9–173.7)	283.0 (262.5–306.1)	275.6 (219.1–346.6)
Medium-sized towns	236 275	1 937	123.6 (113.3–134.9)	103.7 (94.9–113.3)	197.5 (181.8–214.4)	176.9 (137.6–227.4)
Smaller towns/rural areas	79 449	613	117.6 (105.5–131.2)	118.6 (103.1–136.5)	176.5 (158.4–196.7)	167.8 (122.1–293.9)

Age\* (Completed secondary education). AUD: Alcohol use disorder; CI: Confidence interval; IR: Incidence rate per 100 000 person years; N: Population; NEET: Not in Education, Employment, or Training.

**Appendix 2. Cox regression models for first hospital admission/first visit to specialist care due to AUD, by domicile of residence among youths (male and female) between 2009 and 2016. N = 94 700.**

Labour market attachment	N	AUD	HR 95% CI, Model 1	HR 95% CI, Model 2
<b>a) Large cities</b>				
Core workforce	51 766	716	ref	ref
Education	67 431	646	0.74 (0.66–0.83)	0.75 (0.67–0.84)
Insecure workforce	39 051	652	1.23 (1.11–1.37)	1.24 (1.12–1.39)
NEET	4 316	73	1.17 (0.92–1.49)	1.20 (0.94–1.53)
<b>b) Medium-sized towns</b>				
Core workforce	67 088	500	ref	ref
Education	79 802	491	0.86 (0.76–0.98)	0.87 (0.77–0.99)
Insecure workforce	48 711	565	1.56 (1.38–1.76)	1.57 (1.39–1.78)
NEET	5 692	61	1.38 (1.05–1.79)	1.39 (1.06–1.81)
<b>c) Smaller towns/rural areas</b>				
Core workforce	45 748	324	ref	ref
Education	27 820	195	1.08 (0.90–1.29)	1.07 (0.89–1.29)
Insecure workforce	31 743	327	1.49 (1.27–1.74)	1.48 (1.27–1.73)
NEET	3 736	38	1.36 (0.97–1.90)	1.36 (0.96–1.89)

**AUD: Alcohol use disorder; CI: Confidence interval; HR: Hazard ratio; N: Population; NEET: Not in Education, Employment, or Training.**

Model 1: adjusted for sex and age  
Model 2: adjusted for sex, age, and origin

# BMJ Open

## Not in Education, Employment, or Training (NEET) and risk of Alcohol use disorder – A nationwide register-linkage study with 485 839 Swedish youths

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-032888.R1
Article Type:	Original research
Date Submitted by the Author:	12-Sep-2019
Complete List of Authors:	Manhica, Helio; Karolinska Institute, Department of Public Health Sciences Lundin, Andreas Danielsson, Anna-Karin
<b>Primary Subject Heading</b>:	Public health
Secondary Subject Heading:	Addiction, Epidemiology, Health policy
Keywords:	Alcohol use disorder, NEET, Youth, Labour market, Longitudinal study

SCHOLARONE™  
Manuscripts

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Not in Education, Employment, or Training (NEET) and risk of Alcohol use disorder – A nationwide register-linkage study with 485 839 Swedish youths**

Hélio Manhica<sup>1\*</sup>, Andreas Lundin<sup>1 2</sup> and Anna-Karin Danielsson<sup>1</sup>

<sup>1</sup> Karolinska Institutet, Department of Public Health Sciences, Stockholm, Sweden

<sup>2</sup> Centre for Epidemiology and Community Medicine, Region Stockholm, Stockholm, Sweden

\*Corresponding author

Karolinska Institutet

Department of Public Health Science (PHS)

SE-171 77 Stockholm, Sweden

[helio.manhica@ki.se](mailto:helio.manhica@ki.se)

**Total word count:** 3142

**Running head:** NEET and alcohol use disorder

**Key words:** NEET, labour market, youth, alcohol use disorder, longitudinal study.

## ABSTRACT

**Objective:** To investigate to what extent being outside education, employment, or training after completed secondary education in Sweden might affect the risk of subsequent alcohol use disorders, with sociodemographic indicators, such as sex, domicile, and origin, taken into account.

**Design:** Population register-based cohort study with 485 839 Swedish youths.

**Setting:** Sweden.

**Participants:** All youths who were born between 1982 and 1991 and were aged between 19 and 24 years when they completed secondary education in Sweden, between 2005 and 2009.

**Primary outcome measure:** Cox regression models were used to estimate the hazard ratio (HR) of first record of entry into alcohol-related medical care with a diagnosis of an alcohol use disorder, by level of labour market attachment, from 1 January 2009 to 31 December 2016.

**Results:** About 4% of the youth population were outside education, employment, or training and 25% were in insecure workforce after they completed secondary education. The risk of alcohol use disorder was higher among youths in insecure workforce, HR 1.40 (1.30 to 1.50, 95% CI), and among those outside education, employment, or training, HR 1.30 (1.11 to 1.51, 95% CI), compared with youths within the core workforce, also after adjusting for age, domicile, sex, and origin. Being in education was associated with lower HR of alcohol use disorder, HR = 0.84 (0.78 to 0.90, 95% CI).

**Conclusion:** Youths who are in insecure workforce and outside education, employment, or training are at higher risk of alcohol use disorder. Targeted policy actions are needed to support a successful school-work transition to secure equal opportunities for young people.

### Strengths and limitations of this study

- The longitudinal study was based on data from a combination of national registers covering the entire youth population living in Sweden.
- The indicator of levels of labour market participation was constructed using information on all possible income sources.
- The small population sizes for specific countries of origin in the migrant population did not allow conducting analyses separated by specific origin.
- Essential confounder variables, which could account for the different patterns of labour market attachment and alcohol-related behaviours, were not available in our data.

INTRODUCTION

The harmful use of alcohol is a major concern for public health. In 2016, alcohol was responsible for about 3 million deaths (5.3% of all deaths) globally and 5.1% of the total global burden of disease, with the prevalence being highest in the WHO European region: 10.1% of all deaths and 10.8% of the total burden of disease.[1]

In Western countries, a number of studies have shown that alcohol-related mortality and alcohol use disorder (AUD) are more likely to occur among socioeconomically disadvantaged populations.[2-4] However, this association is not sufficiently understood. While some scholars argue that poor labour market attachment, in terms of unemployment, lower levels of income, or low occupational status, is associated with increased risk of excessive alcohol use (*social causation*),[5-7] others have suggested the opposite – that is, heavy use of alcohol is a risk factor for poor labour market outcomes (*social selection*).[8, 9] In fact, Boden and colleagues[10] found support for both the social causation and the social selection theory, reporting unemployment to play a causal role in substance misuse (including alcohol), but also the opposite, whereby substance misuse increased the risk of unemployment.

In general, young people are more affected than adults by both labour market disengagement[11, 12] and excessive use of alcohol.[1] Still, previous studies within this field have mainly focused on adult populations. A recent pilot study[13] found that job security perception was associated with depression, anxiety, tobacco smoking, and alcohol abuse. However, this study did not examine possible age differences.

Against this background, it is of interest to investigate whether being outside education, employment, or training contributes to increased risk of subsequent AUD in youths who are in the process of establishing themselves on the labour market.

Youths and labour market attachment

The transition from school to successful labour market integration can be a challenge in young people’s lives. In fact, the transition often involves moving between different employment statuses, temporary working contracts, and other precarious types of employment with low salaries.[12] These challenges tend to be more pronounced among youths with foreign background than their native peers. Among youth with a migrant background, youth offspring of migrants are less likely to face labour market disadvantages compared to their

migrant peers, including youths who arrived as children. This advantage have been explained by a better knowledge of the host country's language, institutional rules and regulations, social networks and the fact that they are less likely to face ethnic discrimination.[14] Thus, in our study, we expect lower rates of labour market attachment among young migrants compared with native-born children of both immigrants and native Swedes.

The high labour market vulnerability facing youths with a migrant background is currently the focus of the policy debate in Sweden and many other European countries, due to the growth of this population caused by a high influx of refugees and asylum seekers. For instance, in 2015, one in five youths aged 15 to 34 years residing in the EU had a migrant background (either being foreign-born or having foreign-born parents). During the same period, about 41% of all new immigrants to Sweden were youths aged 15 to 29 years.

The concept NEET – Not in Education, Employment, or Training – has been widely used as an indicator for capturing the extent of young people's multifaceted disadvantage in the labour market. It emerged in the UK in the late 1980s, and has been used as an instrument to inform youth-oriented policies in the European Union.[15] This concept covers all young people who are unemployed and inactive, i.e., not enrolled in any formal or non-formal education, as well as those who suffer from long-term sickness or are otherwise unable to work or not available for work.[11] As in many OECD countries, the rates of NEETs in Sweden are higher among youths with low education (i.e., lacking secondary education) than those with tertiary education.[16] Moreover, youths with a migrant background are overrepresented among NEETs compared with their native peers with comparable education levels. Still, obtaining a secondary education has been found to be protective against the risk of being NEET among all youths, regardless of origin.[17]

Some previous studies have shown that NEET youths are more likely to have poor mental health, including poor self-reported health, substance use (including alcohol), and delinquent behaviours.[18-21] However, opposing findings, i.e., that NEET status does not lead to poor mental health and substance use, have also been reported.[22] Thus, results from previous studies are inconsistent and have some methodological limitations, such as relying solely on self-reported data, applying cross-sectional designs, with relative small sample sizes, and having unclear durations of the NEET period.

Many prior studies have focused on the association between unemployment and later hospitalisation or death due to alcohol.[5, 6, 23] To our knowledge, no study has investigated



1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

the association between being outside education, employment, or training and AUD in the total youth population of Sweden. It is hypothesized in the current study that AUD would be severely compounded among youth in NEET, as disengagement from the labour market tend to expose youths to a range of negative social and health consequences, including, the harmful use of alcohol.

Therefore, the main objective of this study was to investigate to what extent being NEET in Sweden might affect the risk of subsequent AUD. In addition, we aimed to examine to what extent these possible associations differed with regard to sociodemographic indicators, such as sex, domicile, and origin.

**METHODS**

**Study population**

The study population comprised all youths who were born between 1982 and 1991 and were alive and residing in Sweden between January 2006 and December 2012, according to the Register of the Swedish Total Population. The dataset allowed us to identify a total of 485 839 youths who were aged between 19 and 24 years old when they completed secondary education in Sweden, between 2005 and 2009. Youths with previous AUD and those who did not complete a secondary degree during the follow-up period were excluded from the analyses. The information regarding level of education and year of graduation was obtained from Statistics Sweden’s Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA). The information regarding origin of birth of the study population was obtained from the Multi-Generation Register.

**Exposure variable**

We created an indicator of labour market attachment based on information on income sources, for the three years consecutively following the year of graduation from secondary school.

**Labour market attachment**

The exposure variable was primarily defined based on a model created by Eurostat for estimating the prevalence of labour market vulnerability among young people. The model was built using data from the EU Labour Force Survey. It defines NEETs as all youths who remained outside education, employment, or training for 6 months or more during the preceding 12 months. In this article, we used an indicator of labour market attachment that has been applied in several studies.[17, 24] This indicator was based on information on social

assistance, parental leave, disposable income, and other sources of income, for the three years consecutively following the year for which information on secondary education was retrieved (between 2005 and 2009). Four categories of labour market attachment were conceptualised as follows:

*Core workforce:* This category comprises all individuals who can support themselves by means of labour market income. This includes persons with earnings of at least 3.5 price base amounts (PBA) during a year. The PBA is a concept used by the Swedish government to calculate benefits in social insurance programmes. The PBA is calculated based on changes in the general price level, in accordance with the National Insurance Act. This also includes income from social insurance that is linked to employment, such as sickness allowances and payments from the parental insurance system. It excludes income sources such as unemployment benefits, student allowances, and disability pensions.

*Education:* All persons with annual earnings of less than 0.5 PBA, or who have been registered as students in any type of education, or have been in some kind of labour market activation programme for at least 100 days, but not in the NEET category.

*Insecure workforce:* All persons with a lower attachment to the labour market; with a labour market income of at least 3.5 PBA for no more than one year, and less than 0.5 PBA for no more than two years. Individuals receiving unemployment insurance for at least two of the three years are also included in this category.

*NEET:* All individuals with annual earnings of at most 0.5 PBA, who have received unemployment insurance benefits, incomes from sickness or part-time disability pensions, full disability pension, or social assistance.

## Outcome

The outcome variable was retrieved from the Swedish national inpatient and outpatient register. It referred to the first register entry on alcohol-related medical care with a diagnosis of AUD, from 1 January 2009 to 31 December 2016. This included acute intoxication, harmful use, dependence, toxic effects, and liver disease (F10:00–F10.99), in accordance with definitions in the tenth edition of the World Health Organization International Classification of Disorders (ICD-10).

## Covariates

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

We characterised the study population into three categories based on *origin*, as given in the Multi-Generation Register. *Youth migrants* were defined as youths born outside Sweden with both parents born abroad. *Youth offspring of migrants* comprised all Swedish-born youths with at least one parent born abroad. *Native Swedish youth* comprised all youths born in Sweden with both parents born in Sweden.

Sociodemographic indicators such as age, sex, and domicile were retrieved from the LISA register. The variable *domicile* indicated the place of residence at the beginning of the follow-up period. This was classified into three categories, in accordance with the Swedish Association of Local Authorities and Regions, which is a politically run organisation that represents and advocates for local government in Sweden: *Big city* referred to the metropolitan areas of Sweden’s three largest cities: Stockholm, Gothenburg, and Malmo. *Town* covered other predominately urban municipalities in or near medium-sized towns, and *rural* covered smaller towns/urban areas and rural municipalities.[25] *Age* was age in years when secondary education was completed between 2005 and 2009. This ranged from 19 and 24 years. *Sex* indicated whether the person was female or male.

**Statistical analyses**

The analyses were based on person-time measured from January 2009 to whichever of the following that occurred first: death, the first recorded hospital admission due to AUD, or the end of the follow-up period on 31 December 2016. In order to minimise possible bias caused by unrecorded migration in our study population, individuals who had a year without any information on household income from work or social benefits were excluded because this was considered to be an indicator of emigration. [26]

We estimated the incidence of the first record of hospital care due to AUD by the degree of labour market attachment, sex, age, domicile, and origin during the follow-up period. Results are presented as Incidence Rate (IR) with 95% confidence interval (CI). Thereafter, multivariate analyses were done with Cox's regression analysis of person-years, [27] to estimate the difference in hazard ratios (HRs) of first record of hospital care due to AUD, between the categories of labour market attachment, i.e., core workforce, education, insecure workforce, and NEET. In the Cox regression models, the category of “core workforce” was seen as the reference category. In Model 2, we adjusted for sex and age. Domicile was adjusted for in Model 3 and, lastly, origin was adjusted for in Model 4. Estimated results are presented as hazard ratios (HR) with 95% confidence interval (CI)

We carried out interaction analyses of sex, domicile, and origin in relation to the risk of AUD. We found no or non-substantial interaction effects of sex and origin on the outcome. Nevertheless, there was an interaction between domicile and AUD; therefore, we have presented the stratified analyses by domicile in Appendix 1. All models were tested for proportional hazard assumption using Schoenfeld residuals. [27] This assumption was not violated. All analyses were made using STATA 15.

### **Patient and public involvement**

This research was done without patient or public involvement. Neither were involved in the study design or invited to comment on the study design and main results.

### **Ethical and Patient and Public Involvement**

The datasets are anonymous and the researchers have no access to any personal information that could identify individuals included in the datasets. The Swedish national registers are protected by special legislation, which makes it possible for researchers to collect certain information without personal consent. The Regional Ethics Committee in Stockholm approved the study before any records were linked (decision number: 2016/987-32).

RESULTS

About 4% of the youth population were NEET and 25% were in insecure workforce (Table 1). The majority of youths (77.3%) were native Swedish, 15% were offspring of migrants and 7.6% born abroad. The majority of the youths lived in medium-sized towns (42.5%), while fewest lived in smaller towns/rural areas (23%). About 96% of the youth population graduated at the age of 19 or 20 years.

Table 1. Distribution of sociodemographic characteristics in the study population.

Sociodemographic characteristics	N = 485 839 Population %
<b><u>Labour market attachment</u></b>	
Core workforce	34.4
Education	36.6
Insecure workforce	25.4
NEET*	3.6
<b><u>Origin</u></b>	
Native Swedish	77.4
Migrants' offspring	15.0
Youth migrant	7.6
<b><u>Sex</u></b>	
Male	51.1
Female	48.9
<b><u>Age at graduation from secondary school (years)</u></b>	
19	85.3
20	11.4
21	2.2
22	0.7
23	0.2
24	0.1
<b><u>Domicile</u></b>	
Large cities	34.5
Medium-sized towns	42.5
Smaller towns/rural areas	23.0

NEET\* (Not in Education, Employment, or Training)

The incidence rate (IR) of AUD (Appendix 1) was higher among youths in insecure work 217.7 (207.1 to 228.7, 95% CI), followed by NEETs 171.8 (148.3 to 198.9, 95% CI), those in the core workforce 155.5 (147.9 to 163.4, 95% CI), and in education 127.9 (121.2 to 135.1, 95 % CI). In general, AUD rates were higher among males than females. The incidence rates were higher in migrants' offspring and native Swedes than in youth migrants. AUD increased with age of graduation from secondary education, and were higher among youths living in the

metropolitan areas of Sweden's three largest cities, Stockholm, Gothenburg and Malmö (Table 2).

The risk of AUD was higher among youths in insecure workforce and NEET compared with youths in the core workforce (Table 2). The hazard ratios (HRs) of AUD was 1.39 (1.20 to 1.50, 95% CI) among youths in insecure workforce and 1.28 (1.09 to 1.50, 95% CI) among NEET youths, after adjustment for age, sex, and domicile. The HR of AUD increased slightly to 1.40 (1.30 to 1.50, 95% CI) and 1.30 (1.11 to 1.51, 95% CI) respectively, when adjusting for origin. The risk of AUD was lower among youths in education, also after adjustments for the sociodemographic indicators.

**Table 2. Cox regression models for first hospital admission/first visit to inpatient/outpatient care due to AUD, by level of employment attachment among youths (male and female) between 2009 and 2016. N = 485 839.**

			HR 95% CI	HR 95% CI	HR 95% CI
Labour market attachment	N	AUD	Model 2	Model 3	Model 4
<i>Core workforce</i>	166 817	1 547	ref	ref	ref
<i>Education</i>	177 464	1 338	0.87 (0.81–0.94)	0.83 (0.77–0.90)	0.84 (0.78–0.90)
<i>Insecure workforce</i>	123 917	1 561	1.39 (1.29–1.49)	1.39 (1.30–1.50)	1.40 (1.30–1.50)
<i>NEET</i>	17 641	178	1.08 (0.92–1.26)	1.28 (1.09–1.50)	1.30 (1.11–1.51)

AUD: Alcohol use disorder; CI: Confidence interval; HR: Hazard ratio; N: Population;

NEET: Not in Education, Employment, or Training.

Model 2: adjusted for sex and age

Model 3: adjusted for sex, age, and domicile

Model 4: adjusted for sex, age, domicile, and origin

Stratified analyses by domicile (Appendix 2) suggested that, regardless of the characteristics of domicile, the HR of AUD was higher among youths in insecure workforce when compared with those of the core workforce. NEET youths were more likely to have higher risk of AUD if they resided in medium-sized towns.

## DISCUSSION

Our register-based follow-up study suggested that there was a positive and significant association between being in insecure workforce or outside education, employment, or training (NEET), and subsequent AUD. In contrast, being in education was associated with lower risk of AUD.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

Across the OECD countries, youths face greater challenges in the labour market compared with adults.[15] Youths often experience multiple periods of unemployment and/or inactivity or move between different employment statuses, with part-time working contracts, temporary contracts, and low salaries.[12, 15] The disadvantage has for instance been explained by the fact that youths lack working experience and skills, and, as a consequence, employers lack willingness to hire them.[12, 16] In this study, we found that about 4% of youths were NEET and 25% were in insecure workforce. This suggests that some youths, despite having graduated from secondary education, may have problems in transiting from school to further education and the core workforce.

Our findings showed that compared with the core workforce, youths in insecure workforce and NEETs have higher risk of AUD. These findings are in line with previous studies showing that labour market disengagement might increase psychological distress and poor mental health.[28, 29] These psychological responses, in turn, could lead to excessive use of alcohol for, e.g., self-medication or as a coping strategy to deal with feelings of distress.[30] Our results underscore the effects of job insecurity and involuntary disengagement from the labour market on psychological health and health risk behaviours.[31, 32]

The fact that the risk was somewhat higher in youths living in medium-sized towns, and smaller towns/rural areas, than in those in larger cities, calls for further investigations. In fact, this study could not confirm the pattern found in other studies that living in smaller communities was associated with a lower proportion of heavy alcohol consumption and alcohol-related problems.[33] One potential explanation for the geographical differences could be differences in local labour market (e.g., local youth labour market programmes) and selection into labour market participation.

**Strengths and limitations**

A major strength of this longitudinal study was that it was based on data from a combination of national registers covering the entire youth population living in Sweden. We were, therefore, able to study a national cohort of youths after they had completed secondary education in Sweden and were transiting from school to labour market. Furthermore, we were able to create an indicator of levels of labour market participation, using information on all possible income sources. This study uses a definition of NEET in line with that proposed by Eurostat in 2016,[11] albeit with a longer reference period. We used three consecutive years,



capturing those who experienced long-term disadvantages. A further strength of this study is that we excluded all individuals who had a diagnosis of AUD before the beginning of the follow-up period, thus reducing the risk of reverse causality.

This study also had some limitations. First, because of the small population sizes for specific countries of origin in the migrant population, it was not possible to split this category into smaller units and conduct analyses separated by more specific origin. Second, we did not consider information about other possible psychiatric health problems. Therefore, caution must be used in drawing definitive conclusions about the association between labour market engagement and AUD. Third, essential confounder variables, such as cultural values, social support, and experiencing discrimination, which could account for the different patterns of labour market attachment and alcohol-related behaviours, were not available in our data.

Fourth, being in NEET and having an AUD might share many overlapping risk factors (school, family, friends, etc.), on which we had no information in this study. Hence, we are not able to explain the mechanisms that put an individual at greater risk of being in NEET. Our main focus, however, was on the possible consequences rather than the causes. Fifth, caution needs to be taken in how these findings are interpreted because the outcome variable, hospital record due to alcohol related disorders, implies serious problems related to alcohol misuse. If anything, however, this may have led to an underestimation of the actual problem.

To summarise, compared with youths in the core workforce, youths who are in insecure workforce and outside education, employment, or training were at higher risk of AUD. In contrast, youths in education had lower risk of AUD. Further studies are needed to explore the mechanisms underlying the associations between labour market disadvantages and AUD.



1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Funding:** This study was supported by grants provided by the Research Council for Health Working Life and Welfare (Forte: 2016-07108).

**Authors' contributions:** HM, AL, and AKD contributed to the study design. HM, carried out the statistical analyses (supported by AL), drafted the initial manuscript, reviewed and revised the manuscript. HM and AKD conceptualized and drafted the initial manuscript. AL and AKD revised the draft of the manuscript as well as the interpretation of the results. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

**Ethics approval:** The Regional Ethics Committee in Stockholm approved the study before any records were linked (decision number: 2016/987-32).

**Declaration of interest:** None.

**Data sharing statement:** The datasets analysed during the current study are not publicly available due to the Swedish data protection laws that restrict public sharing of data. Data are however available from the authors upon reasonable request and with permission of the Department of Public Health Sciences, SE-171 77. Phone number: +46 8 524 800 00.

## REFERENCES

1. WHO. Global status report on alcohol and health 2018. World Health Organization 2018: Geneva.
2. Katikireddi S V, Whitley E, Lewsey J, et al. Socioeconomic status as an effect modifier of alcohol consumption and harm: analysis of linked cohort data. *Lancet Public Health* 2017;2:267-276.
3. Budhiraja, M and Landberg J. Socioeconomic Disparities in Alcohol-Related Mortality in Sweden, 1991-2006: A Register-Based Follow-Up Study. *Alcohol and Alcoholism* 2016;51:307-14.
4. Erskine S, Maheswaran R, Pearson T, et al. Socioeconomic deprivation, urban-rural location and alcohol-related mortality in England and Wales. *BMC Public Health* 2010;10:99.
5. Backhans M, Balliu N, Lundin A, et al. *Unemployment Is a Risk Factor for Hospitalization Due to Alcohol Problems: A Longitudinal Study Based on the Stockholm Public Health Cohort (SPHC)*. *J Stud Alcohol Drugs* 2016; 77:936-942.
6. Lundin A, Backhans M, and Hemmingsson T. Unemployment and hospitalization owing to an alcohol-related diagnosis among middle-aged men in Sweden. *Alcohol Clin Exp Res* 2012;36:663-9.
7. Popovici I, and French M, Does Unemployment Lead to Greater Alcohol Consumption? *Industrial Relations: A Journal of Economy and Society* 2013;52:444-466.
8. Johansson E, Alho H, Kiiskinen U, et al. The association of alcohol dependency with employment probability: evidence from the population survey 'Health 2000 in Finland'. *Health Econ* 2007;16:739-54.
9. MacDonald Z. and Shields M. Does problem drinking affect employment? Evidence from England. *Health Econ* 2004.13:139-55.
10. Boden JM, Lee JO, Horwood LJ, et al. Modelling possible causality in the associations between unemployment, cannabis use, and alcohol misuse. *Social science & medicine* 2017;175:127-134.
11. Eurofound. Exploring the diversity of NEETs. *Publications Office of the European Union* 2016: Luxembourg.
12. Quintini G, Martin JP, Martin S. The Changing Nature of the School-to-Working Transition Process in OECD Countries(2007). *WDA-HSG Discussion Paper No. 2007-2*
13. Bert F, Gualano M, Thomas R, et al. Exploring the possible health consequences of job insecurity: a pilot study among young workers. *Gaceta sanitaria* 2018.
14. OECD/EU. Indicators of Immigrant Integration 2015: Settling In. *OECD Publishing* 2015:Paris/EU, Brussels <https://doi.org/10.1787/9789264234024-en>.

15. Eurofound. NEETs: Young people not in employment, education or training: Characteristics, costs and policy responses in Europe. *Publications Office of the European Union* 2012:Luxembourg.
16. OECD. Investing in Youth: Sweden. *OECD Publishing* 2016:Paris.  
<https://doi.org/10.1787/9789264267701-en>.
17. Manhica H, Berg L, Almquist YB, et al. Labour market participation among young refugees in Sweden and the potential of education: a national cohort study. *Journal of Youth Studies* 2018;1-8.
18. Dea B, Glozier N, Purcell R, et al. A cross-sectional exploration of the clinical characteristics of disengaged (NEET) young people in primary mental healthcare. *BMJ Open* 2014;4:e006378.
19. Henderson JL, Hawke LD, and Chaim G. Not in employment, education or training: Mental health, substance use, and disengagement in a multi-sectoral sample of service-seeking Canadian youth. *Children and Youth Services Review* 2017; 75:138–145.
20. Catherine H, Stewart PB, Dunja P, et al. Cancer-related health behaviours of young people not in education, employment or training (‘NEET’): a cross-sectional study. *BMC Cancer* 2017; 17:165.
21. Benjet C, Hernández-Montoya D, Borges G, et al. Youth who neither study nor work: mental health, education and employment. *Salud pública de méxico* 2012;54:410-417.
22. Baggio S, Iglesias K, Deline S, et al. Not in Education, Employment, or Training status among young Swiss men. Longitudinal associations with mental health and substance use. *J Adolesc Health* 2015;56:238-43.
23. Just-Østergaard E, Mortensen EL, and Flensborg-Madsen T. Major life events and risk of alcohol use disorders: a prospective cohort study. *Addiction* 2018;113:25-33.
24. Bäckman, O. and Nilsson A. Long-term consequences of being not in employment, education or training as a young adult. Stability and change in three Swedish birth cohorts. *European Societies* 2016;18:136-157.
25. S.K.L. The Swedish Association of Local Authorities and Regions (SALAR).2019.  
<https://skl.se/tjanster/englishpages.411.html> (accessed 2019 20 /05).
26. Weitoft, G.R., et al., Mortality statistics in immigrant research: method for adjusting underestimation of mortality. *International journal of epidemiology* 1999; 28:756-763.
27. Hosmer Jr, D.W., S. Lemeshow, and S. May, *Applied survival analysis: regression modeling of time-to-event data*. Wiley-Interscience 2008.
28. Meltzer H, Bebbington P, Brugha T, et al. Job insecurity, socio-economic circumstances and depression. *Psychological medicine* 2010;40:1401-1407.

- 1  
2  
3  
4 29. Kim TJ, and Von Dem Knesebeck O. Perceived job insecurity, unemployment and  
5 depressive symptoms: a systematic review and meta-analysis of prospective  
6 observational studies. *International archives of occupational and environmental*  
7 *health* 2016;89:561-573.  
8  
9  
10 30. Bolton JM, Robinson J, and Sareen J. Self-medication of mood disorders with alcohol  
11 and drugs in the National Epidemiologic Survey on Alcohol and Related Conditions.  
12 *Journal of affective disorders* 2009;115:367-375.  
13  
14 31. Ashford SJ, Lee C, and Bobko P. Content, cause, and consequences of job insecurity:  
15 A theory-based measure and substantive test. *Academy of Management journal*  
16 1989;32:803-829.  
17  
18 32. Coles B, Hutton S, Bradshaw J, et al. Literature review of the costs of being "not in  
19 education, employment or training" at age 16-18. *Social Policy Research Unit,*  
20 *University of York.*2002: Research Report No 347.  
21  
22 33. Bränström, R. and S. Andréasson, Regional differences in alcohol consumption,  
23 alcohol addiction and drug use among Swedish adults. *Scandinavian journal of public*  
24 *health* 2008; 36: 493-503.  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Appendix 1. Incidence rates of first hospital admission/first visit to inpatient/outpatient care due to AUD among youths, between 2009 and 2016. N = 485 839.**

Labour market attachment	N	AUD	Core workforce	Education	Insecure workforce	NEET
			IR 95% CI	IR 95% CI	IR 95% CI	IR 95% CI
			155.5 (147.9–163.4)	127.9 (121.2–135.1)	217.7 (207.1–228.7)	171.8 (148.3–198.9)
Core workforce	166 817	1 547				
Education	177 464	1 338				
Insecure workforce	123 917	1 561				
NEET	17 641	178				
Origin						
Native Swedish	375 667	3 478	149.8 (141.7–158.4)	123.8 (116.3–131.9)	214.1 (202.1–226.9)	185.0 (155.8–219.6)
Migrants' offspring	73 202	835	205.7 (181.6–233.0)	143.3 (126.3–162.5)	262.7 (235.2–293.5)	173.9 (124.3–243.4)
Youth migrant	36 804	310	128.9 (101.3–164.1)	134.9 (113.1–160.8)	164.9 (136.4–199.3)	98.7 (57.3–169.9)
Sex						
Male	248 390	2 581	167.6 (157.7–178.2)	136.1 (125.6–147.4)	236.2 (220.8–252.7)	218.6 (181.7–263.1)
Female	237 449	2 043	136.1 (124.9–148.3)	122.1 (113.5–131.2)	199.4 (185.3–214.5)	125.9 (99.0–160.4)
Age* (years)						
19	414 106	3 577	142.5 (134.6–150.7)	118.7 (111.9–125.9)	198.6 (187.5–210.5)	149.6 (124.9–179.1)
20	55 653	802	221.7 (196.5–250.3)	215.9 (187.4–248.7)	291.5 (260.7–326.1)	230.9 (169.9–313.6)
21	10 882	158	256.7 (198.4–331.9)	181.4 (122.6–268.4)	273.2 (214.3–348.4)	223.4 (120.2–415.2)
22	3 505	50	210.7 (124.8–355.8)	143.9 (68.6–302.1)	381.4 (255.1–548.9)	231.6 (86.9–617.5)
23	1 108	20	226.1 (94.1–543.3)	109.3 (27.3–437.1)	379.7 (187.6–729.8)	844.3 (316.9–2 249.5)
24	585	13	418.5 (174.2–1 005.5)	256.9 (64.2–1 027.2)	483.1 (201.1–1 160.7)	359.2 (50.6–2 549.7)
Domicile						
Large cities	157 456	2 039	229.9 (213.7–247.5)	160.8 (148.9–173.7)	283.0 (262.5–306.1)	275.6 (219.1–346.6)
Medium-sized towns	236 275	1 937	123.6 (113.3–134.9)	103.7 (94.9–113.3)	197.5 (181.8–214.4)	176.9 (137.6–227.4)
Smaller towns/rural areas	79 449	613	117.6 (105.5–131.2)	118.6 (103.1–136.5)	176.5 (158.4–196.7)	167.8 (122.1–293.9)

Age\* (Completed secondary education). AUD: Alcohol use disorder; CI: Confidence interval; IR: Incidence rate per 100.000 person years; N: Population; NEET: Not in Education, Employment, or Training.

**Appendix 2. Cox regression models for first hospital admission/first visit to inpatient/outpatient care due to AUD, by domicile of residence among youths (male and female) between 2009 and 2016. N = 94 700.**

Labour market attachment	N	AUD	HR 95% CI, Model 1	HR 95% CI, Model 2
<b>a) Large cities</b>				
<i>Core workforce</i>	51 766	716	ref	ref
<i>Education</i>	67 431	646	0.74 (0.66–0.83)	0.75 (0.67–0.84)
<i>Insecure workforce</i>	39 051	652	1.23 (1.11–1.37)	1.24 (1.12–1.39)
<i>NEET</i>	4 316	73	1.17 (0.92–1.49)	1.20 (0.94–1.53)
<b>b) Medium-sized towns</b>				
<i>Core workforce</i>	67 088	500	ref	ref
<i>Education</i>	79 802	491	0.86 (0.76–0.98)	0.87 (0.77–0.99)
<i>Insecure workforce</i>	48 711	565	1.56 (1.38–1.76)	1.57 (1.39–1.78)
<i>NEET</i>	5 692	61	1.38 (1.05–1.79)	1.39 (1.06–1.81)
<b>c) Smaller towns/rural areas</b>				
<i>Core workforce</i>	45 748	324	ref	ref
<i>Education</i>	27 820	195	1.08 (0.90–1.29)	1.07 (0.89–1.29)
<i>Insecure workforce</i>	31 743	327	1.49 (1.27–1.74)	1.48 (1.27–1.73)
<i>NEET</i>	3 736	38	1.36 (0.97–1.90)	1.36 (0.96–1.89)

**AUD: Alcohol use disorder; CI: Confidence interval; HR: Hazard ratio; N: Population; NEET: Not in Education, Employment, or Training.**

Model 1: adjusted for sex and age

Model 2: adjusted for

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	2	
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2	
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3,4	
Objectives	3	State specific objectives, including any prespecified hypotheses	4,5	
Methods				
Study design	4	Present key elements of study design early in the paper	5	
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5	
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants	5	
		(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case	-	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-7	
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-7	
Bias	9	Describe any efforts to address potential sources of bias	7	
Study size	10	Explain how the study size was arrived at	5,6	



Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-7	
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7,8	
		(b) Describe any methods used to examine subgroups and interactions	7,8	
		(c) Explain how missing data were addressed	-	
		(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	5,7	
		(e) Describe any sensitivity analyses	-	
<b>Results</b>				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	-	
		(b) Give reasons for non-participation at each stage	-	
		(c) Consider use of a flow diagram	-	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9	
		(b) Indicate number of participants with missing data for each variable of interest	-	
		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	9	
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	9	
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	-	
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	-	
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9,10	
		(b) Report category boundaries when continuous variables were categorized	9,10	



		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10	
<b>Discussion</b>				
Key results	18	Summarise key results with reference to study objectives	10,11	
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11,12	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-12	
Generalisability	21	Discuss the generalisability (external validity) of the study results	11-12	
<b>Other information</b>				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	13	

\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).

# BMJ Open

## Not in Education, Employment, or Training (NEET) and risk of Alcohol use disorder – A nationwide register-linkage study with 485 839 Swedish youths

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-032888.R2
Article Type:	Original research
Date Submitted by the Author:	20-Sep-2019
Complete List of Authors:	Manhica, Helio; Karolinska Institute, Department of Public Health Sciences Lundin, Andreas Danielsson, Anna-Karin
<b>Primary Subject Heading</b>:	Public health
Secondary Subject Heading:	Addiction, Epidemiology, Health policy
Keywords:	Alcohol use disorder, NEET, Youth, Labour market, Longitudinal study

SCHOLARONE™  
Manuscripts

**Not in Education, Employment, or Training (NEET) and risk of Alcohol use disorder – A nationwide register-linkage study with 485 839 Swedish youths**

Hélio Manhica<sup>1\*</sup>, Andreas Lundin<sup>1 2</sup> and Anna-Karin Danielsson<sup>1</sup>

<sup>1</sup> Karolinska Institutet, Department of Public Health Sciences, Stockholm, Sweden

<sup>2</sup> Centre for Epidemiology and Community Medicine, Region Stockholm, Stockholm, Sweden

\*Corresponding author

Karolinska Institutet

Department of Public Health Science (PHS)

SE-171 77 Stockholm, Sweden

[helio.manhica@ki.se](mailto:helio.manhica@ki.se)

**Total word count:** 3142

**Running head:** NEET and alcohol use disorder

**Key words:** NEET, labour market, youth, alcohol use disorder, longitudinal study.

## ABSTRACT

**Objective:** To investigate to what extent being outside education, employment, or training after completed secondary education in Sweden might affect the risk of subsequent alcohol use disorders, with sociodemographic indicators, such as sex, domicile, and origin, taken into account.

**Design:** Population register-based cohort study with 485 839 Swedish youths.

**Setting:** Sweden.

**Participants:** All youths who were born between 1982 and 1991 and were aged between 19 and 24 years when they completed secondary education in Sweden, between 2005 and 2009.

**Primary outcome measure:** Cox regression models were used to estimate the hazard ratio (HR) of first record of entry into alcohol-related medical care with a diagnosis of an alcohol use disorder, by level of labour market attachment, from 1 January 2009 to 31 December 2016.

**Results:** About 4% of the youth population were outside education, employment, or training and 25% were in insecure workforce after they completed secondary education. The risk of alcohol use disorder was higher among youths in insecure workforce, HR 1.40 (1.30 to 1.50, 95% CI), and among those outside education, employment, or training, HR 1.30 (1.11 to 1.51, 95% CI), compared with youths within the core workforce, also after adjusting for age, domicile, sex, and origin. Being in education was associated with lower HR of alcohol use disorder, HR = 0.84 (0.78 to 0.90, 95% CI).

**Conclusion:** Youths who are in insecure workforce and outside education, employment, or training are at higher risk of alcohol use disorder. Targeted policy actions are needed to support a successful school-work transition to secure equal opportunities for young people.

### Strengths and limitations of this study

- The longitudinal study was based on data from a combination of national registers covering the entire youth population living in Sweden.
- The indicator of levels of labour market participation was constructed using information on all possible income sources.
- The small population sizes for specific countries of origin in the migrant population did not allow conducting analyses separated by specific origin.
- Essential confounder variables, which could account for the different patterns of labour market attachment and alcohol-related behaviours, were not available in our data.

**INTRODUCTION**

The harmful use of alcohol is a major concern for public health. In 2016, alcohol was responsible for about 3 million deaths (5.3% of all deaths) globally and 5.1% of the total global burden of disease, with the prevalence being highest in the WHO European region: 10.1% of all deaths and 10.8% of the total burden of disease.[1]

In Western countries, a number of studies have shown that alcohol-related mortality and alcohol use disorder (AUD) are more likely to occur among socioeconomically disadvantaged populations.[2-4] However, this association is not sufficiently understood. While some scholars argue that poor labour market attachment, in terms of unemployment, lower levels of income, or low occupational status, is associated with increased risk of excessive alcohol use (*social causation*),[5-7] others have suggested the opposite – that is, heavy use of alcohol is a risk factor for poor labour market outcomes (*social selection*).[8, 9] In fact, Boden and colleagues[10] found support for both the social causation and the social selection theory, reporting unemployment to play a causal role in substance misuse (including alcohol), but also the opposite, whereby substance misuse increased the risk of unemployment.

In general, young people are more affected than adults by both labour market disengagement[11, 12] and excessive use of alcohol.[1] Still, previous studies within this field have mainly focused on adult populations. A recent pilot study[13] found that job security perception was associated with depression, anxiety, tobacco smoking, and alcohol abuse. However, this study did not examine possible age differences.

Against this background, it is of interest to investigate whether being outside education, employment, or training contributes to increased risk of subsequent AUD in youths who are in the process of establishing themselves on the labour market.

**Youths and labour market attachment**

The transition from school to successful labour market integration can be a challenge in young people’s lives. In fact, the transition often involves moving between different employment statuses, temporary working contracts, and other precarious types of employment with low salaries.[12] These challenges tend to be more pronounced among youths with foreign background than their native peers. Among youth with a migrant background, youth offspring of migrants are less likely to face labour market disadvantages compared to their

migrant peers, including youths who arrived as children. This advantage have been explained by a better knowledge of the host country's language, institutional rules and regulations, social networks and the fact that they are less likely to face ethnic discrimination.[14] Thus, in our study, we expect lower rates of labour market attachment among young migrants compared with native-born children of both immigrants and native Swedes.

The high labour market vulnerability facing youths with a migrant background is currently the focus of the policy debate in Sweden and many other European countries, due to the growth of this population caused by a high influx of refugees and asylum seekers. For instance, in 2015, one in five youths aged 15 to 34 years residing in the EU had a migrant background (either being foreign-born or having foreign-born parents). During the same period, about 41% of all new immigrants to Sweden were youths aged 15 to 29 years.

The concept NEET – Not in Education, Employment, or Training – has been widely used as an indicator for capturing the extent of young people's multifaceted disadvantage in the labour market. It emerged in the UK in the late 1980s, and has been used as an instrument to inform youth-oriented policies in the European Union.[15] This concept covers all young people who are unemployed and inactive, i.e., not enrolled in any formal or non-formal education, as well as those who suffer from long-term sickness or are otherwise unable to work or not available for work.[11] As in many OECD countries, the rates of NEETs in Sweden are higher among youths with low education (i.e., lacking secondary education) than those with tertiary education.[16] Moreover, youths with a migrant background are overrepresented among NEETs compared with their native peers with comparable education levels. Still, obtaining a secondary education has been found to be protective against the risk of being NEET among all youths, regardless of origin.[17]

Some previous studies have shown that NEET youths are more likely to have poor mental health, including poor self-reported health, substance use (including alcohol), and delinquent behaviours.[18-21] However, opposing findings, i.e., that NEET status does not lead to poor mental health and substance use, have also been reported.[22] Thus, results from previous studies are inconsistent and have some methodological limitations, such as relying solely on self-reported data, applying cross-sectional designs, with relative small sample sizes, and having unclear durations of the NEET period.

Many prior studies have focused on the association between unemployment and later hospitalisation or death due to alcohol.[5, 6, 23] To our knowledge, no study has investigated

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

the association between being outside education, employment, or training and AUD in the total youth population of Sweden. It is hypothesized in the current study that AUD would be severely compounded among youth in NEET, as disengagement from the labour market tend to expose youths to a range of negative social and health consequences, including, the harmful use of alcohol.

Therefore, the main objective of this study was to investigate to what extent being NEET in Sweden might affect the risk of subsequent AUD. In addition, we aimed to examine to what extent these possible associations differed with regard to sociodemographic indicators, such as sex, domicile, and origin.

**METHODS**

**Study population**

The study population comprised all youths who were born between 1982 and 1991 and were alive and residing in Sweden between January 2006 and December 2012, according to the Register of the Swedish Total Population. The dataset allowed us to identify a total of 485 839 youths who were aged between 19 and 24 years old when they completed secondary education in Sweden, between 2005 and 2009. Youths with previous AUD and those who did not complete a secondary degree during the follow-up period were excluded from the analyses. The information regarding level of education and year of graduation was obtained from Statistics Sweden’s Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA). The information regarding origin of birth of the study population was obtained from the Multi-Generation Register.

**Exposure variable**

We created an indicator of labour market attachment based on information on income sources, for the three years consecutively following the year of graduation from secondary school.

**Labour market attachment**

The exposure variable was primarily defined based on a model created by Eurostat for estimating the prevalence of labour market vulnerability among young people. The model was built using data from the EU Labour Force Survey. It defines NEETs as all youths who remained outside education, employment, or training for 6 months or more during the preceding 12 months. In this article, we used an indicator of labour market attachment that has been applied in several studies.[17, 24] This indicator was based on information on social

1  
2  
3 assistance, parental leave, disposable income, and other sources of income, for the three years  
4 consecutively following the year for which information on secondary education was retrieved  
5 (between 2005 and 2009). Four categories of labour market attachment were conceptualised  
6 as follows:  
7  
8  
9

10  
11 *Core workforce:* This category comprises all individuals who can support themselves by  
12 means of labour market income. This includes persons with earnings of at least 3.5 price base  
13 amounts (PBA) during a year. The PBA is a concept used by the Swedish government to  
14 calculate benefits in social insurance programmes. The PBA is calculated based on changes in  
15 the general price level, in accordance with the National Insurance Act. This also includes  
16 income from social insurance that is linked to employment, such as sickness allowances and  
17 payments from the parental insurance system. It excludes income sources such as  
18 unemployment benefits, student allowances, and disability pensions.  
19  
20  
21  
22  
23  
24

25  
26 *Education:* All persons with annual earnings of less than 0.5 PBA, or who have been  
27 registered as students in any type of education, or have been in some kind of labour market  
28 activation programme for at least 100 days, but not in the NEET category.  
29  
30

31  
32 *Insecure workforce:* All persons with a lower attachment to the labour market; with a labour  
33 market income of at least 3.5 PBA for no more than one year, and less than 0.5 PBA for no  
34 more than two years. Individuals receiving unemployment insurance for at least two of the  
35 three years are also included in this category.  
36  
37

38  
39 *NEET:* All individuals with annual earnings of at most 0.5 PBA, who have received  
40 unemployment insurance benefits, incomes from sickness or part-time disability pensions, full  
41 disability pension, or social assistance.  
42  
43

## 44 Outcome

45  
46 The outcome variable was retrieved from the Swedish national inpatient and outpatient  
47 register. It referred to the first register entry on alcohol-related medical care with a diagnosis  
48 of AUD, from 1 January 2009 to 31 December 2016. This included acute intoxication,  
49 harmful use, dependence, toxic effects, and liver disease (F10:00–F10.99), in accordance with  
50 definitions in the tenth edition of the World Health Organization International Classification  
51 of Disorders (ICD-10).  
52  
53  
54  
55  
56

## 57 Covariates



1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

We characterised the study population into three categories based on *origin*, as given in the Multi-Generation Register. *Youth migrants* were defined as youths born outside Sweden with both parents born abroad. *Youth offspring of migrants* comprised all Swedish-born youths with at least one parent born abroad. *Native Swedish youth* comprised all youths born in Sweden with both parents born in Sweden.

Sociodemographic indicators such as age, sex, and domicile were retrieved from the LISA register. The variable *domicile* indicated the place of residence at the beginning of the follow-up period. This was classified into three categories, in accordance with the Swedish Association of Local Authorities and Regions, which is a politically run organisation that represents and advocates for local government in Sweden: *Big city* referred to the metropolitan areas of Sweden’s three largest cities: Stockholm, Gothenburg, and Malmo. *Town* covered other predominately urban municipalities in or near medium-sized towns, and *rural* covered smaller towns/urban areas and rural municipalities.[25] *Age* was age in years when secondary education was completed between 2005 and 2009. This ranged from 19 and 24 years. *Sex* indicated whether the person was female or male.

**Statistical analyses**

The analyses were based on person-time measured from January 2009 to whichever of the following that occurred first: death, the first recorded hospital admission due to AUD, or the end of the follow-up period on 31 December 2016. In order to minimise possible bias caused by unrecorded migration in our study population, individuals who had a year without any information on household income from work or social benefits were excluded because this was considered to be an indicator of emigration. [26]

We estimated the incidence of the first record of hospital care due to AUD by the degree of labour market attachment, sex, age, domicile, and origin during the follow-up period. Results are presented as Incidence Rate (IR) with 95% confidence interval (CI). Thereafter, multivariate analyses were done with Cox's regression analysis of person-years, [27] to estimate the difference in hazard ratios (HRs) of first record of hospital care due to AUD, between the categories of labour market attachment, i.e., core workforce, education, insecure workforce, and NEET. In the Cox regression models, the category of “core workforce” was seen as the reference category. In Model 2, we adjusted for sex and age. Domicile was adjusted for in Model 3 and, lastly, origin was adjusted for in Model 4. Estimated results are presented as hazard ratios (HR) with 95% confidence interval (CI)

We carried out interaction analyses of sex, domicile, and origin in relation to the risk of AUD. We found no or non-substantial interaction effects of sex and origin on the outcome. Nevertheless, there was an interaction between domicile and AUD; therefore, we have presented the stratified analyses by domicile in Appendix 1. All models were tested for proportional hazard assumption using Schoenfeld residuals. [27] This assumption was not violated. All analyses were made using STATA 15.

### **Patient and public involvement**

This research was done without patient or public involvement. Neither were involved in the study design or invited to comment on the study design and main results.

### **Ethic and Patient and Public Involvement**

The datasets are anonymous and the researchers have no access to any personal information that could identify individuals included in the datasets. The Swedish national registers are protected by special legislation, which makes it possible for researchers to collect certain information without personal consent. The Regional Ethics Committee in Stockholm approved the study before any records were linked (decision number: 2016/987-32).

RESULTS

About 4% of the youth population were NEET and 25% were in insecure workforce (Table 1). The majority of youths (77.3%) were native Swedish, 15% were offspring of migrants and 7.6% born abroad. The majority of the youths lived in medium-sized towns (42.5%), while fewest lived in smaller towns/rural areas (23%). About 96% of the youth population graduated at the age of 19 or 20 years.

Table 1. Distribution of sociodemographic characteristics in the study population.

Sociodemographic characteristics	N = 485 839 Population %
<b>Labour market attachment</b>	
Core workforce	34.4
Education	36.6
Insecure workforce	25.4
NEET*	3.6
<b>Origin</b>	
Native Swedish	77.4
Migrants' offspring	15.0
Youth migrant	7.6
<b>Sex</b>	
Male	51.1
Female	48.9
<b>Age at graduation from secondary school (years)</b>	
19	85.3
20	11.4
21	2.2
22	0.7
23	0.2
24	0.1
<b>Domicile</b>	
Large cities	34.5
Medium-sized towns	42.5
Smaller towns/rural areas	23.0

NEET\* (Not in Education, Employment, or Training)

The incidence rate (IR) of AUD (Appendix 1) was higher among youths in insecure work 217.7 (207.1 to 228.7, 95% CI), followed by NEETs 171.8 (148.3 to 198.9, 95% CI), those in the core workforce 155.5 (147.9 to 163.4, 95% CI), and in education 127.9 (121.2 to 135.1, 95 % CI). In general, AUD rates were higher among males than females. The incidence rates were higher in migrants' offspring and native Swedes than in youth migrants. AUD increased with age of graduation from secondary education, and were higher among youths living in the

metropolitan areas of Sweden's three largest cities, Stockholm, Gothenburg and Malmö (Table 2).

The risk of AUD was higher among youths in insecure workforce and NEET compared with youths in the core workforce (Table 2). The hazard ratios (HRs) of AUD was 1.39 (1.20 to 1.50, 95% CI) among youths in insecure workforce and 1.28 (1.09 to 1.50, 95% CI) among NEET youths, after adjustment for age, sex, and domicile. The HR of AUD increased slightly to 1.40 (1.30 to 1.50, 95% CI) and 1.30 (1.11 to 1.51, 95% CI) respectively, when adjusting for origin. The risk of AUD was lower among youths in education, also after adjustments for the sociodemographic indicators.

**Table 2. Cox regression models for first hospital admission/first visit to inpatient/outpatient care due to AUD, by level of employment attachment among youths (male and female) between 2009 and 2016. N = 485 839.**

			HR 95% CI	HR 95% CI	HR 95% CI
Labour market attachment	N	AUD	Model 2	Model 3	Model 4
<i>Core workforce</i>	166 817	1 547	ref	ref	ref
<i>Education</i>	177 464	1 338	0.87 (0.81–0.94)	0.83 (0.77–0.90)	0.84 (0.78–0.90)
<i>Insecure workforce</i>	123 917	1 561	1.39 (1.29–1.49)	1.39 (1.30–1.50)	1.40 (1.30–1.50)
<i>NEET</i>	17 641	178	1.08 (0.92–1.26)	1.28 (1.09–1.50)	1.30 (1.11–1.51)

AUD: Alcohol use disorder; CI: Confidence interval; HR: Hazard ratio; N: Population;

NEET: Not in Education, Employment, or Training.

Model 2: adjusted for sex and age

Model 3: adjusted for sex, age, and domicile

Model 4: adjusted for sex, age, domicile, and origin

Stratified analyses by domicile (Appendix 2) suggested that, regardless of the characteristics of domicile, the HR of AUD was higher among youths in insecure workforce when compared with those of the core workforce. NEET youths were more likely to have higher risk of AUD if they resided in medium-sized towns.

## DISCUSSION

Our register-based follow-up study suggested that there was a positive and significant association between being in insecure workforce or outside education, employment, or training (NEET), and subsequent AUD. In contrast, being in education was associated with lower risk of AUD.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

Across the OECD countries, youths face greater challenges in the labour market compared with adults.[15] Youths often experience multiple periods of unemployment and/or inactivity or move between different employment statuses, with part-time working contracts, temporary contracts, and low salaries.[12, 15] The disadvantage has for instance been explained by the fact that youths lack working experience and skills, and, as a consequence, employers lack willingness to hire them.[12, 16] In this study, we found that about 4% of youths were NEET and 25% were in insecure workforce. This suggests that some youths, despite having graduated from secondary education, may have problems in transiting from school to further education and the core workforce.

Our findings showed that compared with the core workforce, youths in insecure workforce and NEETs have higher risk of AUD. These findings are in line with previous studies showing that labour market disengagement might increase psychological distress and poor mental health.[28, 29] These psychological responses, in turn, could lead to excessive use of alcohol for, e.g., self-medication or as a coping strategy to deal with feelings of distress.[30] Our results underscore the effects of job insecurity and involuntary disengagement from the labour market on psychological health and health risk behaviours.[31, 32]

The fact that the risk was somewhat higher in youths living in medium-sized towns, and smaller towns/rural areas, than in those in larger cities, calls for further investigations. In fact, this study could not confirm the pattern found in other studies that living in smaller communities was associated with a lower proportion of heavy alcohol consumption and alcohol-related problems.[33] One potential explanation for the geographical differences could be differences in local labour market (e.g., local youth labour market programmes) and selection into labour market participation.

**Strengths and limitations**

A major strength of this longitudinal study was that it was based on data from a combination of national registers covering the entire youth population living in Sweden. We were, therefore, able to study a national cohort of youths after they had completed secondary education in Sweden and were transiting from school to labour market. Furthermore, we were able to create an indicator of levels of labour market participation, using information on all possible income sources. This study uses a definition of NEET in line with that proposed by Eurostat in 2016,[11] albeit with a longer reference period. We used three consecutive years,

capturing those who experienced long-term disadvantages. A further strength of this study is that we excluded all individuals who had a diagnosis of AUD before the beginning of the follow-up period, thus reducing the risk of reverse causality.

This study also had some limitations. First, because of the small population sizes for specific countries of origin in the migrant population, it was not possible to split this category into smaller units and conduct analyses separated by more specific origin. Second, we did not consider information about other possible psychiatric health problems. Therefore, caution must be used in drawing definitive conclusions about the association between labour market engagement and AUD. Third, essential confounder variables, such as cultural values, social support, and experiencing discrimination, which could account for the different patterns of labour market attachment and alcohol-related behaviours, were not available in our data. Fourth, being in NEET and having an AUD might share many overlapping risk factors (school, family, friends, etc.), on which we had no information in this study. Hence, we are not able to explain the mechanisms that put an individual at greater risk of being in NEET. Our main focus, however, was on the possible consequences rather than the causes. Fifth, caution needs to be taken in how these findings are interpreted because the outcome variable, hospital record due to alcohol related disorders, implies serious problems related to alcohol misuse. If anything, however, this may have led to an underestimation of the actual problem.

To summarise, compared with youths in the core workforce, youths who are in insecure workforce and outside education, employment, or training were at higher risk of AUD. In contrast, youths in education had lower risk of AUD. Further studies are needed to explore the mechanisms underlying the associations between labour market disadvantages and AUD.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Funding:** This study was supported by grants provided by the Research Council for Health Working Life and Welfare (Forte: 2016-07108).

**Authors' contributions:** HM, AL, and AKD contributed to the study design. HM, carried out the statistical analyses (supported by AL), drafted the initial manuscript, reviewed and revised the manuscript. HM and AKD conceptualized and drafted the initial manuscript. AL and AKD revised the draft of the manuscript as well as the interpretation of the results. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

**Ethics approval:** The Regional Ethics Committee in Stockholm approved the study before any records were linked (decision number: 2016/987-32).

**Declaration of interest:** None.

**Data sharing statement:** The datasets analysed during the current study are not publicly available due to the Swedish data protection laws that restrict public sharing of data. Data are however available from the authors upon reasonable request and with permission of the Department of Public Health Sciences, SE-171 77. Phone number: +46 8 524 800 00.



## REFERENCES

1. WHO. Global status report on alcohol and health 2018. World Health Organization 2018: Geneva.
2. Katikireddi S V, Whitley E, Lewsey J, et al. Socioeconomic status as an effect modifier of alcohol consumption and harm: analysis of linked cohort data. *Lancet Public Health* 2017;2:267-276.
3. Budhiraja, M and Landberg J. Socioeconomic Disparities in Alcohol-Related Mortality in Sweden, 1991-2006: A Register-Based Follow-Up Study. *Alcohol and Alcoholism* 2016;51:307-14.
4. Erskine S, Maheswaran R, Pearson T, et al. Socioeconomic deprivation, urban-rural location and alcohol-related mortality in England and Wales. *BMC Public Health* 2010;10:99.
5. Backhans M, Balliu N, Lundin A, et al. *Unemployment Is a Risk Factor for Hospitalization Due to Alcohol Problems: A Longitudinal Study Based on the Stockholm Public Health Cohort (SPHC)*. *J Stud Alcohol Drugs* 2016; 77:936-942.
6. Lundin A, Backhans M, and Hemmingsson T. Unemployment and hospitalization owing to an alcohol-related diagnosis among middle-aged men in Sweden. *Alcohol Clin Exp Res* 2012;36:663-9.
7. Popovici I, and French M, Does Unemployment Lead to Greater Alcohol Consumption? *Industrial Relations: A Journal of Economy and Society* 2013;52:444-466.
8. Johansson E, Alho H, Kiiskinen U, et al. The association of alcohol dependency with employment probability: evidence from the population survey 'Health 2000 in Finland'. *Health Econ* 2007;16:739-54.
9. MacDonald Z. and Shields M. Does problem drinking affect employment? Evidence from England. *Health Econ* 2004.13:139-55.
10. Boden JM, Lee JO, Horwood LJ, et al. Modelling possible causality in the associations between unemployment, cannabis use, and alcohol misuse. *Social science & medicine* 2017;175:127-134.
11. Eurofound. Exploring the diversity of NEETs. *Publications Office of the European Union* 2016: Luxembourg.
12. Quintini G, Martin JP, Martin S. The Changing Nature of the School-to-Working Transition Process in OECD Countries(2007). *WDA-HSG Discussion Paper No. 2007-2*
13. Bert F, Gualano M, Thomas R, et al. Exploring the possible health consequences of job insecurity: a pilot study among young workers. *Gaceta sanitaria* 2018.
14. OECD/EU. Indicators of Immigrant Integration 2015: Settling In. *OECD Publishing* 2015:Paris/EU, Brussels <https://doi.org/10.1787/9789264234024-en>.



15. Eurofound. NEETs: Young people not in employment, education or training: Characteristics, costs and policy responses in Europe. *Publications Office of the European Union* 2012:Luxembourg.
16. OECD. Investing in Youth: Sweden. *OECD Publishing* 2016:Paris.  
<https://doi.org/10.1787/9789264267701-en>.
17. Manhica H, Berg L, Almquist YB, et al. Labour market participation among young refugees in Sweden and the potential of education: a national cohort study. *Journal of Youth Studies* 2018;1-8.
18. Dea B, Glozier N, Purcell R, et al. A cross-sectional exploration of the clinical characteristics of disengaged (NEET) young people in primary mental healthcare. *BMJ Open* 2014;4:e006378.
19. Henderson JL, Hawke LD, and Chaim G. Not in employment, education or training: Mental health, substance use, and disengagement in a multi-sectoral sample of service-seeking Canadian youth. *Children and Youth Services Review* 2017; 75:138–145.
20. Catherine H, Stewart PB, Dunja P, et al. Cancer-related health behaviours of young people not in education, employment or training ('NEET'): a cross-sectional study. *BMC Cancer* 2017; 17:165.
21. Benjet C, Hernández-Montoya D, Borges G, et al. Youth who neither study nor work: mental health, education and employment. *Salud pública de México* 2012;54:410-417.
22. Baggio S, Iglesias K, Deline S, et al. Not in Education, Employment, or Training status among young Swiss men. Longitudinal associations with mental health and substance use. *J Adolesc Health* 2015;56:238-43.
23. Just-Østergaard E, Mortensen EL, and Flensborg-Madsen T. Major life events and risk of alcohol use disorders: a prospective cohort study. *Addiction* 2018;113:25-33.
24. Bäckman, O. and Nilsson A. Long-term consequences of being not in employment, education or training as a young adult. Stability and change in three Swedish birth cohorts. *European Societies* 2016;18:136-157.
25. S.K.L. The Swedish Association of Local Authorities and Regions (SALAR).2019.  
<https://skl.se/tjanster/englishpages.411.html> (accessed 2019 20 /05).
26. Weitoft, G.R., et al., Mortality statistics in immigrant research: method for adjusting underestimation of mortality. *International journal of epidemiology* 1999; 28:756-763.
27. Hosmer Jr, D.W., S. Lemeshow, and S. May, *Applied survival analysis: regression modeling of time-to-event data*. Wiley-Interscience 2008.
28. Meltzer H, Bebbington P, Brugha T, et al. Job insecurity, socio-economic circumstances and depression. *Psychological medicine* 2010;40:1401-1407.

- 1  
2  
3  
4 29. Kim TJ, and Von Dem Knesebeck O. Perceived job insecurity, unemployment and  
5 depressive symptoms: a systematic review and meta-analysis of prospective  
6 observational studies. *International archives of occupational and environmental*  
7 *health* 2016;89:561-573.  
8  
9  
10 30. Bolton JM, Robinson J, and Sareen J. Self-medication of mood disorders with alcohol  
11 and drugs in the National Epidemiologic Survey on Alcohol and Related Conditions.  
12 *Journal of affective disorders* 2009;115:367-375.  
13  
14 31. Ashford SJ, Lee C, and Bobko P. Content, cause, and consequences of job insecurity:  
15 A theory-based measure and substantive test. *Academy of Management journal*  
16 1989;32:803-829.  
17  
18 32. Coles B, Hutton S, Bradshaw J, et al. Literature review of the costs of being "not in  
19 education, employment or training" at age 16-18. *Social Policy Research Unit,*  
20 *University of York.*2002: Research Report No 347.  
21  
22 33. Bränström, R. and S. Andréasson, Regional differences in alcohol consumption,  
23 alcohol addiction and drug use among Swedish adults. *Scandinavian journal of public*  
24 *health* 2008; 36: 493-503.  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Appendix 1. Incidence rates of first hospital admission/first visit to inpatient/outpatient care due to AUD among youths, between 2009 and 2016. N = 485 839.**

Labour market attachment	N	AUD	Core workforce	Education	Insecure workforce	NEET
			IR 95% CI	IR 95% CI	IR 95% CI	IR 95% CI
			155.5 (147.9–163.4)	127.9 (121.2–135.1)	217.7 (207.1–228.7)	171.8 (148.3–198.9)
Core workforce	166 817	1 547				
Education	177 464	1 338				
Insecure workforce	123 917	1 561				
NEET	17 641	178				
Origin						
Native Swedish	375 667	3 478	149.8 (141.7–158.4)	123.8 (116.3–131.9)	214.1 (202.1–226.9)	185.0 (155.8–219.6)
Migrants' offspring	73 202	835	205.7 (181.6–233.0)	143.3 (126.3–162.5)	262.7 (235.2–293.5)	173.9 (124.3–243.4)
Youth migrant	36 804	310	128.9 (101.3–164.1)	134.9 (113.1–160.8)	164.9 (136.4–199.3)	98.7 (57.3–169.9)
Sex						
Male	248 390	2 581	167.6 (157.7–178.2)	136.1 (125.6–147.4)	236.2 (220.8–252.7)	218.6 (181.7–263.1)
Female	237 449	2 043	136.1 (124.9–148.3)	122.1 (113.5–131.2)	199.4 (185.3–214.5)	125.9 (99.0–160.4)
Age* (years)						
19	414 106	3 577	142.5 (134.6–150.7)	118.7 (111.9–125.9)	198.6 (187.5–210.5)	149.6 (124.9–179.1)
20	55 653	802	221.7 (196.5–250.3)	215.9 (187.4–248.7)	291.5 (260.7–326.1)	230.9 (169.9–313.6)
21	10 882	158	256.7 (198.4–331.9)	181.4 (122.6–268.4)	273.2 (214.3–348.4)	223.4 (120.2–415.2)
22	3 505	50	210.7 (124.8–355.8)	143.9 (68.6–302.1)	381.4 (255.1–548.9)	231.6 (86.9–617.5)
23	1 108	20	226.1 (94.1–543.3)	109.3 (27.3–437.1)	379.7 (187.6–729.8)	844.3 (316.9–2 249.5)
24	585	13	418.5 (174.2–1 005.5)	256.9 (64.2–1 027.2)	483.1 (201.1–1 160.7)	359.2 (50.6–2 549.7)
Domicile						
Large cities	157 456	2 039	229.9 (213.7–247.5)	160.8 (148.9–173.7)	283.0 (262.5–306.1)	275.6 (219.1–346.6)
Medium-sized towns	236 275	1 937	123.6 (113.3–134.9)	103.7 (94.9–113.3)	197.5 (181.8–214.4)	176.9 (137.6–227.4)
Smaller towns/rural areas	79 449	613	117.6 (105.5–131.2)	118.6 (103.1–136.5)	176.5 (158.4–196.7)	167.8 (122.1–293.9)

Age\* (Completed secondary education). AUD: Alcohol use disorder; CI: Confidence interval; IR: Incidence rate per 100.000 person years; N: Population; NEET: Not in Education, Employment, or Training.

**Appendix 2. Cox regression models for first hospital admission/first visit to inpatient/outpatient care due to AUD, by domicile of residence among youths (male and female) between 2009 and 2016. N = 94 700.**

Labour market attachment	N	AUD	HR 95% CI, Model 1	HR 95% CI, Model 2
<b>a) Large cities</b>				
<i>Core workforce</i>	51 766	716	ref	ref
<i>Education</i>	67 431	646	0.74 (0.66–0.83)	0.75 (0.67–0.84)
<i>Insecure workforce</i>	39 051	652	1.23 (1.11–1.37)	1.24 (1.12–1.39)
<i>NEET</i>	4 316	73	1.17 (0.92–1.49)	1.20 (0.94–1.53)
<b>b) Medium-sized towns</b>				
<i>Core workforce</i>	67 088	500	ref	ref
<i>Education</i>	79 802	491	0.86 (0.76–0.98)	0.87 (0.77–0.99)
<i>Insecure workforce</i>	48 711	565	1.56 (1.38–1.76)	1.57 (1.39–1.78)
<i>NEET</i>	5 692	61	1.38 (1.05–1.79)	1.39 (1.06–1.81)
<b>c) Smaller towns/rural areas</b>				
<i>Core workforce</i>	45 748	324	ref	ref
<i>Education</i>	27 820	195	1.08 (0.90–1.29)	1.07 (0.89–1.29)
<i>Insecure workforce</i>	31 743	327	1.49 (1.27–1.74)	1.48 (1.27–1.73)
<i>NEET</i>	3 736	38	1.36 (0.97–1.90)	1.36 (0.96–1.89)

**AUD: Alcohol use disorder; CI: Confidence interval; HR: Hazard ratio; N: Population; NEET: Not in Education, Employment, or Training.**

Model 1: adjusted for sex and age

Model 2: adjusted for

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	2	
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2	
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3,4	
Objectives	3	State specific objectives, including any prespecified hypotheses	4,5	
Methods				
Study design	4	Present key elements of study design early in the paper	5	
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5	
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants	5	
		(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case	-	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-7	
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-7	
Bias	9	Describe any efforts to address potential sources of bias	7	
Study size	10	Explain how the study size was arrived at	5,6	

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-7	
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7,8	
		(b) Describe any methods used to examine subgroups and interactions	7,8	
		(c) Explain how missing data were addressed	-	
		(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	5,7	
		(e) Describe any sensitivity analyses	-	
<b>Results</b>				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	-	
		(b) Give reasons for non-participation at each stage	-	
		(c) Consider use of a flow diagram	-	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	9	
		(b) Indicate number of participants with missing data for each variable of interest	-	
		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	9	
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	9	
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	-	
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	-	
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	9,10	
		(b) Report category boundaries when continuous variables were categorized	9,10	

		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10	
<b>Discussion</b>				
Key results	18	Summarise key results with reference to study objectives	10,11	
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11,12	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-12	
Generalisability	21	Discuss the generalisability (external validity) of the study results	11-12	
<b>Other information</b>				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	13	

\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).