Predictors of first incidence of alcohol use disorders in the Lundby cohort from 1947-1997

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Abstract

Objective: Epidemiological evidence indicates an inverse relationship between socio-economic status (SES) and alcohol use disorder (AUD), although there are relatively few recent incidence studies. The present study aimed to assess the incidence of AUD by age, gender and SES and to analyse AUD's association with mental disorder.

Method: Information about mental disorders, including first incidence cases of AUD, was assessed in the Lundby cohort (n=3,563) by field investigations in 1947, 1957, 1972 and 1997. Incidence calculations were based on 3,372 individuals without prior AUD. For the two genders, age-standardised incidences of AUD for the 25-year periods of 1947-1972 and 1972-1997 were compared. Possible risk factors for incident AUD were analysed by means of Cox regression analyses for the whole sample and for each sex separately.

Results: A total of 233 first incidence AUD cases were detected (198 males, 35 females. Incidence rates, expressed as number of cases per 1000 person years, were highest for working class males at 5.46 cases per 1000 person years for the period 1 of July 1947, to 30 June 1972 and 4.77 for the period 1 of July 1972 to 30 June 1997, respectively. Middle class males showed intermediate incidence rates of 2.73 and 2.65. Self-employed males showed the lowest incidence rates of 2.50 and 1.47. Females generally had much lower incidence, although they showed a non-significant tendency for higher incidence rates in the latter period. A diagnosis of depressive disorders, anxiety disorders and unspecific neurotic states increased the risk for developing first incident AUD.

Conclusion: Working class males had higher annual incidence of alcoholism in both time periods relative to middle class and self-employed males. Mental disorder increased the risk for AUD among both genders.

Alcohol use disorder (AUD) is a major health problem in many countries and has been linked to a considerable burden of disease throughout the world (Rehm et al., 2009). Analysis of the global burden of disease has pointed to AUD's importance among the social determinants for ill health and disease (Marmot, 2005). Incidence studies have also reported socio-demographic predictors of high rates of AUD (Grant et al., 2009) and (Bijl, de Graaf, Ravelli, Smit, & Wolleberg, 2002).

A study from EU has confirmed that unemployment and disablement are associated with mental disorders including AUD (Pinto-Mesa et al., 2013). Thus adverse social conditions such as being poor, unemployed and under-privileged are important determinants of mental health.

Earlier research has indicated cultural and historical context as key factors in the establishment of drinking patterns (Johnstone, Leino, Ager, Ferrer, & Fillmore, 1996). In the older literature there was frequent reference to the popular notion that heavy manual work could not be borne without the help of alcoholic beverages. Today no employing organization is immune to the effects of alcoholism, alcohol misuse and related alcohol use disorders (AUD), since these are endemic in many countries. More recent epidemiological research has confirmed that alcohol dependence is associated with male gender, low education and low income (van Oers, Bongers, van de Goor, & Garretsen, 1999) and (Diala, Muntaner, & Wahlrath, 2004). Grant et al. (2009) reported from The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) that respondents with alcohol abuse and dependence were more likely to be younger, male, and never married or separated/divorced /widowed. Low socio-economic status (SES) and low educational level also result in greater risk of death and disease (including AUD), though these factors have a greater influence on males (WHO, 2011). High rates are found among certain groups *outside* the labor force, especially in the unemployed sector, and unemployment benefits and premature retirement pensions paid as a result of incapacity to work

due to an alcohol-related disability account for increasingly heavy social security costs in many countries (Pinto-Mesa et al., 2013).

Most epidemiological studies have examined differences in the prevalence of alcohol consumption and alcohol-related problems by socio-economic status (Bloomfield, Grittner, Kramer, & Gmel, 2006). Findings from the 10-year follow-up of the National Comorbidity Survey (NCS) showed significant associations between socio-demographic variables such as low education and occupation with drug use disorders, but not with AUD alone (Swendsen et al., 2009). Longitudinal cohort studies have also sought to address how SES contributes to unequal rates of alcoholism related diagnoses (Hemmingsson, Lundberg, Diderichsen, & Allebeck, 1998). Earlier Öjesjö, Hagnell, and Lanke (1983) found that the incidence of alcoholism among males in the Lundby cohort from 1957-1972 was higher for subjects in the working class than for those in the middle class or self-employed (e.g., artisans and farmers). Other research supports differences in alcoholism incidence and alcohol-related mortality across social classes and occupations (Hemmingsson et al., 1998) and (Crombie & Precious, 2011).

The Netherlands Mental Health Survey and Incidence Study (NEMESIS) investigated determinants of 12-month first incidence of psychiatric disorder including alcohol use disorder in the general population and showed that men had a substantially higher risk of developing AUD than women. Subjects in the youngest age category had a far greater risk of incident AUD than those in any other age group. Subjects living without a partner were also at higher risk of developing AUD (De Graaf, Ravelli, Smit, & Wollebergh, 2002). It has been previously shown that in population based samples, 37% of subjects with AUD had a comorbid psychiatric disorder (Regier, Farmer, & Rae, 1990). The comorbidity between psychiatric and alcohol use disorder remains an important phenomenon to understand, since comorbidity often aggravates the course of the disorders. The risk posed by already existing disorders for onsets of new disorders or other psychiatric conditions has been extensively debated in psychiatry (Grant et al., 2009). Temporal relationships between AUD and other mental disorders have been studied and reciprocal associations have been found between AUD and anxiety and mood disorders (Grant et al., 2009). Also research on co-morbidity can offer avenues to better understanding of aetiology, courses of disorders and hopefully prevention efforts for both substance disorders and other mental disorders (Hasin & Kilcoyne, 2012).

Men have consistently exceeded women in incidence of AUD (de Graaf et al., 2002, Grant et al., 2009). Compared to what is known about men few scientific studies have focused on risk factors for AUD among women. Thundahl and Allebeck (1998) found very small differences in AUD incidence across educational levels in females. Contrary to this finding, a more recent multi-national study from predominantly EU countries reported that more highly-educated females were likely to drink more heavily, though

drinking heavily is not the same as incident AUD (Bloomfield et al., 2006).

The Lundby study is a longitudinal study of mental health in an unselected population, which commenced in 1947, and had its last follow-up in 1997 (Nettelbladt et al., 2005). Episodes of mental disorders (e.g., AUD) and socio-demographic variables were assessed, affording a unique opportunity to investigate the incidence of AUD and by age, gender and socio-demographic predictors. Hence, the aim of the present study was to describe and compare first incidence of AUD in the two time periods of 1947-1972 and 1972-1997 by age, SES and gender. Another aim was to investigate if a diagnosis of mental disorders predicted onset of first incidence AUD.

Material and Methods

The present study is based on 3,563 individuals within two partly overlapping cohorts from the Lundby study, which started in 1947 when Essen-Möller et al. (1956) conducted a prevalence study of mental disorders among the 2,550 inhabitants in the Lundby area in the south of Sweden. In 1947, the Lundby area was rural with many farmers, farm labourers and self-employed artisans. Since the 1950s, about 50% of the survivors have moved, though many remained in neighbouring regions. The area has gradually changed to a suburban society from which inhabitants commute to work in neighbouring cities.

During the period 1947-1957, 253 participants died. The first follow-up occurred in 1957, when 1,013 participants that had moved into or had been born into the Lundby area were added to the cohort, bringing the total to 3,563. Of these 1,013 newcomers 228 subjects were born into the area between 1947 and 1957 and the rest, 785 subjects had migrated into the area. This resulted in a new cohort, the 1957 cohort partly overlapping the original cohort and consisting of 3,310 persons. The subjects in 1957 had a median age of 34 (range 0-96). Thus the total cohort of 3,563 consists of two partly overlapping cohorts. Since 1957, no additional participants have been included, but all participants from the two cohorts were assessed at follow-ups regardless of where they lived. The second follow-up in 1972 assessed 2,827 survivors, while the third follow-up in 1997 assessed 1,797 survivors (Nettelbladt et al., 2005). The participants were asked about episodes of mental disorders including AUD during the whole study period including the intervals between the different follow-ups. Information about deceased subjects was also gathered during the study period. The Lundby population at the different field investigations is presented in Figure 1.

The attrition rate has been low in the Lundby study at follow-ups in 1947, 1957 and 1972, ranging between 1.2-1.8%. While the dropout rate in 1997 among living subjects was higher (13%), this rate is still quite low. The youngest participants in the 1997 follow-up were 40 years old. The socio-demographic characteristics of the subjects at the different cross-sectional dates are presented in Table 1.

Figure 1

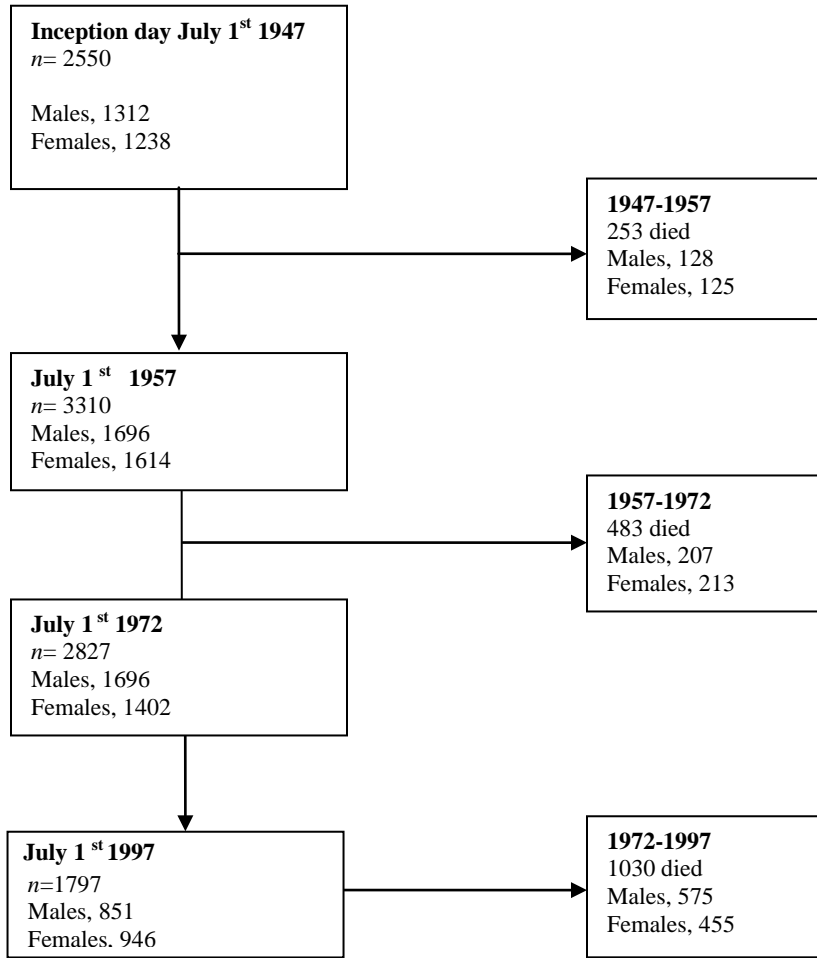*The Lundby population 1947-1997. In 1957, 1013 subjects were added to the cohort*

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┌─────────────────────────────┐
│ Inception day July 1st 1947  │
│ n= 2550                      │
│                              │
│ Males, 1312                  │
│ Females, 1238                │
└─────────────────────────────┘
         │         ┌──────────────────────┐
         │────────▶│ 1947-1957            │
         │         │ 253 died             │
         │         │ Males, 128           │
         │         │ Females, 125         │
         ▼         └──────────────────────┘
┌─────────────────────────────┐
│ July 1 st  1957              │
│ n= 3310                      │
│ Males, 1696                  │
│ Females, 1614                │
└─────────────────────────────┘
         │         ┌──────────────────────┐
         │────────▶│ 1957-1972            │
         │         │ 483 died             │
         │         │ Males, 207           │
         │         │ Females, 213         │
         ▼         └──────────────────────┘
┌─────────────────────────────┐
│ July 1 st 1972               │
│ n= 2827                      │
│ Males, 1696                  │
│ Females, 1402                │
└─────────────────────────────┘
         │
         ▼
┌─────────────────────────────┐    ┌──────────────────────┐
│ July 1 st 1997               │───▶│ 1972-1997            │
│ n=1797                       │    │ 1030 died            │
│ Males, 851                   │    │ Males, 575           │
│ Females. 946                 │    │ Females, 455         │
└─────────────────────────────┘    └──────────────────────┘
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Table 1

Socio-demographic characteristics of the population in 1947, 1957, 1972 and 1997

	1947	1957	1972	1997
Total population	**n=2,395**	**n=3,148**	**n=2,716**	**n=1,768**
Males	1,159 (48.3%)	1,535 (48.8%)	1,316 (48.4%)	823(46.5%)
Females	1,236 (51.6%)	1,613 (51.2%)	1,400 (51.6%)	945 (53.4%)
Age in years[a]	34 (15-50)	33 (18-51)	44 (30-60)	61 (51-70)
Age-groups at field-investigations, n (males/females)				
15-29	486 (267/219)	760 (368/392)	643 (325/318)	
30-39	346 (169/177)	428 (224/204)	468 (211/257)	
40-49	352 (173/179)	439 (211/228)	517 (271/246)	319 (159/160)
50-59	226 (93/133)	406 (200/206)	373(188/185)	519 (247/272)
60-69	195 (76/119)	224 (91/133)	418 (207/211)	452 (216/236)
70+	198 (88/110)	243 (111/132)	297 (114/183)	478 (201/277)

| Total population | 1947
n=2,395 | 1957
n=3,148 | 1972
n=2,716 | 1997
n=1,768 |
|---|---|---|---|---|
| | SES classification, n (%) | | | |
| Blue-collar workers | 1,137 (47.5%) | 1,542 (49.0%) | 1,651 (60.8%) | 953 (53.9%) |
| White-collar workers | 166 (6.9%) | 379 (12.0%) | 647 (23.8%) | 612 (34.6%) |
| Self-employed | 473 (19.4%) | 507 (16.1%) | 415 (15.3%) | 195 (11%) |
| No information | 619 (25.8%) | 722 (22.9%) | 3 (0.1%) | 8 (0.4%) |
| | Marital state, n (%) | | | |
| Unmarried | 1,197 (50.0%) | 1,406 (44.7%) | 600 (22.1%) | 168 (9.5%) |
| Married/cohabitate | 1,071 (44.7%) | 1,549 (49.2%) | 1,841 (67.8%) | 1,211 (68.5%) |
| Divorced | 11 (0.5%) | 34 (1.1%) | 97 (3.6%) | 170 (9.6%) |
| Widowed | 116 (4.8%) | 159 (5.1%) | 178 (6.6%) | 219 (12.4%) |
| No information | | 2 (0.1%) | | |

[a] Median (quartile 1-quartile3).
Notes: The overlapping cohort from 1947 and 1957 consists of 3,563 subjects. 2,550 were interviewed in 1947 and 1,013 were added in 1957. In the present study 191 subjects were excluded from the total cohort because they had developed AUD before entering the cohort. The total population refers to living subjects at the different cross-sectional days. Percentages are given in the parentheses. SES, socio-economic status. Many were farmers and were classified as self-employed. Children and severely disabled individuals were not categorized according to the SES classification system.

The present study of first incidence of AUD by SES is based on the total cohort 3,563 from whom a total of 191 subjects were excluded because they had developed AUD before entering the cohort; thus 3,372 participants of the total cohort of 3,563 remained.

Method

In 1947, experienced psychiatrists carried out semi-structured interviews and carefully described the participants. In 1957, 1972, and 1997, all surviving participants were re-interviewed and information was gathered about subjects who had died during the previous follow-up period. Psychiatrists performed the diagnostic interviews and evaluations at all field-investigations. The semi-structured interview conducted at each time point was modernized in 1997, but kept its basic form. One part of the interview was structured to generate factual information about episodes of mental disorders. The other part was unstructured, but often provided additional, valuable information (Nettelbladt et al., 2005). The majority of the interviews took place in the participants' homes or place of employment, but 128 telephone interviews were performed in the 1997 field investigation, mainly due to distance.

The interview started with questions about the subjects' physical and mental health since the previous investigation, in particular their contact with primary care and psychiatric care, as well as hospital admissions. This section also explored alcohol problems and drug abuse. Next, the interview assessed somatic illnesses and complaints, medications, smoking habits, sleeping problems, and appetite, as well as social life, important relationships, and general life satisfaction. Additional information was obtained through relatives, caregivers and other key informants, such as general practitioners and local vicars. Some official registers were also used: hospital case notes (psychiatric and non-psychiatric); inpatient register, out-patient clinic (the Dalby-Tierp register, Community Medicine Institute, 2004); County Temperance Board; official death certificates from parish and central population registration; National Central Bureau of Statistics; and the cause of death register (Epidemiological Centre, the National Board of Health and Welfare, 2004). After information from these different sources was gathered, diagnostic evaluations were conducted of mental disorders, including AUD, and dates of emergence and recovery. Information from the semi-structured interviews, as well as from the county temperance boards and registers, were of considerable value for the diagnostic assessments. Age-at-onset of AUD was assessed mainly from field investigations, participants and/or key informants. Case files were also important for the assessment of age-at-onset.

Socio-Economic Status (SES)

SES was defined from each individual's occupation and type of employment before the occurrence of incident AUD. In 1997, all subjects of working age at all investigations were rechecked according to the principles of Swedish SES classification (Statistics, Sweden, 1982).

1. Working class or "blue collar".
2. Middle class employees or "white collar".
3. Self-employed businessmen, artisans and farmers.

Non-working dependents were considered to be members of the social class of their caretakers. For students, the father's social class was used. If retired, the occupation participants had pursued for most of their working lives was used. Unemployed participants were categorized according to their most recent occupation. Housewives were classified according to their husband's SES.

Definitions of AUD

AUD includes alcohol dependence and alcohol abuse, as outlined in the Diagnostic and Statistical Manual of Mental Disorders, version IV (DSM-IV) (American Psychiatric Association, 1994. An individual was assessed as having AUD if he or she met the DSM-IV criteria for the alcohol abuse or alcohol dependence at any time between 1947 and 1997: (a) *alcohol abuse*: signs of excessive drinking, frequent episodes of intoxication, and in some cases tolerance change. The pattern should be persistent and could include failure to fulfill major role obligations. (b) *alcohol dependence*: a persistent pattern of tolerance, withdrawal symptoms, persistent desire for alcohol consumption, alcohol often being consumed in larger amounts over a longer period than intended, and important social and occupational activities being given up or reduced. In addition, an estimated duration of disorder of at least one year was required. Sustained full remission (stable recovery) was defined as none of the criteria for dependence or abuse being met at any time during the previous 12 months.

Ascertainment of Diagnosis of Mental Disorder

Because the Lundby Study started before the DSM was established and before structured diagnostic instruments were in use, it has its own simplified diagnostic system. The Lundby diagnostic classification is practical and adapted to fieldwork (Hagnell, Essen-Möller, Lanke, Öjesjö, & Rorsman, 1990). In this study, the main diagnostic categories applied were: depressive disorders, anxiety disorders, psychotic disorders; alcohol-induced psychotic disorders, other psychotic disorders (mainly schizophrenia and bipolar disorders), organic disorders and dementia.

AUD was assessed at four different time points, and the fieldworkers (psychiatrists) asked for alcohol problems during the intervals between follow-ups. The diagnoses of alcohol-related psychotic disorders, primarily alcohol-induced psychotic disorders and delirium tremens, were obtained from the in-patient register and hospital records. The County Temperance Board provided also useful information about alcohol problems among the participants. Organic syndrome included cognitive deficits, such as memory difficulties, slow reactions and concentration difficulties. Dementia included Alzheimer's disease, multi-infarct dementia and other types of dementia. There was also a diagnostic category of mixed neuroses, in which no neurotic symptom was especially dominant, including neurotic states with symptoms such as fatigue, anxiety, depression and obsessive-compulsive symptoms. In the last field investigation in 1997, DSM-IV diagnoses and ICD-10 diagnoses were assessed simultaneously with the Lundby diagnostic system.

Predictors of First Incidence AUD

Socio-demographical variables as age, gender, marital status and SES as well as diagnosis of mental disorder were used as predictors of first incidence AUD. Age was grouped into the following age groups: 15-29, 30-39, 40-49, 50-59, 60-69 and 70+. The youngest participants were 40 years old in 1997 and thus there were no participants in the age groups 15-29 and 30-39 in 1997. Marital status comprised the categories: unmarried, married/cohabitate, divorced, widow/widower. Marital status was coded as unmarried/married in the regression models.

Statistical analysis

Demographical variables such as age, gender, marital status and SES were used as predictors of first incidence AUD. Incidence rates of any alcoholism were based on individuals who were free of AUD when follow-up started. The risk period for each subject started at July 1, 1947 for the initial cohort or July 1, 1957 for the second cohort for those subjects remaining and added and ended when the subject developed AUD, died or reached the end of the study period (July 1, 1997). The person years were then allocated to study period (1947-1972 and 1972-1997), gender, SES and age group, and the specific incidences were calculated. To compare total rates, direct standardization was performed with the total Lundby cohort at cross-sectional day July 1, 1972, as the standard population. The standardized rates for the two study periods were compared between gender and across SES using 95% confidence intervals for the rate ratios (Clayton & Hills, 2004).

Cox regression analyses were carried out with time from entry into the cohort until first incidence of AUD and with censoring at death or end of study. Diagnoses of mental disorders, treated as time-dependent variables, coded as 0 before onset of the disorder and as 1 after onset, were considered as possible predictors of incidence of AUD. The influence of each these risk factors was first assessed separately in what is called simple models, adjusting for age-at-onset, marital status and SES. Then, multivariate regression analyses were performed starting with models containing all possible risk factors, and where non-significant predictors of mental disorders were omitted one by one in backwards-stepwise manner. All models, both simple and multivariate, were performed separately for each gender and for the total sample. Results were considered statistically significant when $P < 0.05$. The Statistical Package for the Social Sciences (SPSS), version 18, was used to analyse the data.

Results

Incidence by SES

Over the 50-year study, 233 subjects with AUD out of 3,372 (6.9%) were identified, 198 males and 35 females. For males, incidence rates, calculated per 1,000 person-years from 1947-1972 and 1972-1997, were highest for working class (5.46 and 4.77, respectively), and followed by middle class (2.73 and 2.65, respectively) and finally self-employed (2.50 and 1.47, respectively). All rate ratios were greater than 1, implying that the rates were generally higher during the first study period. However, rates were not significantly different between the two periods for any group: rate/ratio was 1.14, 95% CI (0.80-1.64) for working

class males, 1.03, 95% CI (0.44-2.43) for middle class males and 1.7, 95% CI (0.32-9.1) for self-employed males.

The pattern in females was less clear. Incidence rates from 1947-1972 and from 1972-1997 were 0.43 and 0.89 in the working class, 0.47 and 0.88 in the middle class, and 0.36 and 0.73 for self-employed. Contrary to results in males, working class females had slightly higher incidence rates in the latter period. However, rates were not significantly different between the two periods for any group: rate/ratio was 0.48, 95% CI (0.19-1.21) for working class females, 0.53, 95% CI (0.14-2.08) for middle class females and

0.49, 95% CI (0.06-3.74) for self-employed females. It should be noted that there were only four self-employed females with AUD.

Incidence of new cases of AUD in males by SES for the two time periods is presented for both genders in Figures 2 and 3. Incidences by age across the two time periods showed only small differences between gender and across SES.

Figure 2

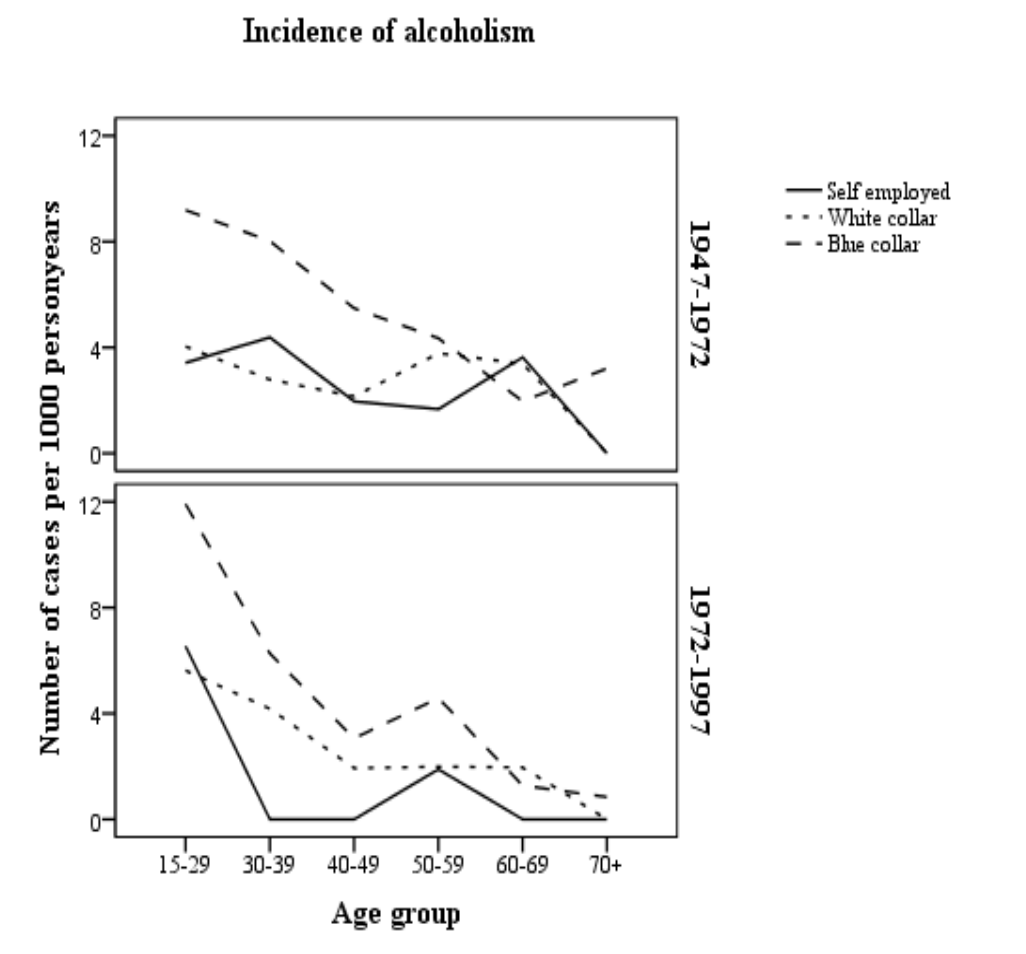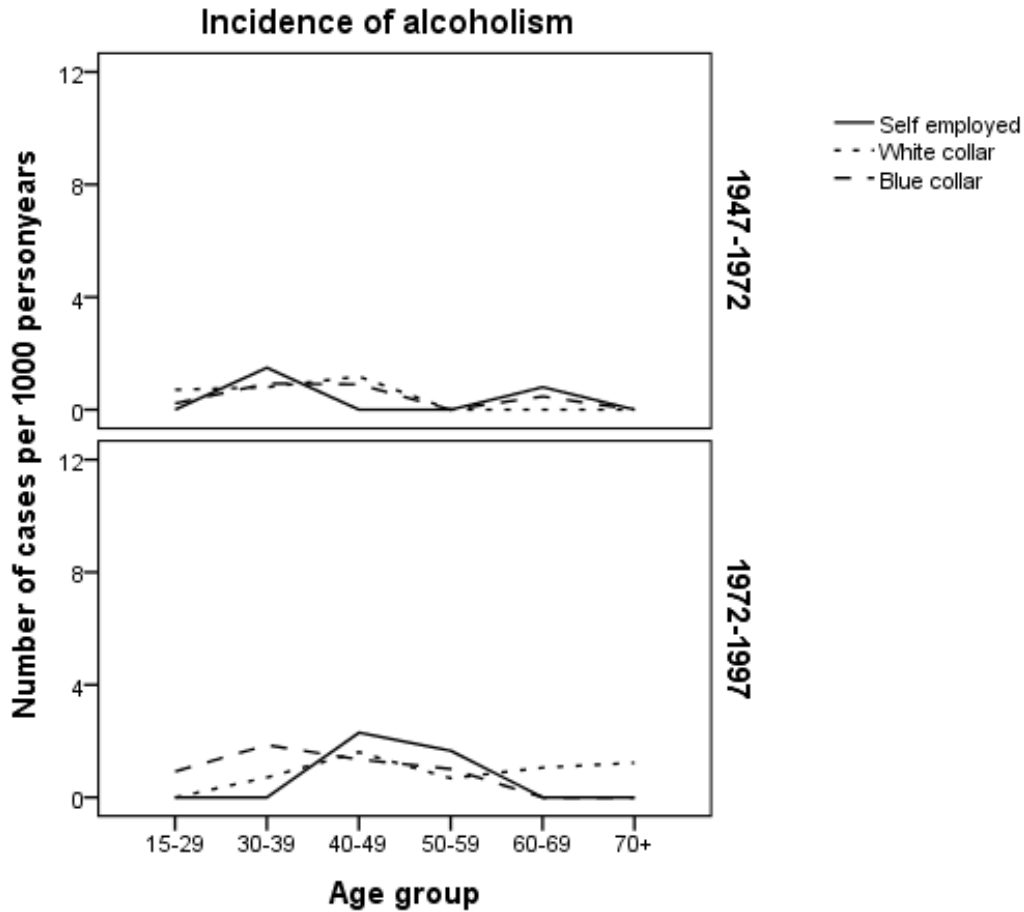*Incidence of new cases of AUD in males by SES for the periods of 1947-1972 and 1972-1997*

Figure 3

Incidence of new cases of AUD in females by SES for the periods of 1947-1972 and 1972-1997

Regression Analyses of Predictors of First Incidence AUD

These results are presented in Table 2. In the simple regression models younger age and male gender were positively, statistically significant associated to first incident AUD. Male gender was more than six fold (hazard ratio 6.18) associated to AUD in comparison to female gender. Marital status was not associated with first incident AUD. Subjects with a "blue-collar" status were associated with a higher risk to develop AUD in comparison to subjects with "white-collar status". Among subjects with "self-employed status" the lowest risk for incident AUD was found.

Males with blue-collar status were statistically significant associated with first incident AUD, whereas females were not. They were though very few females with AUD.

For males, diagnoses of depressive disorders, anxiety disorders, psychotic disorders as well as mixed neurosis increased the risk of developing first incident AUD. For females the risk of developing first incident AUD was higher if the subjects were diagnosed with depressive or anxiety disorders.

In the multivariate models age and male gender turned out as predictors for incident AUD as well as the mental disorders; depressive, anxiety and psychotic disorders. For males, blue-collar status turned out as a predictor. For females, anxiety and depressive disorders turned out as predictors similarly to the results in the simple models.

Discussion

The Lundby study is a longitudinal cohort study on a geographically defined population consisting of 3,563 individuals. The present study included all subjects with first incidence of AUD during 1947-1997 with the primary aim to explore the influence of SES and mental disorder on the risk of onset for AUD.

Table 2

Simple regression models and multivariate regression models with first incidence of AUD as outcome.

	All *n*=233			Males *n*=198			Females *n*=35		
	HR	**CI**	***P***	**HR**	**CI**	**P**	**HR**	**CI**	***P***
	Simple models								
Age	0.98	0.97-0.99	0.009	0.99	0.97-0.99	0.027*	0.97	0.94-1.01	0.131
Gender	6.18	4.26-8.77	0.000*						
	Marital state								
Unmarried	1.0		0.928	1.0		0.967	1.0		0.145
Married	0.92	0.60	0.689	0.89	0.56-1.41	0.610	1.20	0.39-3.67	0.743
Divorced	1.60	0.22-11.95	0.645	0.00	1.34-141.1	0.971	13.75	1.34-141.1	0.027
Widow	0.00	0.00-1.62	0.938	0.00	0.00-4.64	0.955	0.00	0.00-.	0.987
	SES								
White-collar	1.0		0.000	1.0		0.000	1.0		0.959
Self-employed	0.68	0.36-1.30	0.248	0.88	0.44-1.76	0.719	0.00	0.00-6.92	0.960
Blue-collar	1.75	1.19-2.58	0.005*	2.01	1.28-3.17	0.003*	1.12	0.52-2.41	0.777
	Diagnoses								
Depressive disorders	3.04	2.05-4.50	0.000*	2.60	1.60-4.23	0.000*	4.31	2.07-9.03	0.000*
Anxiety disorders	2.91	1.88-4.49	0.000*	2.65	1.55-4.53	0.000*	3.41	1.57-7.43	0.002*
Mixed neurosis	3.49	1.11-10.96	0.032*	3.91	0.97-15.80	0.055	2.17	0.30-16.00	0.447
Psychotic disorders	3.08	1.56-6.07	0.001*	3.37	1.63-6.96	0.001*	1.69	0.23-12.57	0.611
Organic disorders	0.45	0.06-3.24	0.452	0.50	0.07-3.59	0.492			
Dementia	1.49	0.36-6.21	0.586	1.80	0.43-7.58	0.425			
	Multivariate models								
Age	0.98	0.97-0.99	0.001*	0.98	0.97-0.99	0.004*	0.97	0.94-1.01	0.110
Gender	7.22	5.00-10.41	0.000*						
	Marital state								
Married	0.89	0.59-1.34	0.574	0.93	0.59-1.46	0.753	0.86	0.30-2.46	0.777
	SES								
White-collar	1.0		0.000	1.0		0.000	1.0		0.999
Self-employed	0.65	0.34-1.24	0.193	0.82	0.41-1.65	0.823			
Blue-collar	1.69	1.15-2.49	0.008	1.97	1.23-3.10	0.004*	1.01	0.47-2.18	0.982
	Diagnoses								
Depressive disorders	2.84	1.91-4.23	0.000*	2.48	1.52-4.04	0.000*	3.98	1.89-8.40	0.000*
Anxiety disorders	2.73	1.76-4.22	0.000*	2.54	1.48-4.35	0.001*	3.05	1.34-6.68	0.005*
Psychotic disorders	2.87	1.46-5.65	0.002*	3.18	1.54-6.56	0.002*	1.70	0.23-12.61	0.606

Note. The simple models with diagnostic categories as covariates also contain age-at-onset, marital status and socio-economic status. HR refers to hazard ratio, CI to 95% confidence interval and P refers to the p-value. Unmarried state and white-collar status are reference categories

In the former Lundby survey 1957-1972 by Öjesjö, the original cohort from 1947, *N*=2,550 were investigated, not the overlapping cohorts as in the present survey. Hence, the different Lundby surveys are not completely comparable, but the results are converging with the highest incidence rates detected for working class in both surveys. As expected, AUD incidence rates were much higher for males than females in all SES groups. According to the WHO Global Status Report on Alcohol and Health, the harmful use of alcohol is a particularly grave threat to males, although recent research suggests that the gender gap could be closing (Keyes, Grant, & Hasin, 2008) and (Mattisson, Bogren, Horstmann, & Öjesjö, 2010). The findings in the present study suggest that the socio-demographic pattern regarding the incidence of AUD have remained roughly unchanged. There was a slightly

increasing trend in the latter time-period for women in the different socio-economic groups, but this change was not statistically significant. Due to policy restrictions in Sweden, females had less access to alcohol in the first period, and alcoholism may still be more hidden than for males and thus more likely to be missed.

Even if the male/ female differences in alcohol-use disorders have decreased, the gender gap in AUD is still large (Mattisson et al., 2010). However there exist few studies of incident AUD, and most studies are conducted in Caucasian populations. There could be differences in incident AUD between different kinds of populations. The sex ratio (males/females were 6:1 in the Lundby Study as well as in the ECA-study, but in a study of Taiwanese aborigines the sex ratio (DSM-IV diagnoses) was 2:1, probably explained by severe life stress among aboriginal females (Lee, Liao, Liu, Lee, & Cheng, 2013).

As shown in previous research, working class males had the highest incidence rates for AUD, and this was observed in both time periods of the present study. These results were similar to previous research showing that individuals with alcohol dependence have lower SES than those without (Marmot, 2005; Thundal et al., 1998). Furthermore, there is evidence for higher prevalence's of alcohol-related problems in lower educational levels in both sexes (Van Oers et al., 1999). Also in developing countries a similar pattern with low SES associated to AUD have been reported (Pillai et al., 2013). Interestingly, parental social class did not turn out as a predictor for excessive alcohol use for adolescents followed up at age 32 years (Huurre, Lintonen, Kaprio, Pelkonen, & Marttunen, 2010). In the same study it was reported that drunkenness-oriented drinking, parental divorce, depressive symptoms, leisure-time spent daily among friends were predictors of excessive alcohol use in adulthood among males. For females the strongest predictors of excessive alcohol use in adulthood were drunkenness- oriented drinking and frequent smoking.

Clearly, AUD as other mental disorders are not equally distributed in the population. Further, unemployment and underemployment were found to be risk factors for alcohol-related disorders in European countries (Pinto-Mesa et al. 2012). There is evidence that the social class gradient has increased markedly in recent years (Crombie & Precious, 2011). However, categorization of an individual into a particular SES group is not fixed, as there is mobility among groups. In our study, movements were mostly towards a higher SES group (e.g., working class to middle class). Hence, there may have been a bias towards higher incidence rates for the working class, as movements to middle class were not identified until the next field investigation.

Mental disorders have been pointed out as risk factors for AUD. Significant findings in this study are that mental disorders as anxiety disorders, depressive disorders, mixed neurosis and psychotic disorders fell out as risk factors for AUD among males. These results are consistent with findings from the prospective NESARC study (Grant et al.,

2009) that also found reciprocal temporal relationships between alcohol abuse, dependence, major depressive disorders and anxiety disorders. A twin study also showed that the risk of alcohol dependence was substantially increased by a prior episode of major depressive disorder but a previous episode of alcohol dependence did not increase the risk of major depressive disorder (Kuo, Gardner, Kendler, & Prescott, 2006). Further, alcohol use disorder was found to be a risk factor for first depressive disorders among males in a study from the Lundby study (Mattisson et al., 2009). Probably there exists etiological heterogeneity behind both AUD and depressive disorders (Kuo et al., 2006). Also comorbidity of AUD and other mental disorders is very common in populations (Compton, Thomas, Stinson, & Grant, 2007). Combinations of mental disorders including AUD may occur through chance alone or be the actions of the same predisposing factors such as stress, personality disorders, childhood experiences and genetic influence (Schuckit, 2006). This reality could complicate the courses of the psychiatric conditions involved as well as the diagnostic process. Comorbidity of AUD with psychotic disorders is also highly prevalent. It was found in the ECA study that the prevalence of schizophrenia was found to be 3.8 % among subjects with AUD (Regier et al., 1990). However Lev-Ran, (2012) found that self-reported psychotic disorders were generally higher among individuals with 12-month exposure to specific categories of substances except alcohol and hallucinogens. In our study though, psychotic disorders turned out as a risk factor for incident AUD among males. Anxiety and depressive disorders turned out as statistically significant risk factors for AUD for both sexes maybe suggesting that these disorders should be diagnosed and treated properly in order prevent the onset of AUD. Finally, the low number of females with AUD makes analyses of gender differences only tentative.

Strengths and Limitations

A strength of the present study was the use of prospective data from a population-based cohort. Limitations included retrospective assessment of age-at-onset in some cases, which could have assumed later onset, as well as no formal assessment of reliability or validity of diagnoses. Best-estimate consensus diagnoses were assessed based on the interview and several other information sources as registers, medical records and various key-informants.

Long intervals between follow-ups may have prevented detection of some cases of AUD and may affect findings due to differences in diagnoses over time (Nettelbladt et al. 2005). During the 50-year follow-up period, a few individuals changed SES group, which made analysis difficult (they were included in the SES group they started in). Finally, the low number of female alcoholics made analyses of gender differences problematic.

Conclusions

The incidence rate for AUD was found to be highest for working class males, and incidence rates by SES were similar across the two time periods. Moreover, there was an indication of a rising trend in AUD for females,

especially among the middle class. However, the number of females was very low and these findings were not statistically significant. Mental disorders also increased the risk of incident AUD.

Ethical Approval

The ethics committee of the medical faculty at Lund university hospital approved the 1997 follow-up of the Lundby Study, and participants provided written consent.

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