ORIGINAL ARTICLE

Abstinence and current or former alcohol use as predictors of disability retirement in Finland

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Abstract

Aim: According to previous studies, abstinence from alcohol increases the risk of disability retirement (DR). We studied whether former alcohol users' poor mental or physical health might have contributed to this result. *Methods*: Prospective population-based study of 3621 occupationally active Finns aged 30–55 years at baseline. Disability pension data for 2000−2011 was retrieved from national pension records. We examined medically certified disability retirement due to all causes and due to mental disorders among lifelong abstainers, former drinkers, those with an alcohol use disorder irrespective of consumption and current users, further classified according to weekly intake of alcohol. Chronic somatic diseases were evaluated in a clinical examination and common mental and alcohol use disorders using the Composite International Diagnostic Interview. Cox regression was used. *Results*: Neither lifelong abstinence nor alcohol consumption, even at hazardous levels, without alcohol use disorder was associated with disability retirement. Compared with light drinkers, former drinkers' hazard ratio for DR due to mental disorders was 2.67 (95% CI 1.39−5.13), allowing for somatic and mental morbidity, physical and psychosocial workload, health behaviour and socio-demographic factors. The respective hazard ratio of DR due to all causes for those with alcohol use disorder was 2.17 (1.49−3.16) and of DR due to mental disorders 4.04 (2.02 to 8.06). ***Conclusions*: Lifelong abstinence did not predict disability retirement. Former drinkers and people with alcohol use disorders were at a multi-fold risk of work disability due to mental disorders compared with light drinkers, thus it is important to support their work ability.**

Key Words: *Abstinence, alcohol consumption, alcohol use disorder, disability pension, mental disorders, work ability*

Introduction

Some studies have suggested that abstaining from alcohol increases the risk of early retirement compared with moderate drinking [1–4]. This conclusion is in accordance with the results of several studies reporting that light to moderate alcohol consumption is associated with a reduced risk of multiple cardiovascular outcomes [5].

While ethanol intake at high levels, either in acute (occasional binge drinking) or daily settings, increases the risk for myocardial infarction and stroke, epidemiological studies have consistently noted an inverse relationship between regular consumption of alcoholic beverages at light to moderate levels and cardiovascular risk [6]. However, according to the 'sick-quitter' hypothesis [7,8], cessation of alcohol use may result from previous problematic alcohol consumption that has led to health problems, and/or general poor health that is incompatible with alcohol

use [9]. The literature also lacks explanations for the possible increased risk of work absence and poor health among abstainers [3].

It is suggested that abstainers have poorer health because of the increased prevalence of common mental disorders. In a cross-sectional population based study, abstinence was related to increased odds of both case-level anxiety and depression [10]. However, in a follow-up study, abstainers were less likely to have new onset of anxiety or depression [11].

The aim of this study was to examine whether abstinence was associated with medically certified disability retirement when lifelong abstainers, current and former drinkers and those with alcohol disorders (alcohol dependence or abuse) were observed at the same time but in separate categories. We analysed the incidence of all-cause disability retirement and of disability pension granted for mental disorders among occupationally active Finns in a nationally representative sample.

Methods

Procedure and participants

The current study is based on the nationally representative Health 2000 Survey, which was conducted in Finland between August 2000 and June 2001 [12]. It was carried out in several phases and included a number of questionnaires, an extensive face-to-face home interview, laboratory and functional capacity tests, and a clinical examination. The population sample of Finnish adults aged 30 or over was formed using a two-stage cluster systematic sampling method, so that Finland was stratified into 20 strata, i.e. the 15 biggest cities and five university hospital districts. The 15 cities, and 65 of the 234 municipalities or groups of municipalities with joint primary care (within the five university hospital districts) drawn by systematic sampling, formed 80 clusters. All the participants signed their written informed consent, and the Ethical Committee for Epidemiology and Public Health of the hospital district of Helsinki and Uusimaa in Finland approved the study.

A total of 8028 people aged between 30 and 99 years were sampled from the clusters, but 51 died before the data were gathered. Of the remaining 7977, persons 6986 (88%) were interviewed and 6354 (80%) participated in a health examination [12]. Our study had 3621 participants who were 30−55 years old at the baseline and had been occupationally active during the 12 preceding months. They participated in a clinical examination, home interview and filled in self-administrated questionnaires.

Disability pensions

Data on disability pensions (and other pensions) were obtained from the national registers of the Finnish Centre for Pensions, and provided complete information on all retirement events and their main diagnoses. Disability pensions granted before 1 January 2011 were linked to the Health 2000 data by each participant's personal identification number. Employees under 63 years of age are eligible for disability pension after 1 year of continuous work disability that has been verified by a medical certificate from a physician. They are also eligible for a daily allowance from sickness insurance for 300 working days. If the disability is anticipated to continue longer than this maximum, the person must apply for either a temporary or a permanent disability pension. Medical impairment is evaluated by weighing health status against the demands of the person's job [13]. The diagnoses of chronic illnesses in the national pension register are classified according to The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) [14].

Survival data

The follow-up of each subject started from the day they first participated in the Health 2000 Survey and ended with the award of a disability pension or other pension, death or end of follow-up (31 December 2011), whichever came first. Data on deaths were retrieved from Statistics Finland.

Measurement of alcohol use

Information on alcohol consumption during the past 12 months was collected by a self-administered questionnaire. The participants were first asked whether they had ever consumed alcohol. Three alternatives were offered: (1) 'I have been sober all my life (or have tasted alcohol beverages 10 times at the most in my life)', (2) 'I have consumed alcohol beverages since __ (year) but quit __ years ago', and (3) 'I have consumed alcohol beverages since __ (year) and still do'.

Participants who claimed that they have always been sober and reported no alcohol consumption during the past week were categorized as 'lifelong abstainers'. Those who stated that they had quit drinking and reported no alcohol consumption during the past week were categorized as 'former drinkers'. Participants who had an alcohol use disorder that fulfilled the diagnostic criteria of alcohol dependence or alcohol abuse during the last 12 months were categorized into one group regardless of their level of alcohol intake. Those who currently used alcohol but

did not meet the criteria of an alcohol use disorder were classified into three groups according to the number of standard drinks per week: (1) light; 1−6 for men, 1−4 for women, (2) moderate; 7−23 for men, 5−15 for women, and (3) hazardous; ⩾ 24 for men and ⩾ 16 for women. The portion limits for hazardous alcohol drinking are based on Finnish epidemiological alcohol research [15].

Six questions were used to assess alcohol consumption [15]. The questions were: 'How often have you consumed alcohol during the past 12 months?' and 'On the days when you consumed alcohol, how much did you drink?' There were 10 response categories for the frequency question. The beverage-specific (mild beverages/wine/spirits) amounts were converted to Finnish standard drinks (a standard drink=12 g of pure alcohol). The QF (quantity–frequency method) for each of the three beverage types was calculated by multiplying the weekly quantities and weekly frequencies. These beverage-specific QFs were summed as a total QF measure. The proportion of missing data in alcohol use categories was 1.3%.

Alcohol use disorders

Alcohol use disorders were assessed (12-month prevalence) using the computerized version of the Composite International Diagnostic Interview (CIDI) [16,17]. The CIDI was carried out by healthcare workers who were trained for the interview by psychiatrists and physicians who had themselves been trained by a WHO authorized trainer. The programme uses operationalized criteria for diagnoses from the Diagnostic and Statistical Manual of Mental Disorders: DSM-IV [18] and enables the estimation of DSM-IV diagnoses for major mental disorders. Alcohol use disorders include alcohol dependence and alcohol abuse. The criteria of alcohol dependence comprise tolerance, withdrawal, continued use despite problems and impaired control. Alcohol abuse is a complementary non-dependence diagnosis, which refers to conditions of obvious adverse consequences caused by alcohol use. Altogether 90 (2.9%) participants did not take part in the CIDI interview, but most of these (87%) answered the questionnaire concerning alcohol use.

Potential confounders

Covariates were chosen on the basis of the literature on factors possibly confounding the association between alcohol use and disability retirement. Detailed information of the variables is described elsewhere [12].

Socio-demographic factors. Information on *gender, age (continuous)* and *marital status (single, cohabiting)* was collected in the home interview.

Common mental disorders. Depressive and anxiety disorders were assessed (12-month prevalence) using the computerized version of the CIDI [18,19]. The participants were identified as having a common mental disorder if they fulfilled the criteria for depressive disorders (i.e. major depressive disorder, dysthymic disorder) or anxiety disorder (i.e. panic disorder with or without agoraphobia, generalized anxiety, social phobia not otherwise specified, or agoraphobia without panic disorder).

Chronic musculoskeletal disorders. Musculoskeletal disorders (MSD) were diagnosed in the clinical examination on the basis of disease history, symptoms and clinical findings. The specific information regarding diagnostic criteria and prevalence is presented elsewhere [19].

Other chronic diseases. The participants were categorized as having a chronic disease if a physician had diagnosed one of the following: *cardiovascular, respiratory or neurological disease; diabetes; cancer; permanent injury;* or *peptic ulcer.*

Other health behaviour. Body mass index (BMI, kg/m^2) was based on measured weight and height and classified as ⩽ 29.9 (normal or overweight) and ⩾ 30.0 (obese). Current daily smoking (no/yes) was evaluated in the interview. *Leisure time physical exercise* was classified into two categories: exercising at least once a week (active)/more seldom (passive).

*Occupational factors. Occupational status (*manual, non-manual) and exposure to physical strain at work were elicited in the home interview. The number of 10 *physical workload factors* were classified into two categories: 0−3 and ⩾4.

Psychosocial strain was measured using the Job Content Questionnaire [20]. The scales of *job demands* comprised five items (Cronbach's alpha, $\alpha = 0.79$), and *job control* nine items ($\alpha = 0.84$). Participants with a high level of job demands (above the median) and a low level of job control (below the median) were assumed to have job strain. Missing values (10.3%) were substituted with the mean of each scale.

Statistical analyses

We took the sampling design into account in all statistical analyses. Post-stratification weights, which were calibrated using age, sex, living district and

Table I. Descriptive information on alcohol use categories and covariates at baseline.

	All participants (*N*)	Weighted (**%**)	Disability retirement cases	Weighted (%)
Predictor: Alcohol use				
Lifelong abstainer	247	6.7	30	7.1
Former drinker	436	11.8	58	14.4
User, alcohol portions/week				
1−6 (men), 1−4 (women) (light)	1423	38.9	130	32.7
7−23 (men), 5−15 (women) (moderate)	1071	30.0	111	28.4
≥ 24 (men), ≥ 16 (women) (hazardous)	249	7.1	25	6.5
Participants with an alcohol use disorder	195	5.5	42	10.9
All	3621	100	396	100
Covariates				
Age (range 30−55) years, mean (SD)	42.8 (7.5)		46.7 (6.4)	
Gender, men	1715	50.0	193	47.8
Marital status, single vs. married/co-habiting	832	23.0	119	30.1
Chronic musculoskeletal disorders ≥ 1	1031	28.5	193	48.7
Other chronic somatic disorders ≥1	1263	34.9	213	53.8
Mental disorders ≥1	344	9.5	78	19.7
Mental disorders; missing responses (included in analyses as a separate category)	90	2.5	10	2.5
Other health behaviour				
BMI ≥30	637	17.6	99	25.0
Daily smoking, yes vs. no	979	27.3	153	38.6
Leisure time exercise, passive vs. active	914	25.3	132	33.3
Occupational factors				
Manual vs. non-manual workers	1561	43.1	242	61.1
Job strain, yes vs. no	530	14.6	74	18.7
Number of physical workload factors ≥4	677	18.7	136	34.3

language, were applied to correct the effects of non-response. We conducted the statistical analyses using SUDAAN software (release 11), and plotted Kaplan–Meier survival curves (PROC KAPMEIER) to show the time to disability pension award for each category of the determinant variable of alcohol use. We fitted the Cox proportional hazards regression models (PROC SURVIVAL) in order to examine, by four models, the effect of demographic factors, chronic diseases and disorders, and health behaviour with occupational factors, on the relationship between alcohol use categories and subsequent granting of disability pension (1) for all causes, and (2) for mental disorders.

The assumption of proportional hazards was tested with the Kolmogorov-type supremum test, using the PHREG procedure of the SAS software package (version 9.4; SAS Institute, Inc, Cary, North Carolina). The test indicated that the proportional hazards assumption for each model was satisfied.

Results

The mean age of participants at baseline was 42.8 years (Table I); the total age range was 30–55, and 50.0% were men. During an average 10.7-year follow-up, 11.1% of the subjects were awarded a disability pension. Of all participants, 18.5% were abstainers at the baseline: 6.7% lifelong abstainers and 11.8% had quit drinking (Table I). The proportion of current light drinkers was 38.9%, of moderate drinkers 30.0% and 7.1% consumed alcohol at a hazardous level (≥ 16 portions/week for women, ≥ 24 portions/week for men), but did not have an alcohol use disorder, which was diagnosed in 5.5% of participants.

Lifelong abstainers' risk of all-cause disability retirement did not differ from that of light drinkers (Table II), which made up the reference group. The hazard ratio (HR) was 1.05 (95 % confidence interval (CI) 0.74−1.48) when age, gender and marital status were adjusted for (Model 1a). Lifelong abstainers' risk of disability pension due to mental disorders was not higher than that of light drinkers (Table III).

When only age, gender and marital status were adjusted for (Model 1a), former drinkers' HR for disability retirement was 1.52 (1.09−2.13) compared with light drinkers, but this decreased below a statistically significant level when other health behaviour and occupational factors were allowed for

Table II. Alcohol use in association with subsequent disability pension for any cause. Cox regression, hazard ratios (HR) and confidence intervals.

Adjusted for[a]	Model 1a		Model 2a		Model 3a		Model 4a	
	Age, gender and marital status		Model 1 + chronic somatic diseases and common mental disorders		Model 1 + other health behaviour and occupational factors		All aforementioned	
Reference=1								
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
All								
Lifelong abstainer	1.05	0.74, 1.48	1.13	0.80, 1.59	0.90	0.63, 1.29	1.00	0.70, 1.40
Former drinker	1.52	1.09, 2.13	1.51	1.06, 2.16	1.24	0.87, 1.75	1.30	0.90, 1.86
Light drinker	1.00		1.00		1.00		1.00	
Moderate drinker	1.16	0.90, 1.50	1.12	0.86, 1.47	1.09	0.82, 1.44	1.07	0.81, 1.43
Hazardous drinker	1.06	0.69, 1.64	0.95	0.60, 1.51	0.88	0.56, 1.39	0.85	0.52, 1.38
Participants with alcohol use disorder	2.94	2.09, 4.14	2.42	1.67, 3.49	2.45	1.73, 3.48	2.17	1.49, 3.16

[a]Adjustments in models: (1) age, gender, and marital status; (2) Model 1 + chronic somatic diseases and common mental disorders; (3) Model 1 + marital status, BMI, smoking, leisure time exercise, occupational status, job strain and number of physically loading work factors; and (4) All aforementioned.

Table III. Alcohol use in association with subsequent disability pension for mental disorders. Cox regression, hazard ratios (HR) and confidence intervals.

Adjusted for[a]		Model 1b		Model 2b		Model 3b		Model 4b	
		Age, gender and marital status		Model 1 + chronic somatic diseases and common mental disorders		Model 1 + other health behaviour and occupational factors		All aforementioned	
Reference=1	Cases								
		HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
All	108								
Lifelong abstainer	9	1.49	0.66, 3.34	1.63	0.72, 3.70	1.48	0.66, 3.33	1.66	0.72, 3.83
Former drinker	22	2.75	1.49, 5.07	2.74	1.44, 5.22	2.54	1.35, 4.79	2.67	1.39, 5.13
Light drinker	25	1.00		1.00		1.00		1.00	
Moderate drinker	23	1.27	0.71, 2.28	1.25	0.70, 2.24	1.20	0.66, 2.18	1.18	0.66, 2.13
Hazardous drinker	9	1.86	0.86, 4.04	1.62	0.73, 3.59	1.59	0.73, 3.47	1.40	0.63, 3.13
Participants with alcohol use disorder	20	6.53	3.55, 12.04	4.67	2.43, 8.98	5.63	2.98, 10.63	4.04	2.02, 8.06

[a]Adjustments in models: (1) age, gender, and marital status; (2) Model 1 + chronic somatic diseases and common mental disorders; (3) Model 1 + marital status, BMI, smoking, leisure time exercise, occupational status, job strain and number of physically loading work factors; and (4) All aforementioned.

(HR 1.24, 0.87−1.75) (Model 4a). When disability retirement, especially for mental disorders, was examined, former drinkers' HRs were high even when all covariates were allowed for (2.67, 1.39−5.13) (Table III, Model 4b).

Moderate or hazardous drinker's HRs for disability retirement, regardless of whether it was due to all causes or mental causes, did not differ from those of light drinkers. People with alcohol use disorders, i.e. alcohol dependency or abuse, were at an approximately twofold risk of all-cause disability retirement even when all covariates, including chronic somatic and common mental disorders, were adjusted for (Model 4a). In a full model, HR was 2.17 (1.49−3.16) (Model 4a) and when chronic somatic and common mental disorders were omitted (Model 3a), HR was 2.45 (1.73−3.48). When disability retirement due to mental disorders was examined, the corresponding HRs were 4.04 (2.02−8.06) and 5.63 (2.98−10.63) (Table III, Models 4b and 3b).

The Kaplan–Meier survival curves of disability pension rewards from 2000 to 2011, divided into six alcohol use categories, are plotted in Figure 1a,b. Light drinkers' risk was the lowest. The curves of lifelong abstainers and moderate or hazardous drinkers did not differ greatly from each other, but among those who had an alcohol use disorder at baseline, a particularly sharp decline was seen.
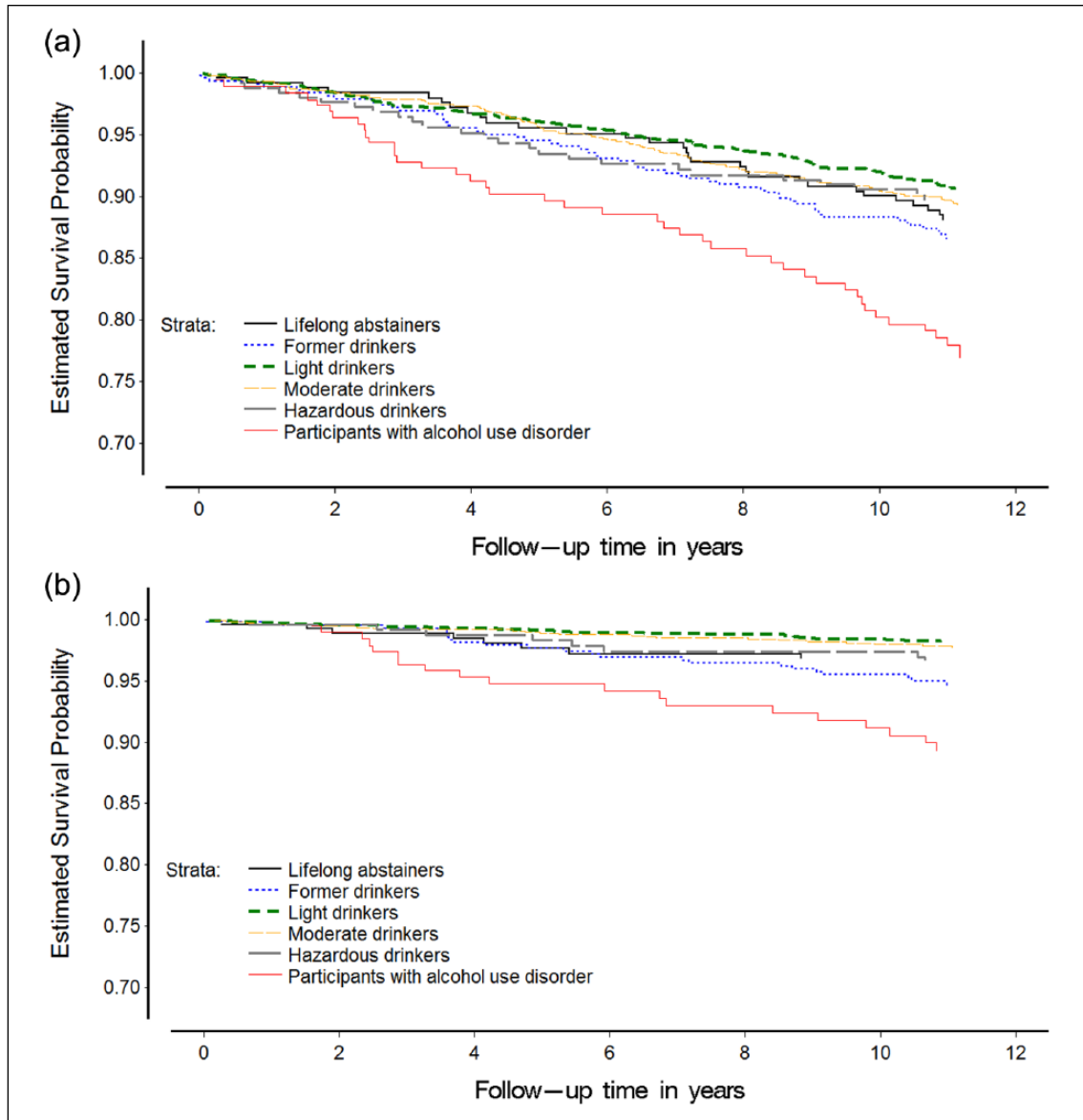
Figure 1. (a) Cumulative survival curves for incidence of all-cause disability pension due to alcohol use categories in an average 10.7-year follow-up. (b) Cumulative survival curves for incidence of mental-cause disability pension due to alcohol use categories in an average 10.7-year follow-up.

Discussion

In this national representative study, abstaining from alcohol was not associated with an increased risk of subsequent disability retirement in an average 10.7-year follow-up when lifelong abstainers, current and former drinkers and those with alcohol disorders were observed at the same time but in separate categories. Former alcohol drinking and alcohol disorders, i.e. alcohol dependence and abuse, were strongly and constantly associated with subsequent disability retirement due to mental disorders in particular.

Interpretation of results. Our results diverged partly from those of previous studies, suggesting that abstainers are

at an increased risk of disability retirement [2–4]. The reason for the different results was primarily in methodology; based on the idea of the 'sick-quitter' hypothesis, we separately analysed those who had always been abstainers and those who had quit drinking. It is suggested that former drinkers, compared with light-to-moderate drinkers, are less healthy than current drinkers [21]. It appeared that former drinkers were at an increased risk of disability retirement due to mental disorders in particular. However, in our study, no diseases at baseline but other health behaviour and occupational factors seemed to have the strongest effect on the relationship between former drinking and subsequent disability retirement. The effect among people

with an alcohol use disorder was the opposite, and diseases at baseline had the strongest impact.

A population-based follow-up study in Norway offered some support to the 'sick-quitter' hypothesis, when the authors found that the previous alcohol consumers among the abstainers were at a clearly higher risk of disability retirement than the constant abstainers [3]. A Finnish nationwide cross-sectional study also concluded that underperformance of abstainers in the labour market was almost entirely due to ex-drinkers, and abstinence as such did not decrease the probability of employment [22].

Our study is in line with previous studies that suggest that even high average alcohol consumption does not increase the risk of disability retirement, but 'problem drinking' identified by the CAGE questionnaire was a strong predictor of disability retirement for all causes [3] and for mental disorders [4]. Also in a 39-year follow-up study of conscripts [23], a hazardous drinking pattern was generally a significant marker of subsequent disability pension, even at a younger age. In addition, the increased mortality risk of people with alcohol use disorders has been reported in several previous studies [24] and it may be irrespective to current volume of consumption [25]. However, abstinence from alcohol does not seem to be a risk factor for all-cause mortality [26].

Strengths and limitations. Our study has several strengths. The sample represented the Finnish population, the participation rate was high, the alcohol information was diverse and it had few missing data. The standardized CIDI interview was used to assess alcohol use disorders and common mental disorders according to DSM-IV diagnostic criteria. As the data on disability pensions were retrieved from national pension records, they may be considered reliable. The main categories of chronic diseases were diagnosed by specially trained physicians who followed a predetermined clinical protocol. Most items in the questionnaires, interviews and in the health examination were selected on the basis of standard recommendations or nationally established practice [12].

A limitation in our study was that the determinants were measured only once and we had no information on incident disorders during the follow-up. Another weakness involves the reliability of survey data on alcohol consumption in general: it is well known that people underestimate their consumption [27], and, in addition, may increase and decrease drinking. It has been shown that abstainers [28] in particular, but also ex-drinkers [29], often forget their former drinking and that heavy drinkers are less stable in consumption than abstainers or moderate drinkers in the long run [30]. Thus it is possible that the heavy drinkers among the participants have decreased their alcohol consumption and avoided work disability. Follow-up time should perhaps be longer in order to also detect signs of decreased work ability among the heavy drinkers who do not have an alcohol use disorder.

Conclusion

Lifelong abstinence was not associated with subsequent disability retirement, but former drinkers and those with alcohol use disorders were at an increased risk of work disability, especially due to mental disorders. It is important to identify workers with alcohol use disorder and efficiently support their work ability in order to prevent early disability retirement.

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