Full length article

Cigarette smoking and alcohol use as predictors of disability retirement: A population-based cohort study

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ARTICLE INFO

ABSTRACT

Background: This study investigated how cigarette smoking and alcohol use predict disability retirement.
Methods: Data from the longitudinal nationwide Finnish Twin Cohort study were analyzed, with clustered study design applied when computing 95% confidence intervals (CI). The sample included 21,719 individuals. Smoking and alcohol use were assessed with a questionnaire in 1975. Registry data on retirement events up till end of 2004 were obtained from the Social Insurance Institution and the Finnish Centre for Pensions.
Results: Disability pension was granted to 4251 participants. Among men, adjusted for age and alcohol use, former (HR = 1.45, 95%CI 1.28, 1.65, $p < .001$) and daily smokers (HR = 1.93, 95%CI 1.71, 2.17, $p < .001$) showed elevated disability pension risk compared to never smokers. Among women, daily smokers (HR = 1.25, 95%CI 1.11, 1.40, <.001) had elevated risk. The age and smoking adjusted risk estimates for alcohol were elevated among abstainers (men HR = 1.41, 95%CI 1.21, 1.65, $p < .001$; women HR = 1.36, 95%CI 1.23, 1.52, $p < .001$) and heavy drinkers (men HR = 1.30, 95%CI 1.18, 1.43, $p < .001$; women HR = 1.34, 95%CI 1.04, 1.72, $p = .026$). Those being persistent smokers and binge drinkers had over three-fold disability risk compared to those who were binge drinkers but had only a few smoking years (men: HR = 3.32, 95%CI 2.43, 4.54, $p < .001$; women: HR = 4.05, 95%CI 2.05, 8.00, $p < .001$). Among men and women who were not binge drinkers, longer smoking duration was needed for elevated disability risk.
Conclusions: Both smoking and excess alcohol use significantly predict disability retirement. In order to extend working careers, more attention should be paid to health behaviors, in addition to working conditions.

1. Introduction

Tobacco use and excess alcohol consumption are both risk factors for several chronic diseases. Tobacco use is a leading preventable risk factor for premature mortality (World Health Organization (WHO), 2009a,b), accounting for 18% of deaths in high-income countries (WHO, 2009a,b), and being second only to high blood pressure globally (9% vs. 13% of deaths, respectively). Smoking raises the risk of chronic diseases such as heart disease, diabetes and cancers (WHO, 2009a,b). Compared to never smokers,

smokers have a 25-fold risk of death due to Chronic Obstructive Pulmonary Disease (COPD), a 2.5-fold risk due to ischemic heart disease, and a 2.8-fold risk due to stroke (Thun et al., 2013). Globally, tobacco is responsible for 59 million Disability Adjusted Life Years (DALYs), which compares to alcohol at 58 million DALYs. These substances are clearly major contributors to the global burden of disease (Ezzati et al., 2002). In fact, the most recent report of the World Health Organization (WHO, 2009a) states that excess alcohol consumption is among the three leading burden of disease risks globally, as measured in DALYs.

Disability retirement is a category of pension given to people who are permanently or temporarily unable to work due to disability. This premature withdrawal from active working life has a large impact not only in terms of public health, but also health economics. For example, in 2008 the total expenditure for disability

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pensions in the EU/Finland was about 2400 million Euros. Various mental and behavioral disorders were the main diagnoses responsible for disability retirement, but diseases of the circulatory system, musculoskeletal system and connective tissue were also relatively common (The Social Insurance Institution of Finland, 2010). Smoking and excess alcohol consumption are risk factors for many of those conditions (Ezzati et al., 2002).

In Finland, the number of disability pensions related to excess alcohol use shows a rising trend over recent years. However, only a few published studies have indicated that smoking is related to increased risk of disability retirement (Husemoen et al., 2004; Claessen et al., 2010; Koskenvuo et al., 2011). Additionally, a Swedish twin study found that persistent tobacco use predicted disability retirement due to musculoskeletal disorders, although that association did not remain after controlling for familial confounding (Ropponen et al., 2011). Familial confounding was addressed by within family analyses, comparing the risk of disability in the twin who smokes with the twin brother or twin sister who did not. Such within-family analyses control for shared family influences (Kujala et al., 2002) and can provide additional evidence for or against the causal nature of the association. However, similar association found in a Finnish twin sample remained after controlling for familial confounding (Ropponen et al., 2013). Concerning associations between alcohol use and disability retirement, adverse drinking habits have been reported as risk factor for early retirement due to poor mental health in a Finnish sample (Salonsalmi et al., 2012). In a Swedish sample risky drinking patterns during adolescence have been shown to increase risk for future disability retirement (Sidorchuk et al., 2012). Although it is well known that tobacco and alcohol use often cluster among the same persons (Williams and Ziedonis, 2004), and that both smoking and frequent alcohol use are risk factors for work disability, it is still unclear to what extent they have independent roles in the process. Interactive effects of tobacco and alcohol use on disability retirement have been studied earlier among Swedish twins (Ropponen and Svedberg, 2014), but to our best knowledge, not among Finnish population.

The aim of this study was to investigate how cigarette smoking and alcohol use predict disability retirement, using nationwide Finnish Twin Cohort data from 1975 combined with registry data on all retirement events up till 2004. A further aim was to examine the effect of combined alcohol and tobacco use in relation to disability pension. Within-pair analyses were conducted to further understand the nature of the association between exposure and later risk of disability pension.

2. Methods

2.1. Subjects

The Finnish Twin Cohort was formed in 1974 to examine determinants of chronic diseases and health behaviors. This population-based cohort was compiled from the Central Population Registry by identifying as twin candidates sets of persons of the same sex, born on the same day in the same local municipality, and with the same surname at birth. The cohort included all same-sex twin pairs born before 1958 with both members alive in 1967 (Kaprio and Koskenvuo, 2002). The project was approved by the Ethics Committee of the University of Helsinki.

The first questionnaire survey was conducted in 1975 when the twins were 17–65 years old, and follow-up has continued since then. The initial overall response rate was 89%. Information on mortality and migration has been updated regularly from the Central Population Register. The initial sample included 23,993 individual twins, but after excluding individuals who retired before 1975 and those with missing values in any study variable, the study sample comprised 21,719 twin individuals.

2.2. Predictors

For the present study, all data on predictor variables were based on the 1975 self-reported survey data collected using postal questionnaires.

2.2.1. Cigarette smoking. We used smoking status in 1975 as the main variable, including four categories as follows: never smokers, former smokers, current occasional smokers, and current regular/daily smokers. The questions asked were: "Have you ever smoked more than 5–10 packs of cigarettes (100 cigarettes) in your lifetime?" Those responding positively were asked, "Do you smoke or have you smoked cigarettes regularly, say daily, or almost daily during your lifetime?" Positive responders were further asked if they still smoked regularly. If so, they were classified as current daily smokers. Persons who had smoked more than 100 cigarettes but were not regular smokers were considered as occasional smokers. Former smokers were regular smokers who reported no longer smoking at the time of the survey (Kaprio and Koskenvuo, 1988; Korhonen et al., 2009). Among current regular/daily smokers the average daily cigarette consumption was then defined. The response categories to the question "How many cigarettes do you smoke daily on average?" were as follows: < 5, 5–9, 10–14, 15–19, 20–24, 25–39, and >40. Among ever smokers (including current regular/daily and former smokers), duration of smoking in years was categorized into four groups as follows: (1) >0 but ≤5 (reference category); (2) >5 but ≤10; (3) >10 but ≤20; (4) >20 years. In addition, a cumulative exposure measure, 'pack years' (number of cigarettes smoked per day × number of years smoked/20), was calculated, describing both amount and duration of smoking; e.g. both a person who smokes one pack a day during one year and a person who smokes two packs a day during six months have one pack year. This variable was categorized into four groups as follows: (1) >0 but ≤5 (reference category); (2) >5 but ≤10; (3) >10 but ≤20; (4) >20 years.

2.2.2. Alcohol consumption. We used two variables measuring alcohol use. First, daily alcohol consumption (grams/day) was categorized as follows: (1) Abstinence (0 g); (2) Moderate alcohol use (>0 g but ≤20 g); (3) Heavy alcohol use (>20 g). Twenty grams/day was used as the cut-off because this was the limit for the highest consumption decile. In the analyses moderate alcohol use was used as a reference category. Additionally, binge drinking, defined as drinking to intoxication at least once per month with more than five drinks per occasion (Kaprio et al., 1987), was used in the analysis as a dichotomy (no/yes).

2.2.3. Educational level. We also adjusted the associations between smoking and alcohol use with the outcome for educational level of the respondents. Education was self-reported variable assessed in 1975 with eight categories ranging from the lowest (less than basic school) up to highest (academic degree or higher) category. This variable was used as a continuous one (equivalent to years of schooling) in the survival analysis, but as a categorical one in the descriptive analysis.

2.3. Outcome measures

Registry data on all retirement events during the follow-up until the end of 2004 were obtained from the Social Insurance Institution and the Finnish Centre for Pensions. Disability retirement is a form of pension given to people who are permanently or temporarily unable to work due to a disability. In Finland, if someone