



# Devil in disguise: Does drinking lead to a disability pension?



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## ABSTRACT

**Objectives.** To examine whether alcohol consumption in adulthood is related to the incidence of receiving a disability pension later in life.

**Methods.** Twin data for Finnish men and women born before 1958 were matched to register-based individual information on disability pensions. Twin differences were used to eliminate both shared environmental and genetic factors. The quantity of alcohol consumption was measured as the weekly average consumption using self-reported data from three surveys (1975, 1981 and 1990). The disability pension data were evaluated from 1990–2004.

**Results.** The models that account for shared environmental and genetic factors reveal that heavy drinkers are significantly more likely to receive a disability pension than moderate drinkers or constant abstainers. Heavy drinking that leads to passing out is also positively related to receiving a disability pension. The results were robust to the use of potential confounders that twins do not share, such as education years, the number of chronic diseases, physical activity at work and leisure, and stressful life events.

**Conclusion.** Drinking profiles in early adulthood are an important predictor of receiving a disability pension later in life.

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## 1. Introduction

Does heavy drinking in early adulthood predict the incidence of receiving a disability pension? There are two policy motivations to examine this question. First, heavy drinking is a potentially important determinant of health and labor market transitions. Second, understanding the link between alcohol consumption and receiving a disability pension is a policy-relevant issue because the labor force of industrialized countries is aging rapidly (OECD, 2006). Keeping public expenditures in control and maintaining the labor supply at a sufficient level calls for longer working careers. Alcohol consumption is a modifiable risk factor that can be affected by regulating the price and the availability of alcohol. For this reason, it is a potential policy instrument that can have an impact on labor market attachment and the length of working careers.

The literature has linked drinking profiles to the incidence of receiving a disability pension. Swedish research suggests that alcohol use is positively associated with receiving a disability pension (Ropponen et al., 2011; Sidorchuk et al., 2012; Upmark et al., 1997), whereas a

Finnish study did not find such an association (Krause et al., 1997). There is also evidence of a U-shaped relationship between alcohol consumption and disability retirement. Thus, alcohol misuse, as well as tee-totalism, are both positively related to receiving a disability pension (Månssaaon et al., 1999; Skogen et al., 2011; Salonsalmi et al., 2012; Upmark et al., 1999). Among abstainers, former drinkers are more likely to receive disability pensions than constant abstainers (Skogen et al., 2011).

We contribute to the literature by using a large and representative dataset on twins. Having within twin-pair variation is useful if there are unobservable factors that are correlated with both alcohol consumption and disability, leading to a (spurious) correlation between the outcome and the predictor of interest. First, using data on non-identical (dizygotic, DZ) twins allows us to account for shared family and neighborhood factors as well as for other sibling effects, such as similar friends and social network. Family members and various peer groups, such as close friends and roommates, are a significant determinant of alcohol consumption (e.g., Brooks-Russell et al., 2014; Guo et al., 2015; Poelen et al., 2007). Second, using data on identical (monozygotic, MZ) twins allows us to also account for inherited traits and preferences that may affect risk-taking behaviors (van Dongen et al., 2012). Because genetic endowment is a contributor to many chronic diseases and thus disability and because alcohol consumption has a significant heritable component (Van Eerdewegh et al., 1998), it is important to account

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for its effect on the incidence of receiving a disability pension. Furthermore, there is evidence that exposure to peers who use alcohol is influenced by genetic factors (e.g., Fowler et al., 2007; Guo et al., 2015). With the use of MZ twins we are thus able to account for individual differences in vulnerability to peer effects.

Only three empirical studies have used twin data to estimate how alcohol consumption is related to the incidence of receiving a disability pension (Korhonen et al., 2015; Ropponen et al., 2011; Samuelsson et al., 2013). Using Swedish twin survey data, Ropponen et al. (2011) examine the effect of drinking on the incidence of receiving a disability pension for DZ pairs. This analysis does not allow for confounding caused by genetic factors. A significant positive relationship between drinking and receiving a disability pension was found in some specifications. In another analysis that uses the same Swedish twin data, both teetotalism and alcohol misuse elevate the risk of receiving a disability pension when shared family and neighborhood factors are accounted for (Samuelsson et al., 2013). However, these patterns become statistically insignificant when genetic factors are also controlled for by using within MZ-pair variation. Korhonen et al. (2015) used the Finnish twin and register data (like we do) to study the incidence of receiving a disability pension and its relation to past drinking and smoking. The authors find that the two are independent predictors of disability retirement and, in particular, that both teetotalism and excess alcohol use predict disability retirement. However, the reported estimations that include the alcohol use categories account neither for the effects of a shared family environment nor for genetics.

Our study extends the literature in three important policy-relevant ways. First, we base our estimates on conditional (fixed-effects) logistic regression that allows us to account for the factors that two twins share. Thus, our preferred results are estimated for a sample of MZs. Accounting for both family environment and genetics brings us closer to establishing an unconfounded (causal) effect because many potential confounders such as risk-taking behaviors are related to genetics. This is an important extension, because evidence-based public health policy should be guided by causal reasoning and because only one prior study has utilized within-twin dimension (Samuelsson et al., 2013). Second, in contrast to the earlier studies based on twins our analysis uses a longitudinal research design to distinguish former drinkers from constant abstainers. We accomplish this by using detailed information on alcohol consumption that the three twin surveys provide us with. Therefore, our study is the first to address the open question of whether the incidence of receiving a disability pension among abstainers is heterogeneous in terms of their drinking history even after accounting for both shared family and genetic factors. This extension is important, because the potential heterogeneity matters for individuals' choices and policy. Third, we assess whether the relationship is robust after accounting for a very rich set of confounders that twins do not share such as the number of chronic diseases, physical activity at work and leisure, and stressful life events.

### 1.1. Institutional setting

Disability pensions can be granted to 16–64-year-old individuals who have become permanently incapable of working in Finland. If the disability has lasted continuously for at least one year, the individual is entitled to apply for a disability pension, either in the form of a rehabilitation subsidy or a (permanent) disability pension. Individuals who are temporarily incapable of working and whose handicaps or illnesses are expected to improve through rehabilitation are normally granted the rehabilitation subsidy. According to the statistics compiled by the Finnish Centre of Pensions, over 50% of applicants are granted the permanent disability pension, and the rest are granted the rehabilitation subsidy. Approximately 80% of the rehabilitation benefits are eventually converted into disability pensions.

## 2. Methods

### 2.1. Data sources and the sample

Our twin data source is the Older Finnish Twin Cohort Study (of the Department of Public Health in the University of Helsinki); see Kaprio et al. (1979). The data were originally compiled from the Central Population Registry of Finland, for which the initial twin candidates were persons with the same birth date, commune of birth, sex, surname at birth and were born before 1958. Three surveys were conducted in 1975, 1981 and 1990. The response rate for the latest survey was 77%, totaling 12,502 twin pairs. The attrition and representativeness of the twin sample have been documented previously (e.g., Hyytinen et al., 2013; Kaprio et al., 1979; Maczulskij, 2013).

Following Hyytinen et al. (2013), we linked the twin data to the Finnish Longitudinal Employer-Employee Data (FLEED) using personal identifiers. FLEED is an annual panel and is based on administrative registers that are collected by Statistics Finland. In the data, 16% of individuals were granted a disability pension at some point in the observation window from 1990–2004.

Our analysis focuses on twin pairs for whom we have data on alcohol consumption, other covariates and disability pension. We restrict all analyses to the cohort of twins who are less than 65 years old in 2004. After further excluding observations with missing data for the other sibling, the number of twin pairs decreased to 5903 (i.e., 11,806 individuals). The total number of person-year observations in the data is 151,100.

Our dependent variable takes the value of one for those person-year observations when a person receives a disability pension (or has the status of individual early retirement) and is zero otherwise. Some of the individuals who initially obtain a rehabilitation benefit may return to work. Once an individual with a disability pension begins to obtain either an old-age or unemployment pension, his/her subsequent person-year observations are not included in the sample.

### 2.2. Drinking profiles

The quantity of alcohol consumed is measured as the daily average consumption as documented by Kaprio et al. (1987) (see also Böckerman et al., 2015a). The initial measure is the self-reported amount of alcohol consumed in 1975, 1981 and 1990. The twin survey gathered information on the frequency of alcohol consumption, measured by daily consumption per month, using a five-point scale (1 = 'never', 5 = 'over 16 days a month') and separately for different types of alcohol: beer, wine and spirits. The quantities were measured on a seven-point scale for each alcohol type, with the upper limits for consumption of more than 48 bottles of beer (10 bottles of wine) per week or more than 20 bottles of spirits per month. A unit of alcohol is defined as 12 g of pure alcohol. Using this information, alcohol consumption was initially converted into grams of pure alcohol consumed daily in each twin survey. We have further converted alcohol use in grams to average weekly consumption.

In Finland, 280 g of pure alcohol per week (i.e.,  $\approx 24$  units of alcohol) is commonly used as the limit for heavy drinking for men, and 190 g per week (i.e.,  $\approx 16$  units of alcohol) is the limit for heavy drinking for women (Aalto, 2001). Using these thresholds, we assign the individuals into four mutually exclusively categories (see also Table 1): Former drinkers (those who were classified as abstainers in 1990, but did consume alcohol in 1975 or/and 1981); Constant abstainers (those who were classified as abstainers in 1975, 1981 and 1990); Moderate drinkers (those who consumed alcohol in 1990 but less than 280 (190) grams per week); and Heavy drinkers (those who consumed alcohol in 1990 at a rate of more than 280 (190) grams per week).

The twin data also contain a self-reported measure for pass out frequency (i.e., losing consciousness due to intoxication caused by alcohol drinking). It is based on the question about the pass out frequency

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