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If you drink, don't smoke: Joint associations between risky health behaviors and labor market outcomes

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ABSTRACT

This paper examines the links between risky health behaviors and labor market success. We provide new evidence on the joint relationships between the most prominent forms of risky health behavior – alcohol consumption, smoking and physical inactivity – and long-term labor market outcomes. We use twin data for Finnish men and women linked to register-based individual information on earnings and labor market attachment. The twin data allow us to account for shared family and environmental factors and to measure risky health behaviors in 1975 and 1981. The long-term labor market outcomes were measured in adulthood as an average over the period 1990–2009. The sample sizes are 2156 and 2498 twins, for men and women, respectively. We find that being both a smoker and a heavy drinker in early adulthood is negatively related to long-term earnings and employment later in life, especially for men. We conclude that how and why risky health behaviors cluster and how that affects individual level outcomes call for more attention.

1. Introduction

Health behavior consists of a bundle of choices, such as whether to consume alcohol, whether to smoke and whether to be physically active or not. People do not make decisions on health behaviors independently of each other (e.g., Van Ours, 2004). However, it is not well understood how health behaviors interact and whether and how they are jointly linked to long-term labor market outcomes.

The use of addictive substances is distinct from normal consumer choices. Smoking and, less so, alcohol use are addictive behaviors, and quitting either one – especially smoking – is difficult (National Cancer Institute, 2009). The initiation of smoking and alcohol use usually occurs in adolescence (Taioli and Wynder, 1991; Sartor et al., 2007), when the person is not mature enough to take long-term effects into account in decisions. Physical inactivity tracks moderately from adolescence onwards (Waller et al., 2017). There are motivational factors and societal barriers to maintaining an adequate level of physical activity (Aaltonen et al., 2014).

There is an extensive body of literature on the relationships between *specific* risky and protective health behaviors and labor market outcomes (Cawley and Ruhm, 2012). Smoking and heavy alcohol consumption are associated with weaker labor market attachment and lower earnings (French and Zarkin, 1995; MacDonald and Shields, 2001; Van Ours, 2004; Böckerman et al., 2015, 2017; Korhonen et al., 2015). Furthermore, there is a negative relationship between physical inactivity and subsequent labor market outcomes (Lechner, 2009; Hyytinen and Lahtonen, 2013). These negative correlations are consistent with risky health behavior and weak health eroding the capacity (e.g., owing to increased absence from work) and opportunities (e.g., due to discrimination by employers, co-workers or consumers) to earn market income.

A crucial limitation of the empirical literature is that the effect of a specific health behavior has been analyzed in isolation, without considering the potential joint associations of health behaviors with labor market outcomes. An exception to this is Van Ours (2004), who examined the wage effects of alcohol use and smoking using survey data from the Netherlands. For men, Van Ours (2004) found that the association of wage with alcohol use was, a bit surprisingly, positive. The wage effect of smoking was opposite and of approximately equal (absolute) size as that of alcohol use. While insightful, Van Ours (2004) did not consider the (potential) *joint* relationships between alcohol use and smoking. Heavy alcohol consumption may reinforce the negative association of smoking with labor market outcomes.

This paper contributes to the literature by developing an empirical

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framework that treats risky health behaviors as a bundle and allows for a systematic examination of the joint associations (i.e., interactions) of health behaviors. We adopt the econometric approach of Carree et al. (2011), which was originally introduced to examine the joint effects (i.e., complementarities) between different production inputs. We modify their approach so that it allows a direct examination of whether, e.g., heavy alcohol consumption and smoking reinforce each other's links to labor market outcomes. In so doing, we address the recent call of Cawley (2015), who stressed the need to understand the interconnections among health behaviors.

We examine the potential joint associations of health behaviors with *long-term* labor market outcomes. We use nationally representative twin data that are linked to register-based information on long-term labor market outcomes. The linked data have four major strengths. First, the data allow us to construct measures for risky health behaviors (smoking, alcohol use, physical inactivity) that refer to the same points in time in the twins' early adulthood and that are predetermined relative to the outcome variables, measured later in life. Second, we measure individuals' smoking, alcohol use and physical inactivity over an extended period using two surveys, one conducted in 1975 and the other in 1981. Therefore, we are not forced to rely on cross-sectional measures of risky health behaviors, which may provide incomplete or noisy descriptions of what unhealthy lifestyle choices imply in the long term. Third, the register-based administrative data allow us to measure the average of an individual's annual earnings and employment over an extended 20-year period. Cross-sectional measures are poor proxies for individuals' lifetime labor market outcomes (Böhlmark and Lindquist, 2006). The use of register-based data also minimizes non-response and reporting biases that are typical in survey data. Fourth, the twin data allow distinguishing between monozygotic (MZ, genetically identical) and dizygotic (DZ, genetically full siblings) twins. We can therefore to account for both shared environmental factors, such as family background, neighborhood and shared peer effects, as well as for genetic factors, which are potential confounders. The data also allow us to control for a number of (predetermined) differences between the co-twins of twin pairs.

The prior medical and epidemiological literature suggests a number of reasons for why unhealthy behavioral patterns may cluster (i.e., why certain health behaviors are related to other health behaviors; see, e.g., Hale and Viner, 2016). For example, Rensburg et al. (2009) argue that exercising affects implicit motivational processes and promotes smoking cessation. Papathanasiou et al. (2012) note that the direction of causality may run from smoking to physical inactivity through reduced cardio-respiratory fitness. Using a twin design, Kujala et al. (2007) examine adolescent physical activity and later smoking behavior. Smoking later in life is more prevalent among those who were initially persistently inactive. Evidence on whether exercise supports smoking cessation is inconclusive (Ussher et al., 2014). Using an experimental design, Savette et al. (2005) showed that alcohol use increased both the magnitude and emotional valence of cigarette cravings. Smoking may also enhance pleasure and reward from alcohol consumption (Lipperman-Kreda and Lee, 2011). Additionally, nicotine can promote the consumption of alcohol, for example, through different neurotransmitter expressions (Lajitha and Sershen, 2010). Finally, research based on twin data suggest that multiple risky health behaviors are correlated (see, e.g., Sudharsanan et al., 2016, and the references therein). For example, True et al. (1999) and Han et al. (1999) found that genetic factors contribute to the risk for dual dependence of both alcohol use and smoking (see also Madden and Heath, 2002). Further support for shared genetic liability comes from molecular genetic analyses of measured genetic variants across the genome; genetic correlations between smoking and alcohol use and abuse are high (Clarke et al., 2017). Lia et al. (2016) showed that smoking is negatively associated, and former drinking positively associated with BMI even when shared genetic and environmental factors were accounted for.

The clustering of smoking, heavy alcohol consumption and physical inactivity at the individual level may lead to weaker labor market attachment (e.g., increased absence from work) and to limited job market opportunities through numerous channels. While we cannot empirically pin down the exact mechanisms at work, there are two primary reasons why the clustering of adverse health behaviors can be expected to predict poor labor market outcomes. First, the clustering of addictive and irresponsible health behaviors may be related to a latent factor mirroring myopic time preferences or delayed discounting (impatience) of individuals. Such preferences reduce a person's initial investments in human, social and health capital, making him/her less productive in the labor market. Second, the clustering of risky health behaviors may erode an individual's existing stocks of human, social and health capital. For example, the smoking-drinking interaction erodes employability and productivity at work: Heavy alcohol use leads to work absence (Norström, 2006) and can alone be a cause of severe adverse health conditions (e.g. due to accidents while drunk). When combined with smoking, alcohol use has a particularly negative effect on specific health measures (Antunes et al., 2013). For example, joint consumption of alcohol and cigarettes increases the risk of cancer and cardiovascular diseases and eventually mortality (e.g., Wang-Hong et al., 2007). Similarly, being a smoker who is physically inactive or being a heavy drinker who is physically inactive may, in the long-term, lead to reduced physical capacity and erode cognitive and non-cognitive skills, which are the fundamental determinants of earnings and employment capacity (Heckman et al., 2006).

2. Methods

2.1. Data sources and the sample

We use the Older Finnish Twin Cohort Study of the Department of Public Health at the University of Helsinki. As in prior work (Hyytinen and Lahtonen, 2013; Böckerman et al., 2015, 2017), the twin data have been linked to the Finnish Longitudinal Employer-Employee Data (FLEED) of Statistics Finland (SF) using personal identifiers. The record linkages of linked data comply the Data Protection Act and have been approved by the ethical committee of the Department of Public Health, University of Helsinki and SF.

The Finnish Cohort Study was originally compiled from the Central Population Registry of Finland (Kaprio et al., 1979; Kaprio and Koskenvuo, 2002). Initial twin candidates were persons born before 1958 with the same birth date, commune of birth, sex, and surname at birth. A questionnaire was mailed to the candidates in 1975 to gather baseline data and to determine their zygosity. Two follow-up surveys were conducted in 1981 and 1990. The 1990 survey was sent only to those twins who were born after 1930. These twins were at least 33 years old in 1990. Therefore, we focus on the working-age population.

FLEED is an annual panel over the years 1990–2009 that covers the working-age population of Finland (see, e.g., Hyytinen and Lahtonen, 2013; Böckerman et al., 2015, 2017). FLEED contains information, obtained from tax and other administrative registers, on individuals' labor market status, and salaries and other relevant sources of income.

The analysis focuses on twin pairs for whom we observe information on health behaviors in 1975 and 1981 and earnings and employment status from 1990 to 2009. Excluding those men and women who retired before 2009, the estimation sample includes 4654 twin pairs, i.e., 9308 individuals. The individuals were, on average 27, years old in 1975, 33 years old in 1981 and 42 years old at the time we start measuring their labor market outcomes in 1990.

2.2. Measures

We use two outcome variables that capture poor labor market outcomes in the long run. The first outcome variable measures an individual's lifetime earnings (= wage + salary earnings + self-employment income). It is calculated as the gender-specific reverse rank