

ADOLESCENT ALCOHOL CONSUMPTION AND LABOR MARKET OUTCOMES

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ABSTRACT

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<p>Abstract</p> <p>Misuse of alcohol at young age has been linked to several problems in adulthood. In this study, it is examined if alcohol consumption has a negative effect on the earnings and employment of adolescence. Earlier literature shows that risky and heavy alcohol consumption tends to result both in poor labor market outcomes and reduced health. However, the results also indicate that moderate alcohol consumption is often associated with the most favorable labor market outcomes, such as the highest earnings.</p> <p>In this study, data are drawn from the Health 2000 -study conducted by the National Institute for Health and Welfare. The final estimation sample consists of 1171 individuals aged 18-29. These individuals are divided into four categories based on their drinking habits; heavy drinkers, moderate drinkers, former drinkers and constant abstainers. The differences between the categories are compared using OLS-regression method. The results indicate that moderate drinkers seem to higher earnings than constant abstainers. Furthermore, both constant abstainers and former drinkers are less likely to be employed than moderate drinkers. Since the data set covers a period of only one year, the results can only be used for short-run estimations. The participants of the study were also relatively young which makes it difficult to estimate the true impact of alcohol consumption on their earnings and employment later in life. Therefore, the conclusion of the study is that further research on long-term labor market outcomes is needed.</p>	
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<p>Tämä tutkimus käsittelee suomalaisten nuorten aikuisten alkoholin kulutuksen vaikutuksia heidän työmarkkinatulemiinsa. Tarkoituksena on selvittää, onko kulutuksella negatiivisia vaikutuksia nuorten aikuisten tuloihin ja työllisyyteen. Aiemmistä tutkimuksista on ilmennyt, että alkoholin riskikäyttö on yhteydessä sekä negatiivisiin työmarkkinatulemiin että heikentyneeseen terveydentilaan. Toisaalta alkoholin maltillisella käytöllä on kuitenkin havaittu olevan myös positiivisia vaikutuksia, sillä esimerkiksi maltillisten käyttäjien tulojen on todettu useassa tutkimuksessa olevan vertailuryhmiä korkeammat.</p> <p>Tutkimuksen aineistona käytetään Terveyden ja hyvinvoinnin laitoksen koostamaa Terveys 2000 -tutkimusta, josta tähän tutkimukseen valittiin 18-29-vuotiaat henkilöt. Lopullinen otos koostuu 1171 henkilöstä, jotka jaettiin neljään kategoriaan alkoholin kulutuksen mukaan; runsaisiin käyttäjiin, maltillisiin käyttäjiin, entisiin käyttäjiin sekä absolutisteihin. Muodostettujen kategorioiden välisiä eroja vertailtiin pienimmän neliösumman menetelmällä (PNS). Tulosten mukaan absolutistit saavat vähemmän tuloja kuin maltilliset alkoholin käyttäjät. Absolutisteilla ja alkoholin entisillä käyttäjillä on myös selkeästi heikompi todennäköisyys olla töissä kuin maltillisilla käyttäjillä. Koska aineisto kuitenkin kattaa vain yhden vuoden havainnot, tuloksia ei voida soveltaa pitkän aikavälin tarkasteluun. Lisäksi, kohderyhmän henkilöiden nuoren iän vuoksi on myös vaikeaa ennustaa alkoholin todellisia vaikutuksia heidän tuloihinsa ja työllisyyteensä myöhemmin elämässä. Tämän vuoksi pitkän aikavälin aineistolla saatuja tuloksia voitaisiin rikastaa.</p>	
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1 INTRODUCTION

It is common, that the initiation of substance abuse usually occurs in adolescence and quitting the risky habit may be difficult (Sartor et al. 2007). Young adults are in the phase of entering the labor market and consumption of alcohol may affect the process negatively. Misuse of alcohol in adolescence has been related to several problems, such as continuousness of problem drinking into adulthood, increased risk of adult alcohol dependency, truncated education, unemployment, and downward social mobility (Rose et al. 2015). In addition, substantial amount of earlier empirical literature suggest that heavy drinking is related to lower earnings (e.g. Hamilton & Hamilton 1997). This thesis examines the association of drinking during early adulthood and the labor market outcomes.

There are a few prime mechanisms how alcohol may affect one's earnings and the ability to participate in the labor market (Jones et al. 1995). In the short-run, drinking may lead to absenteeism from work, which decreases one's productivity. Furthermore, decreased productivity leads to a lower wage, possibly reducing labor market attachment. In the long-run, severe consumption of alcohol leads to health problems, which reduces productivity even more and therefore may lead to even poorer labor market outcomes. Alcohol may also have negative effects on one's labor market outcomes through discrimination at workplace due to heavy consumption of alcohol (Böckerman et al. 2017).

Since young adults have not been able to consume alcohol for a very long period, it is likely that the labor market effects are not as profound for them as for older individuals. However, if young people continue to misuse alcohol in an intense pace, they may experience grim effects in the future. Actually, as alcohol carries unbeneficial outcomes on health, it affects human capital as well. According to Becker (1975), human capital can be described as a set of characteristics that increases individual's productivity. These characteristics include for example the stock of knowledge, habits, ability, social and personality attributes. Poor health reduces one's ability to perform work tasks, which also reduces the human capital. As a result, productivity declines.

1.1 Research motivation

It is important to study the consequences of health behavior for several reasons. Following a healthy lifestyle and avoiding risky habits results in higher work productivity. This increases the productivity of the labor force and eventually higher productivity increases economic welfare and competitiveness (Grossman 1972). Therefore, in order to support economic welfare, it is especially useful to understand the harmful effects of alcohol consumption at younger age. Firstly, evidence from Finland suggests that adolescent drinking is associated with lower income in adult-life (Sloan & Grossman 2012; Rose et al. 2014). Second, understanding whether and how economic resources are related to individuals'

alcohol consumption might possibly improve health and wellbeing of the whole population.

Additionally, alcohol consumption produces significant costs to the society, both directly and indirectly. For instance, if the economic cost of drinking and its consequences could be better traced and calculated, policy makers would have important tools for setting alcohol taxes and restrictions on correct levels. Costs could also be reduced by preventing problems with alcohol already from a young age. For example, there is a high risk of receiving a disability pension if an individual begins to consume alcohol already in adolescence (Böckerman et al. 2015). Correct taxation of alcohol could also prevent individuals from receiving a disability pension in the future.

There is controversy whether alcohol consumption is solely harmful, since several studies suggest that moderate consumption may actually lead to positive labor market outcomes. Indeed, according to evidence from the studies conducted with US and Australian data, moderate drinkers earn more than former abusers (Lee 2003; Zarkin et al. 1998) or constant abstainers (Barrett 2002; French & Zarkin 1995; Hamilton & Hamilton 1997; Heien 1996). Furthermore, some studies have discovered evidence of an inverted U-shaped curve relationship between drinking and earnings. The results indicate that those US employees who consume approximately 2–3 drinks per day appear to earn the most (French & Zarkin 1995; Heien 1996). Consumption of alcohol has also been connected with positive effects on health, for example reducing the risk of catching another illnesses. Alcohol consumption may also lower the risk of heart conditions (Heien 1996). It has been noticed in earlier research, that improved health is connected with higher productivity and less absences from the workplace. This may lead to better promotional opportunities and higher wages (MacDonald & Shields 2000).

1.2 Research objectives

In this study, it is examined if the consumption of alcohol affects the labor market outcomes of adolescents. More specifically, the study aims to answer if alcohol consumption has a negative effect on the earnings and employment of young Finnish adults. It is also studied if overall experienced health has an effect on earnings and employment, since alcohol consumption and health might be correlated. For the time being, the matter concerning young adults in Finland has not been widely studied. The subject requires more research, since reducing alcohol-related problems and preventing them in earliest state possible might reduce costs for the entire society. However, it requires to be stated that moderate alcohol consumption habits may in fact be beneficial for both individuals and, through improved productivity, the economic welfare and competitiveness. The study is conducted using cross-sectional data from a "Health 2000"-survey conducted by the National Institute of Health. In the study, individuals are divided into different categories based on their drinking habits. The group differences in earnings and employment are compared using Ordinary Least

Squares (OLS) regression. The consequences of alcohol consumption are examined in the short run and the results are reflected with the results of earlier literature. The research aims to answer the question if alcohol consumption during adolescence has a negative effect on the individuals' earnings and employment.

1.3 Source of the data

The data are drawn from a "Health 2000-2011" -study conducted by the National Institute for Health and Welfare. The purpose of the study was to gather information on the health and wellbeing of Finnish people. Information was collected on the determiners of health, the need and current use of health services and the differences in health and wellbeing among the population. The study also collected information on the possible causes behind the differences in health and wellbeing. 10 000 Finnish people were randomly selected from the population registry to take part in the study. Data was gathered through interviews, medical examinations and questionnaires. (National Institute of Health and Welfare 2018.)

The Health 2000 study was performed in 2000-2001 and 8028 adults aged 30 years or older were examined through an interview, a comprehensive health check and several questionnaires. Also, 1894 young adults aged 18-29 took part in a thorough health interview and filled in a questionnaire. The Health 2000 study was followed by Health 2011 study in 2011-2012. Same respondents took part in the study in both 2000 and 2011. This creates a unique individual-level panel data, which allows examining the predictive factors of changes in health and wellbeing. However, since there were several values on earnings missing from the Health 2011 -study, only data from the Health 2000 -study is used. (National Institute of Health and Welfare 2018.)

1.4 Structure of work

The study is going to be organized in the following way: in section 2 the basic principles of Grossman's model and health capital are briefly explained. It is observed how alcohol consumption affects health capital and deterioration of health. Alcohol consumption in Finland is also reviewed. Existing empirical literature concerning the relation of alcohol consumption and labor market outcomes is presented in section 3, with an emphasis on the effect on earnings and employment. In section 4, the data on which the empirical analysis is based on is analyzed and some descriptive statistics are also provided. The econometric approach to estimate the effects of alcohol consumption on labor market outcomes is also introduced. Binding the entire work together, section 6 contains the main empirical results. In section 7, the study and the main results are concluded. Suggestions for further research are also provided.

2 THEORETICAL FRAMEWORK

In this chapter, theoretical framework for the study is provided. First, it is studied how health capital is associated with an individual's earnings and employment. The basic principles of Grossman's model are also briefly explained. Next, the characteristics of alcohol consumption in Finland are observed. Finally, alcohol consumption habits of adolescence in Finland and the socioeconomical consequences of alcohol consumption are discussed. The theoretical framework acts as a foundation for the study and motivates the research further, providing evidence on why is it important to study the effects of alcohol consumption.

2.1 The demand for health

The standard approach in economics views human capital as a set of characteristics that increase an individual's productivity. In other words, human capital refers to the stock of knowledge, habits, social and personality attributes embodied in the ability to work to produce economic value. The theory was popularized by Gary Becker (1975) and Jacob Mincer (1974). The theory of human capital has become an established way to model the effects of education, ability and health in political and economic decision-making.

Becker (2009) argues that one may aim to possess better financial stability in the future by binding some of the current resources as investments. Similarly, efforts in education, ability and health may be perceived as investments in human capital. These investments produce an output of better productivity in the future. According to Becker, human capital cannot be separated from an individual, unlike fixed and investment capital. It is a solid part of one's skills, health and values. Moreover, Grossman (2000) argues that increases in one's human capital are assumed at a conceptual level to raise productivity in the economy. For example, an employee can decide to educate himself further. As a result, the employee is more efficient and produces more goods. This raises his value as a worker, which increases his earnings. Also in the household sector, more commodities are produced which increases utility. Therefore, the overall productivity raises (Grossman 2000).

Health is one of the key determinants of labor productivity (Luft 1975). Without health a person is unable to educate himself further or acquire work experience. It can therefore be argued that health actually has a broader impact on one's life than labor productivity's other key determinants, education and work experience (Keng 1998). Improved health increases the quality of life. Good health allows people to take part in many activities and to develop themselves further. Poor health not only impairs the labor productivity due to physical and mental limitations but also reduces healthy days available for other activities. A rational person has an incentive to invest in his health since pursuing good health has multiple advantages. Grossman (1972) argues that health capital also differs fundamentally from other forms of human capital. For example, a person's stock

of knowledge affects his productivity, both in non-market and in market actions. Stock of health on the other hand determines the total amount of time he can spend producing commodities and earnings (Grossman 1972). Without health, person does not have time to transfer his stock of knowledge into productivity and further into earnings.

In 1972, Grossman (1972) developed his model for the demand of “good health”. Currently, it is perhaps the most well-known model in health economics. The model describes the choice of an individual, who decides his level of health by consuming and producing health. In the model, health is viewed as a durable capital stock that produces an output of more healthy days. The model determines how long an individual can be a part of the labor force and gain earnings. A person inherits an initial stock of health at birth. The stock depreciates with age and can be increased with investment. An individual can invest in health by making health-improving daily decisions, such as consuming nutritious food, exercising or receiving medical care. Aging is the main cause of health depreciation. However, many daily choices may have an indirect or directly relation to investments in health. For example, excess alcohol and substance abuse may be considered as a type of disinvestment. Heavy consumption of alcohol almost certainly causes health problems and weakens the ability to be a part of the labor force. Therefore, alcohol use can shorten the time of working and decrease the lifelong earnings of an individual. When stock of health falls below a certain level, life comes to an end and death occurs. (Grossman 1972.)

2.2 Principles of Grossman’s model

In Grossman’s model (1972), health consists of consumption and investment. In other words, health is both demanded and produced by consumers. Good health produces instant utility and is constantly consumed. If a consumer wishes to have more healthy days, investments in health must be made. With more healthy days one can work longer, earn more income or have more time for leisure. Optimal health capital accumulation requires the decision making of the owner of the stock – the individual – who is also the consumer and the producer. One of the characteristics of the model is that consumers also choose their length of life through the health-related choices they make (Sloan & Kasper 2008). Over the years, Grossman’s model has become the foundation for many analyses of the demand for health in health economics and at the medical care markets (Keng 1998).

In the model, gross investments are produced by health production functions. These functions transform health inputs, such as medical care utilization, eating habits, physical activity and substance abuse, into an output of health. Sloan and Kasper (2008) provide a simplified presentation of the principles in Grossman’s model. Sloan and Kasper explain that in most economic models of health behavior, a person seeks to maximize utility or good health, which is characterized by a utility function, U . This function expresses the utility maximizer’s preferences about things he values. In Grossman’s model the person cares about

the amount of healthy time (h_t) available to him (Grossman 1972). Healthy days are the benefits from the person's stock of health (H_t). The bigger the stock of health is, the more health days it produces. However, like physical products such as infrastructure, health deteriorates as time passes. Stock of health is therefore not fixed on a certain level and it needs to be maintained with constant investments in health. Investments are made by combining different variables into health commodities with given technology (Grossman 1972).

Sloan and Kasper (2008) explain that the individual also cares about other commodities (z_t) that one produces by combining market goods and time inputs. Individual utility, $U(h_t, z_t)$, is constrained by one's available time for producing commodities (both health and "non-health"). Utility is also constrained by one's income (Y_t) to purchase market goods. In other words, individual utility is dependent on time constraint and the budget constraint. (Sloan & Kasper 2008.)

The person's health stock determines the amount of time lost due to illnesses. The time that remains can be allocated between health production, home production, and work in the marketplace (Sloan & Kasper 2008). In other words, health stock determines how much time an individual has for all activities in life. For example, alcohol-caused problems such as hangovers reduce the available time for utility production. The health stock determines the healthy time that provides utility each period. This can be described as:

$$(1) h_t = f(H_t)$$

The deterioration rate (δ_t) determines how fast health capital is spend. The rate for each person is different, but it can also change during the life cycle of an individual. Future health is dependent on the deterioration of current health and the investments in health. Investments in future health can be made by combining health inputs of medical care (m_t) and the time spent in health-producing activities (T_t^H). This can be described as:

$$(2) H_{t+1} = (1 - \delta_t)H_t + g(m_t, T_t^H)$$

As mentioned before, an individual is also interested in other commodities that provide utility. Sloan and Kasper (2008) explain that in Grossman's model production of the home good, requires both market inputs (x_t) and nonmarket inputs (e.g. time) (T_t^Z), similarly to the production of health. This can be described as:

$$(3) z_t = z(x_t, T_t^Z)$$

Income is a function of one's wage (w_t) and time spent working (T_t^W) Income production can be described as:

$$(4) Y_t = w_t, T_t^W$$

The time available for producing health and non-health commodities is not infinite. Individuals are issued with a fixed amount of time, Ω , each period (e.g. 365

days per year). They lose time, T_t^L , if they are ill ($T_t^L = \Omega - h_t$). Nonsick time is allocated between health-, home-, and incomeproducing activities. The time constraint can be written as:

$$(5) \Omega = T_t^H + T_t^Z + T_t^W + T_t^L$$

A person's initial assets (A_0) and labor income determine which combinations of the market inputs (m_t and x_t) are possible at prices p_{m_t} and p_{x_t} . All future earnings are discounted using interest rate r to reflect their present values. The lifetime budget constraint is:

$$(6) \sum_{t=1}^T (p_{m_t} m_t + p_{x_t} X_t) / (1 - r)^t = \sum_{t=1}^T (w_t T_t^W) / (1 - r)^t + A_0$$

An individual's choices regarding work time, time spent in health and home producing activities, and the purchase of medical care and other market inputs determine the end of life (T). When health falls below a life-sustaining level, a person dies. Sloan and Kasper (2008) explain that maximizing utility with respect to the time constraint, budget constraint, and production technologies yields a set of optimality conditions that are satisfied by the optimal combination of the choice variables. Stock of health follows the function:

$$(7) H_t = I_t - 1 + (1 - \delta)H_{t-1}$$

Where I_t describes investments to health aka inputs such as exercise. With given technology, the marginal efficiency of investment (MEI) is decreasing in time. Health can be improved in two ways; either by increasing inputs with given technology or with increased technology. For example, when medical science improves and new ways of curing illnesses are found, technology improves. This means that health production function shifts up and more health can be produced with given inputs aka health investments. The change can be seen in figure 2.

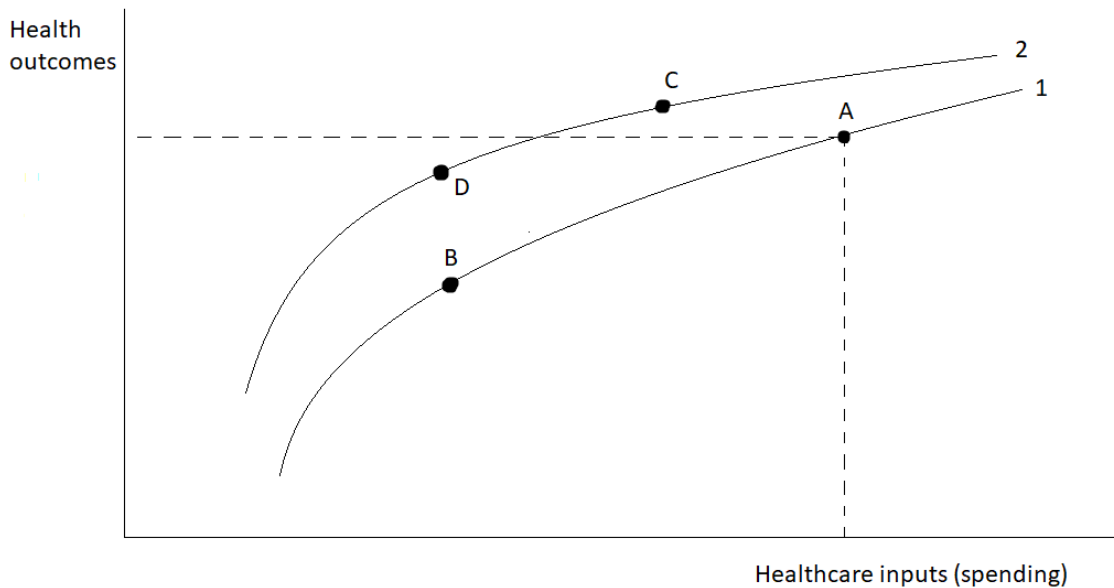


FIGURE 1. Health production function.

Health appears important to people because the more they have healthy days the more they can work and therefore earn money. Even for people who are only interested in money, the investments in health are above zero. If they would not make any investments in their health, they would not have as many healthy days and could not earn money. Investments in the stock of health result in higher productivity and higher lifetime earnings. Consequently, alcohol consumption reduces healthy days and the available time for individual utility production. Heavy alcohol consumption may cause permanent damages to health which can also grow the deterioration rate of health stock. A person's stock of health may therefore fall below a life-sustaining level earlier than other people's.

2.3 Alcohol consumption in Finland

Alcohol is often consumed for its tension and stress relieving qualities, and to gain feelings of pleasure (Heien 1996). Though these sensations may provide temporary utility, alcohol consumption causes considerable harm in the long run. Finnish people have a history of consuming substantial amounts of alcohol at one time. Especially binge drinking has been common. Otherwise, the level of alcohol consumption is in accordance with the average European levels (Treatment of Alcohol Abuse: Current Care Guidelines Abstract 2018). Alcohol consumption not only affects the health of an individual but also raises many socioeconomic issues and increases the costs of health care system in Finland. In order to evaluate the negative labor market effects caused by the misuse of alcohol, it is

beneficial to understand the characteristics of Finnish drinking culture (National Institute for Health and Welfare 2016).

If the consumption of alcohol stays lower than the risk limits, it is not likely to cause issues with health. However, this does not mean that staying just below the level of minor risk is completely safe. Personal qualities play a significant role in how alcohol influences one's body and how harmful it is. Many health problems are also increased when using alcohol in a constant pace. One serving of alcohol includes 12 grams of pure alcohol. This is equivalent to for example one small bottle of beer or cider (0.33 l), one glass of wine (12 cl) or a serving of clear liquor (4 cl). According to the national guidelines, the high-risk limit is crossed by drinking at least 23-24 servings of alcohol a week or 40g of alcohol a day regularly. 40g of alcohol is equivalent to approximately three servings of alcohol. For women, the high-risk limit is crossed by drinking at least 12-16 servings a week or consuming 20g alcohol a day regularly. 20g of alcohol is equivalent to approximately two servings of alcohol. Drinking habits that surpass the risk limits increase the risk of illnesses and the risk of death significantly. Drinking slightly less than the high-risk limit recommendations is not healthy either. Even moderate, regular consumption of alcohol can lead to an increased amount of GGT (gamma-glutamyl transferase) in blood. (Treatment of Alcohol Abuse: Current Care Guidelines Abstract 2018.)

The National Institute for Health and Welfare collects data on the consumption of alcohol in Finland. The total consumption of alcohol consists of reported selling and distributing of alcohol, as well as the unreported consumption. For example imported alcohol, homemade alcohol and smuggling are unreported consumption. During the sharp growth in total alcohol consumption in the early 1970s, binge drinking also increased according to a report conducted by the National Institute for Health and Welfare (2016). After the 1970s, binge drinking has not increased considerably among men. However, binge drinking became more and more common among women until the beginning of the 2000. Since then, binge drinking has not grown more popular in spite of an increase in total consumption. (National Institute for Health and Welfare 2016.)

As Figure 4 shows, total consumption of alcohol has been declining since 2008. At the same time, binge drinking also started to decrease. For example, between 2008 and 2016 monthly binge drinking fell from 27% to 19% among men and from 9% to 6% among women. Although binge drinking has declined, the amount of alcohol consumed in one sitting over a 12-month period has been extremely high in Finland. The highest maximum volumes were seen among 20-29 year-olds. In 2016, 26% of men in this age group reported drinking at least 18 servings of alcohol during a single day at least once during the past year. 18% of women of the same age had drunk at least 13 servings during a single day. (National Institute for Health and Welfare 2016.)

The differences in drinking habits between each age group are considerably skewed. In some groups, alcohol is hardly consumed, whereas in some groups the consumption level is very high. This means that for example in 2016, 10 per cent of the population drank about half of all alcohol consumed in Finland. (National Institute for Health and Welfare 2016.)

In 2017, total consumption of pure alcohol in Finland per each 15-year-old or older was 10.3 liters. The amount was almost three times as much as in the beginning of the 1960s. However, it was 0.5 liters less than in 2016 or 2015. Figure 4 shows that the total consumption of alcohol per person has actually been slowly declining for the past ten years. The total documented consumption of alcohol in 2017 was 38.7 million liters and the undocumented consumption was 9.0 million liters of 100% pure alcohol. The documented consumption of alcohol was 0.5% less than in 2016 and the undocumented consumption was 17.1% less than in the previous year. (National Institute for Health and Welfare 2017.)

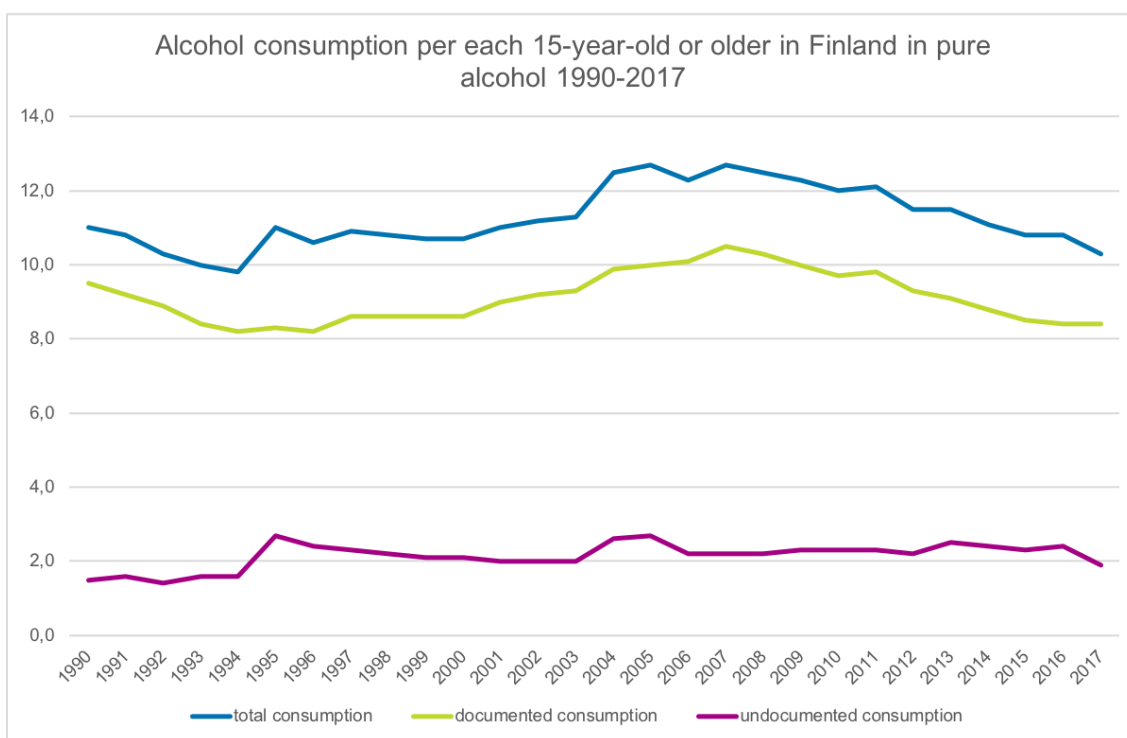


FIGURE 2. Alcohol consumption in Finland. (National Institute for Health and Welfare 2018.)

2.4 Adolescent alcohol abuse in Finland

Experimenting with alcohol and binge drinking is popular with teenagers and young adults. According to the Finnish Alcohol Act, selling, distributing and advertising alcoholic beverages for people under 18 years old is also prohibited. People over the age of 18 years are legally allowed to consume mild alcoholic beverages (up to 20% of alcohol in volume) and people over 20 are legally able to consume strong alcoholic beverages. In 2015 only 13% of Finnish 18-year-olds had not drunk alcoholic drinks, and 9% of men and 8% of women had been binge drinking for the first at the age of 13 or younger (National Institute for Health and Welfare 2016).

However, alcohol consumption of young adults has begun to decline. In 2009, 30% of individuals aged 18-29 years reported to binge drink several times

a month, whereas in 2015 only 15% reported to binge drink. The alcohol consumption of teenagers aged 18 and under has been slowly decreasing for the past 15 years. (Varma 2015.)

The new alcohol act entered into force in Finland on 1st of March in 2018 (Ministry of Social Affairs and Health 2019). The new alcohol act allows for example retail stores to sell alcoholic beverages that contain up to 5.5% alcohol in volume. There has been public concern that the wider availability of alcohol may lead to increased consumption and eventually increased problems with drinking, especially among young people.

2.5 Socioeconomic effects

Researchers have found that consumption of alcohol leads to significant costs for the society. Not only does drinking lead to lost employment and reduced productivity but also causes car accidents, increased healthcare costs and criminal justice costs to name a few (Hamilton & Hamilton 1997) The annual costs of alcohol consumption to the public sector are estimated to be as much as 1.3-1.5 billion euros (National Institute for Health and Welfare 2016). It has been reported in social cost studies, that alcohol consumption causes a significant economic burden on society. Especially the loss of work productivity is deepens the costs since over a half of the total economic costs are estimated to be due it (Feng et al. 2001).

In 2012, the estimated output losses due to alcohol-related deaths amounted to approximately 852 million euros according to the National Institute for Health and Welfare. These deaths included alcoholic poisonings, as well as those injured by accidental or violent deaths while being intoxicated. The indirect cost¹ of alcohol consumption for the society was at least 937 million euros. Altogether, the indirect and direct costs were estimated to be as much as over 2 billion euros. (National Institute for Health and Welfare 2013.)

The transfer of employees to disability and partial disability pension due to alcohol-related illness resulted in a loss of production of about 75 million euros in 2012. Labor costs for sickness absences due to the use of alcohol were 8.8 million. However, the effect of substance abuse on disability pension and sickness absence is often not thoroughly documented and therefore the true cost of disability pensions and sickness absences may be severely underreported. Thus, the costs presented in the report of National Institute for Health and Welfare are only minimal estimates of the indirect costs. (National Institute for Health and Welfare 2013.)

¹ The indirect cost includes the loss of inputs caused by alcohol-related deaths and disability retirement, and the loss of working time caused by employee sickness absences during working hours. The data did not include information on indirect costs caused by decreased productivity of labor force or sickness absences due to being hungover. The direct costs include for example social care, maintenance of order and from the ward and outpatient care of primary and special health care.

3 EARLIER LITERATURE

In this chapter, existing empirical research is presented. First, common challenges that arise when studying the relation of alcohol consumption and labor market outcomes are reviewed. Then, research concerning especially adolescent alcohol consumption is presented. Other literature concerning the effects of alcohol consumption on earnings and employment are observed next. Finally, other alcohol-related effects on the labor markets are discussed and the earlier empirical research is summarized.

3.1 Challenges in modelling the consequences of alcohol consumption

The relationship between alcohol consumption and labor market outcomes has proven to be difficult to model, since there are multiple unobservable factors that are correlated with both subjects. This leads to biased results from the Ordinary Least Squares (OLS) regression, which is a commonly used econometric method in studies concerning the labor market effects. If the regression results are biased, the relationship between alcohol consumption and labor market outcomes might become distorted. Researchers have addressed this problem by including control variables to their regression (e.g. French and Zarkin 1995). Few studies (Lee 2003; Rose et al. 2014; Böckerman et al. 2015; Böckerman et al. 2017) have also used a twin-data to better control for genetic and environmental issues.

The existing empirical results are mixed. While all studies related to alcohol consumption at young age are in consistence that adolescent alcohol consumption has negative labor market effects (Sloan & Grossman 2011; Rose et al. 2014; Böckerman et al. 2015), the results from other research do not explicitly condemn alcohol consumption harmful. While many earlier empirical results imply that heavy drinking is associated with lower earnings, most studies in fact suggest that moderate drinkers actually seem to have the highest earnings compared to abstainers and abusers. Evidence from Finland (Böckerman et al. 2017) is in consistency with these results. In addition, the evidence (Johansson et al. 2007; Paljärvi et al. 2015) also imply that labor market attachment is substantially weaker for people who are dependent on alcohol. Studies from UK found similar results (MacDonald & Shields 2001, 2004). However, there was no negative association between alcohol consumption and employment when evidence from the US was used. (Feng et al. 2001; Mullahy and Sindelar 1996). Furthermore, evidence from Finland and Sweden suggest that there is a positive correlation between alcohol consumption and sickness absence (Johansson et al. 2009; Norström 2006).

There is a substantial body of literature concerning the effects of different health behaviors. However, estimating the true impact of harmful health behavior on labor market outcomes is difficult for several reasons. For example,

there are multiple ways of measuring alcohol consumption which results in varying results. It is also common that only correlations are estimated, which may not provide a truthful image of the association. There are three possible phenomena that correlations may reflect. Correlation may occur due to the causal impact of unhealthy behaviors on outcomes or, in contrast, due to the impact of poor outcomes on unhealthy behaviors. The third possibility is that there are omitted variables that affect both unhealthy behaviors and poor outcomes. According to Cawley and Ruhm (2012), the most convincing research design in estimating the causal effect of unhealthy behavior would randomly assign individuals into treatment and control groups. These groups would be rather large and the individuals as similar as possible. The treatment group would then engage in unhealthy behavior. The outcomes of the two groups would then be compared. This would generate a consistent estimate of the impact of unhealthy behaviors. The use of twin-data has allowed some researchers to create a similar experiment in natural surroundings (e. g. Rose et al. 2014). Another significant problem in estimation is unobserved bias in the results. This can be addressed by for example adding explanatory variables to the model to control unobserved variation. For example French and Zarkin (1995) included several additional variables to their study that could possibly affect both alcohol consumption and earnings. However, the variables must be powerful and valid (Cawley & Ruhm 2012).

3.2 Adolescent drinking and labor market outcomes

A few studies have issued the relationship between adolescent alcohol consumption and labor market outcomes. Sloan and Grossman (2011), Rose et al. (2014) and Böckerman, Hyytinen and Maczulskij (2015) all find a negative relationship between drinking at young age and employment and earnings in later life. Sloan and Grossman (2011) used evidence from the US, whereas Rose et al. (2014) and Böckerman, Hyytinen and Maczulskij (2015) used twin-data for Finnish men and women born before 1958.

The results of Sloan and Grossman (2011) suggest that adolescent alcohol consumption leads to grim labor market outcomes later in life. They argue drinking is quite common among college students and young adults of that age. Therefore, they studied the relation of alcohol consumption in early adulthood to problem drinking 10 years later. They also examined how drinking in early adulthood is connected to educational attainment and labor market outcomes later in life. The differences between genders and between black and white people were compared by using data from the National Longitudinal Survey of Youth, including information from years 1982-84, 1991 and 2006. The study subjects were aged between 19-27 in 1982 and 41-49 in 2006. According to results, drinking in early adulthood is predictive of drinking in midlife. The results also indicate that heavy drinking at young age reduces earnings and employment for blacks but not for whites. (Sloan & Grossman 2011.)

Rose et al. (2014) studied adolescent alcohol abuse with Finnish twin data. The use of twin data allowed them to control for shared family background, as well as environmental and genetic factors. They find that adolescent drinking disrupts the transition into adulthood and is associated with several negative outcomes. Similarly to Rose et al. (2014), Böckerman, Hyytinen and Maczulskij (2015) also used a twin-data from Finland. They linked the twin data to register-based information on an individuals' labor market status. This allowed them to study if drinking is connected to receiving a disability pension. The differences between each twin-pair were used to eliminate the genetic, environmental and family-related factors. The results indicate that heavy drinkers are more likely to receive disability pension than moderate drinkers or abstainers. Additionally, if the consumption of alcohol of an individual resulted in passing out, the possibility of receiving a disability pension rose. Böckerman, Hyytinen and Maczulskij (2015) conclude that drinking habits in early adulthood play a significant role later in life.

TABLE 1 Adolescent drinking and labor market outcomes.

Author(s) and publication year	Sloan and Grossman (2011)	Rose et al. (2014)	Böckerman, Hyytinen and Maczulskij (2015)
Study	Alcohol consumption in early adulthood and schooling completed and labor market outcomes at midlife by race and gender.	Adolescent Alcohol Abuse and Adverse Adult Outcomes: Evaluating Confounds with Drinking-Discordant Twins.	Devil in disguise: Does drinking lead to a disability pension?
Data	the National Longitudinal Survey of Youth 1979; data from 1982-84	The Older Finnish Twin Cohort Study	The Older Finnish Twin Cohort Study and the Finnish Longitudinal Employer-Employee Data
Alcohol measure	5 categories for alcohol drinks consumed per week.	Rutgers alcohol problem index*	4 categories: former drinkers, constant abstainers, moderate drinkers and heavy drinkers: also a measure for passing out. Calculated by using weekly average consumption
Methods	OLS	Mean difference test	OLS, twin differenced OLS
Main results	Heavy alcohol consumption in ado-	Adolescent drinking disrupts the transition into	Heavy drinkers are more likely to receive a disability

	lescence is negatively associated with labor market outcomes at mid-life for black men	adulthood and is linked with financial difficulties later in life.	pension than moderate drinkers or abstainers.
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Notes: The original Rutgers Alcohol Index (RAPI) is a 23-item self-administered screening tool for assessing adolescent problem drinking. (Rose et al. 2014.)

3.3 Alcohol and earnings

3.3.1 Evidence from Finland

Böckerman, Hyytinen and Maczulskij (2017) later continued to view the effects alcohol consumption again using twin data for Finnish men and women. As in their previous study (2015), the use of twin-data allowed them to control for environmental and genetic factors. Additionally, the data was once again linked to register based information. The results indicate that former drinkers and heavy drinkers both seem to have almost 20% lower earnings compared to moderate drinkers. The results imply that the effect of alcohol consumption on earnings may not be solely negative.

3.3.2 Evidence from other countries

Berger and Leigh (1988) studied the effect of alcohol consumption on wages with data from the 1972-73 US Quality of Employment Survey. The aim of the study was to estimate wage equations for drinkers and non-drinkers. They also aimed to conduct a probability-of-drinking equation. Their results suggest that those who consume at least one drink per week earn significantly more than people who do not drink. Additionally, their results do not indicate a negative association between heavy alcohol consumption and earnings. Their results could therefore be argued to suggest that alcohol consumption does not only have negative effects on labor market outcomes. (Berger & Leigh 1988.)

French and Zarkin (1995) examined the relationship between alcohol consumption and wages at individual work-sites. The assumption of the study was that there might be a U-shaped relationship between drinking and wages, which means that as drinking increases, wages also increase until a maximum point. Consequently, wages decrease as alcohol consumption rises. Their results support the hypothesized inverse U-shape relationship between drinking and wages. Furthermore, the results imply that moderate drinkers seem to receive the highest wages compared with heavy drinkers and those who abstain from alcohol. French and Zarkin also calculated the amount of daily alcohol consumption which has the highest returns. According to the results, maximum returns occur at 1.7 drinks per day when full-effect estimates are used and at 2.4 drinks per day when direct-effect estimates are used. The maximum returns correspond to a wage premium of around 5% over non-drinkers. Unlike the results of Berger and

Leigh (1988), their results suggest that while moderate consumption is associated with higher earnings, heavy consumption has a negative impact on earnings. (French & Zarkin 1995.)

Heien (1996) used data from the US National Survey on Alcohol Use for 1979 and 1984, and, like Berger and Leigh (1988), from the US Quality of Employment Survey from 1972 to 1973. Evidence from the 1979 sample offer support for the existence of an inverse U-shaped relationship between drinking and earnings. In other words, the results support the assumption that moderate drinkers seem to earn more than abstainers and heavy drinkers. This result was gained when using religious preference as an instrument. The results correspond to a maximum returns point at approximately 2-3 drinks a day. This level of consumption was associated with a return of 50% on the average household income. The research of Heien differed from earlier empirical work with the allowance of curvilinear effects. Heien assumed that the inconclusiveness of these effects had previously caused the disagreement on the effect of alcohol consumption on earnings. (Heien 1996.)

Hamilton and Hamilton (1997) studied the effects of alcohol consumption on earnings with data from the Canadian 1985 General Social Survey, focusing on male workers between the ages of 25 and 59 years. They formed three categories based on the frequency and intensity of alcohol consumed, and each individual was assigned to a single category. The researchers used a multinomial logit equation to allow for selection into drinking status and to address the potential endogenous relationship of alcohol consumption and earnings, which might lead to biased results. The found evidence suggests that moderate drinking is associated with higher earnings in comparison to refraining from alcohol. However, the researchers also found evidence that the earnings of heavy drinkers are lower compared with moderate drinkers. (Hamilton & Hamilton 1997.)

Zarkin et al. (1998) aimed to reproduce the earlier findings of French and Zarkin (1995) focusing on workers on their prime-age. The data was a combined sample of the 1991 and 1992 National Household Surveys on Drug Abuse (NHSDA). People were divided into 8 categories based on their alcohol consumption amounts and intensity during the past 30 days. The results suggest that men who identify as alcohol consumers have approximately 7% higher wages than men who do not consume alcohol. The same proportion for women was approximately 3,5%. However, the result was statistically insignificant. The researchers did not find evidence for a similar turning point for neither men nor women as in the 1995 study, where the highest wages occurred for people who drank on average 1.7 and 2.4 drinks per day, depending on the effects used in the study. (Zarkin et al. 1998.)

The results of MacDonald and Shields (2001) are in line with the results of earlier empirical evidence and suggest that moderate drinking is associated with highest earnings compared to abstainers and heavy drinkers. The authors studied the impact of drinking on occupational attainment in England and used data from the Health Survey for England between 1992 and 1996. The results suggest that moderate drinking is associated with positive returns for both men and women. However, their results also suggest that as consumption increases, the

positive results collapse rapidly. In other words, it is indicated that heavy drinkers earn possibly less than moderate drinkers do. Additionally, MacDonald and Shields note that because of the endogenous nature of drinking, it is possible that the regression estimates may not offer a truthful image of the effect of alcohol consumption on labor market outcomes and therefore the results may be biased. (MacDonald & Shields 2001.)

The evidence found by Barrett (2002) is similar that MacDonald and Shields (2001). Barrett studied the effect of alcohol consumption on the earnings of full-time male workers in Australia. He used data from the Australian National Health Survey 1989–1990 and divided individuals into 3 categories. The intensity of drinking was measured as the amount and frequency of alcohol consumption. A multinomial logit choice model was chosen for the study to explain workers' choice of drinking status. The choice of model also allowed him to correct for selection bias. The results support a substantial earnings premium for moderate drinkers. It was found that moderate drinking leads to more favorable labor market outcomes than abstaining from alcohol or heavy drinking. Additionally, Barrett argues that moderate drinking is associated with better health and therefore increased productivity and earnings. (Barrett 2002.)

Like Barrett (2002), Lee (2003) studied the wage effects of drinking in Australia and used data from the Australian twin registry. Similarly to Rose et al. (2014) and Böckerman, Hyytinen and Maczulskij (2015) after him, he used twin-data to control genetic and environmental factors. Similarly to Barrett (2002), Lee implemented a multinomial logit framework to explain the allocation of workers across multiple drinking-statuses. The use of this kind of model also allowed him to also correct for selection bias in the wage equations. The results indicate that moderate drinking is associated with increases in wages. In addition, moderate consumers have higher earnings than abusers. The results are very similar to those of Barrett. (Lee 2003.)

TABLE 2 The effect of alcohol consumption on earnings in earlier literature.

Author(s) and publication year	Berger and Leigh (1988)	French and Zarkin (1995)	Heien (1996)	Hamilton and Hamilton (1997)	Zarkin et al. (1998)	McDonald and Shields (2001)	Barrett (2002)	Lee (2003)	Böckerman, Hyytinen and Maczulskij (2017)
Study	The effect of alcohol use on wages.	Is moderate alcohol use related to wages? Evidence from four worksites.	The relationship between alcohol consumption and earnings.	Alcohol and earnings: does drinking yield a wage premium?	Alcohol use and wages: new results from the National Household Survey on Drug Abuse.	The impact of alcohol consumption on occupational attainment in England.	The effect of alcohol consumption on earnings.	Wage effects of drinking in Australia.	Alcohol consumption and long-term labor market outcomes.
Data	US Quality of Employment Survey from 1972-73	A sample of randomly selected employees at four US worksites in 1991, 1992 and 1993	National Household Survey on Alcohol Use from 1979-84 and Quality of Employment Survey from 1972-73	Canadian General Social Survey data from 1985	Combined sample of prime-age workers from the 1991 and 1992 National Household Surveys on Drug Abuse	The Health Survey for England from 1992-96.	The Australian National Health Survey 1989-90	Australian twin data 1988-89	The Older Finnish Twin Cohort Study and the Finnish Longitudinal Employer-Employee Data
Alcohol measure	2 categories: drinkers and non-drinkers	Dummy variables for former drinkers and abstainers who	A dummy variable for former drinkers and polynomial of the	3 categories: non-drinkers, moderate drinkers and heavy drinkers.	8 categories based on the estimate of number of drinks during the	Drinking intensity and drinking frequency over the last 12 months.	3 categories: non-drinkers, moderate drinkers and heavy drinkers	3 categories: non-drinkers, light drinkers and moderate drinkers	4 categories: former drinkers, constant abstainers, moderate

		have never consumed alcohol. An estimate for the amount of drinks consumed in the past month.	number of drinks consumed per month.	Calculated using frequencies and quantities of alcohol consumed.	past 30 days: non-drinkers, 2 categories for light drinker, 3 categories for moderate drinking and 2 categories for heavy drinking.		calculated using frequencies and quantities of alcohol consumed.	calculated from frequencies and quantities of alcohol consumed.	drinkers and heavy drinkers; a measure for binge-drinking. Calculated by using weekly average consumption
Methods	OLS	OLS	OLS	OLS, selectivity-corrected regression	OLS	OLS	Selectivity-corrected regression	OLS and twin differencing	OLS, twin differenced OLS
Main results	On average, drinkers receive higher wages than non-drinkers do. No support for U-shaped relation between drinking and wages.	Evidence for a U-shaped relationship between drinking and wages; moderate drinkers seem to earn more than abstainers and heavy drinkers.	Moderate drinkers earn more than either constant abstainers or heavy drinkers. Constant abstainers earn more than former drinkers.	Moderate drinkers earn more than people who refrain from alcohol. Heavy drinking results in rapidly dropping earnings.	Male drinkers receive approximately 7% higher wages than men who do not consume alcohol.	Moderate drinking associated with positive and significant returns. Increased consumption results in dropping returns.	Moderate drinkers tend to have a significant earnings premium compared to constant abstainers and heavy drinkers.	Former drinkers and heavy drinkers both have almost 20% lower earnings compared to moderate drinkers.	Former drinkers and heavy drinkers both have almost 20% lower earnings compared to moderate drinkers.

3.4 Alcohol and employment

3.4.1 Evidence from Finland

The relationship between alcohol consumption and employment has been addressed in a few studies with Finnish evidence. The aim of the research of Paljärvi et al. (2015) was to examine how young adults aged 18-34 participated in the labor market after their compulsory basic education was completed. Their data from Statistics Finland included information on educational attainment, main resource of income, months in employment, and months in unemployment. The results suggest that problem drinking at young age is negatively related with employment. Those who reduced their alcohol consumption after adolescence experienced improved employment later in life. According to the results, they were in employment 39% of the time from age 18 to 34. However, those who continued as problem drinkers into adulthood experienced constantly decreasing effects on their employment. They were employed only approximately 12% of the time. In comparison, the general population were employed 58% of the time from 18 to 34. (Paljärvi et al. 2015.)

Böckerman, Hyytinen and Maczulskij (2017) later continued to view the effects alcohol consumption on labor market outcomes again using twin data for Finnish men and women. The data was linked to register-based individual information to better address the long-term relationship between alcohol consumption and lifetime labor market outcomes, such as employment and earnings. Once again, the use of twin-data allowed them to control the environmental and genetic factors. Similar to the results of Paljärvi et al. (2015), their evidence suggest that heavy use of alcohol reduces employment. It was found that former drinkers worked annually approximately 1 month less than other individuals over the 20-year observation period. (Böckerman, Hyytinen, & Maczulskij, 2017.)

3.4.2 Evidence from other countries

The aim of the work of Mullahy and Sindelar (1996) was to provide sound estimates of the relationship between measures of problem drinking and of employment and unemployment. They used data from the 1988 Alcohol Supplement of the National Health Interview Survey. The results imply that problem drinking is associated with poor labor market outcomes. Problematic alcohol consumption both lowered employment as well as increased unemployment. The results were similar for both genders. However, the results were statistically insignificant. Therefore, it is unclear if alcohol has an influence on employment based on this study. (Mullahy & Sindelar 1996.)

Feng et al. (2001) studied the relationship of alcohol consumption and employment with evidence from the US. They used a randomly selected sample of working age people from six Southern states (Alabama, Arkansas, Georgia, Louisiana, Mississippi and Tennessee). While controlling for other covariates that might result in biased regression, the results of the study do not find a negative

correlation between employment and alcohol consumption. When comparing the results by gender, the results remained the same. Feng et al. also argue that the actual costs of problem drinking may not be as high as suggested earlier, since the labor supply relationships might be misleading. (Feng et al. 2001.)

Contrary to Mullahy and Sindelar (1996) and Feng et al. (2001), MacDonald and Shields (2004) found evidence in UK that problem drinking is associated with significant and negative labor market outcomes, such as reduced employment. They used data from the Health Survey of England. As in their previous study (2001), they accounted for the endogenous relationship between drinking and labor attainment. The results imply that alcohol consumption is negatively linked with employment. Being classified as a problem drinker is associated with significant reduction in the probability of working by between 7 and 31%. Additionally, MacDonald and Shields address support to benefits from public health policies. As the results imply, problem drinkers may experience substantial negative labor market effects due to alcohol consumption. The prevention and treatment of problem drinking may have important positive effects for the labor market. (MacDonald & Shields 2004.)

TABLE 3 The effect of alcohol consumption on employment in earlier literature.

Author(s) and publication year	Mullahy and Sindelar (1996)	Feng et al. (2001)	McDonald and Shields (2004)	Paljärvi et al (2015)	Böckerman, Hyytinen and Maczulskij (2017)
Study	Employment, unemployment, and problem drinking.	The impact of problem drinking on employment.	Does problem drinking affect employment? Evidence from England.	Life course trajectories of labour market participation among young adults who experienced severe alcohol-related health outcomes: a retrospective cohort study.	Alcohol consumption and long-term labor market outcomes.
Data	The 1988 Alcohol Supplement of the National Health Interview Survey	A random sample of men and women of prime working age from six Southern states in the US	The Health survey for England 1992-96	Information on employment from Statistic Finland	The Older Finnish Twin Cohort Study and the Finnish Longitudinal Employer-Employee Data
Alcohol measure	Consumption of alcohol, two dummy variables for heavy consumption and a dummy for diagnosed alcohol abuse.	A dummy for problem drinkers.	Psychological and physical symptoms of drinking, a dummy for drinking every day and a dummy for drinking more than 45.3 units per week.	Number of alcohol-related hospitalizations	4 categories based on weekly average consumption of alcoholic drinks: former drinkers, constant abstainers, moderate drinkers and heavy drinkers: additionally a variable for binge-drinking.
Methods	OLS and IV	Bivariate probit model	Univariate and bivariate probit and IV-Probit models	Generalized estimating equations (GEE)	OLS, twin differenced OLS

Results	Problem drinking results in reduced employment and increased unemployment	No significant connection between problem drinking and employment	Consuming alcohol in a problematic manner leads to a significant reduction in the probability of working by between 7 and 31%.	Problem drinking at young age is negatively related with employment.	Both former drinkers and heavy drinkers have almost 20% lower earnings compared to moderate drinkers.
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3.5 Alcohol consumption and sickness absence

The relationship between alcohol consumption and sickness absence has been widely studied. To mention a few, both Norström (2006) as well as Johansson, Böckerman and Uutela (2007) have studied the subject using data from the Nordic countries. Norström (2006) studied the relationship between aggregate alcohol consumption and sickness absence in Sweden. Using data collected from Swedish sickness insurance data and labor force surveys, Norström controlled the endogeneity of alcohol abuse by adding unemployment and real wages as control variables. The data were analysed through the Box-Jenkins method for time-series analyses. The results indicate that a one liter rise in the consumption of alcohol is associated with a 13% increase in sickness absence for men. However, Norström states that the results were insignificant for women.

Johansson, Böckerman, and Uutela (2007) found results similar to Norström (2006). They studied the individual-level relationship between alcohol consumption and sickness absence and used data on sickness absence and alcohol consumption for 18 Finnish regions over the period 1993-2005. The results were estimated using Poisson regression models. The authors also considered the unobserved determinants of lifestyle behaviors, personal characteristics and clustering and included control variables. The results indicate that alcohol consumption is positively linked with sickness absence. The higher the number of consumed drinks per week, the higher the number of days spend sick during a year. Similar to the results of Norström (2006), the relationship is particularly strong for low-educated males.

TABLE 4 The effect of alcohol consumption on sickness absence in earlier literature

Author(s) and publication year	Norström (2006)	Johansson, Böckerman, and Uutela (2007)
Study	Per capita alcohol consumption and sickness absence.	Alcohol consumption and sickness absence: evidence from microdata.
Data	Sickness insurance data and Swedish labor force survey from Statistic Sweden	Sickness absence and alcohol consumption for 18 Finnish regions from "Health 2000"-survey
Alcohol measure	Sales of liters of 100% alcohol per inhabitant.	A dummy variable for diagnosed alcohol dependence.
Methods	OLS	Probit and IV-Probit models
Main results	Sickness absences increased by 13% with a 1-litre increase in total consumption of alcohol for men	Alcohol consumption is associated with sickness absence

3.6 Joint associations of health behaviors

Empirical literature concerning health behavior and labor market outcomes has mainly focused on examining one specific risky behavior at the time, such as alcohol consumption. However, it is very likely that different health behaviors have joint associations with labor market outcomes, rather than one specific behavior causing harmful effects in isolation (Böckerman et al. 2018). Though literature on substance abuse and its labor market outcomes is remarkably wide, the joint associations have not received much attention.

Böckerman et al. (2018) found that pursuing multiple risky health behaviors at the same time may have even more negative effects on health than just one risky behavior. The researchers aimed to evaluate the joint effects of more than just one risky health behavior on the long-term labor market outcomes. Similar to a few earlier studies (Rose et al. 2014; Böckerman et al. 2015; Böckerman, Hyttinen, & Maczulskij 2017), they used twin data from Finland to account for shared family and environmental factors. Carree et al. (2011) had originally introduced an econometric approach to examine the joint effects between multiple variables, which was used in the study. The results reveal that being both a smoker and a heavy drinker early in life is negatively related to long-term earnings and employment in the future, especially for men. If a person is also physically inactive, the results are even more grim. Additionally, the evidence also suggests that those individuals who are neither smokers or drinkers experience more positive labor market outcomes than those who engage in multiple harmful health behaviors simultaneously. (Böckerman et al. 2018.)

3.7 Summary of earlier literature

According to earlier literature, it is clear that alcohol consumption at young age has negative effects in later life. Heavy drinking in adolescence was negatively associated with earnings in later life and disrupted the transition from adolescence into adulthood (Sloan & Grossman 2011; Rose et al. 2014). However, research also indicates that all alcohol consumption is not solely harmful. Moderate alcohol consumption tends to be associated with the best labor market outcomes in several studies. According to the US and Australian evidence, moderate drinkers earn more than constant abstainers (Barrett 2002; French & Zarkin 1995; Hamilton & Hamilton 1997; Heien 1996) or former abusers (Lee 2003; Zarkin et al. 1998). It was discovered in some studies that there is a U- or J-shaped curve relationship between drinking and earnings, and those US employees who consumed approximately 2–3 drinks per day seemed to have the highest earnings (French & Zarkin 1995; Heien 1996). However, alcohol consumption was also associated with positive effects on health, such as lowering stress and reducing the risk of cardiovascular diseases (Heien 1996). It was argued that these health benefits may lead to increased productivity and higher earnings (MacDonald & Shields 2000).

Some critique can be addressed to earlier research. Firstly, it has seldomly been specified in earlier literature if the impact of alcohol consumption is due to health related issues or discrimination. As mentioned earlier, alcohol consumption has a few mechanisms through which it affects labor market outcomes. Section 2 explained how alcohol affects earnings and employment through health capital. Another explanation could be discrimination, which may occur from employer, other employees or even customers. Therefore, it is difficult to single out if for example the association between abstaining from alcohol and low earnings is due to health-related issues or discrimination at workplace. Secondly, many studies have been conducted with cross-sectional data, covering only observations from one occasion. It is rather challenging to estimate long-term effects of alcohol consumption without observing the same individuals several times. Thirdly, majority of research is based on self-reported estimation of alcohol consumption which may have caused bias in the results.

4 DATA AND METHOD

This chapter presents the data used in the study. The data is analyzed and the measures formed from the data are presented. Further, this chapter provides descriptive evidence, which support the results from the estimation. Finally, the method chosen for the study is presented and motivated.

4.1 Data

In this study, the research data are drawn from a "Health 2000-2011" -study conducted by the National Institute for Health and Welfare. The purpose of the study was to gather a comprehensive review of the health and wellbeing of Finnish people.

The Health 2000 study was performed in 2000-2001 and 8028 adults aged 30 years or older were examined through an interview, a comprehensive health check and several questionnaires. Also, 1894 young adults aged 18-29 took part in a thorough health interview and filled in a questionnaire. Additionally, 1278 people who had taken part in the Mini-Finland -health study in 1978-1980 were summoned to the study. After the collection of basic data, several advanced studies were executed to gather further information on mental health, physical condition, oral health and cardiovascular diseases. The study was implemented on 80 different areas, and 9922 individuals were selected for the study. 15 largest cities and 65 randomly selected health regions were picked as research localities to represent the whole country as truthfully as possible. (National Institute for Health and Welfare 2018.)

The Health 2000 study was followed by Health 2011 study in 2011-2012. Same respondents took part in the study in both 2000 and 2011. This creates a unique individual-level panel data, which allows examining the predictive factors of changes in health and wellbeing. There was also a "Mini-Finland"-study that was conducted in 1978-1980. Many health related phenomena that were scanned in the Health 2000-2011 study were also detected in the Mini-Finland study. The results are comparable. Thus, the changes in the health and wellbeing of Finnish people can be examined from a period of over 30 years. Since the data covers a rather long period of time, determiners of health and the evolvement of different factors are able to be examined in a more reliable manner. (National Institute of Health and Welfare 2018.)

This study focuses on the young adults aged 18-29 from the Health 2000 -study. Since there was no information on the earnings of this group in the 2011 study, only data from the initial Health 2000 study will be used. Therefore, the estimation sample contains 1894 individuals. The empirical analysis will focus on those individuals for whom information on alcohol consumption, employment and earnings are observed. After dropping out the individuals who had not answered questions on alcohol consumption, employment or earnings,

the final estimation sample consists of 1171 individuals. Table 5 provides variable means for the study estimation sample.

TABLE 5 Variable means of the study sample.

Measure	All	Male	Female
		0.47 (0.50)	0.53 (0.50)
Education (years)	13.82 (0.07)	13.44 (0.11)	14.15 (0.10)
Age	23.37 (0.35)	23.47 (0.15)	23.29 (0.14)
Married	0.16 (0.04)	0.13 (0.01)	0.19 (0.02)
Currently employed	0.57 (0.05)	0.66 (0.02)	0.48 (0.02)
Unemployed	0.03 (0.02)	0.03 (0.01)	0.02 (0.01)
Studying	0.33 (0.05)	0.27 (0.02)	0.38 (0.02)
Finnish matriculation examination (graduated)	0.54 (0.05)	0.43 (0.02)	0.63 (0.02)
Disability pension	0.01 (0.07)	0.01 (0.00)	0.00 (0.00)
Earnings	1543.30 (112.91)	1811.30 (57.40)	1306.80 (33.20)
Smoker (full time or on occasion)	0.68 (0.05)	0.72 (0.03)	0.64 (0.03)
Used or tried drugs	0.21 (0.04)	0.23 (0.02)	0.19 (0.02)
Exercise at least once a week	0.66 (0.05)	0.65 (0.02)	0.67 (0.02)
Former drinker	0.03 (0.17)	0.03 (0.01)	0.03 (0.01)
Abstainer	0.11 (0.31)	0.10 (0.01)	0.11 (0.13)
Moderate drinker	0.84 (0.37)	0.85 (0.02)	0.82 (0.02)
Heavy drinker	0.03 (0.17)	0.03 (0.01)	0.03 (0.01)
Observations	1171	549	622

Notes: Earnings have been converted into euros to simplify the interpretation of numbers.

Table 5 shows that moderate drinkers form the largest category (84%). Abstainers are the second largest group, since approximately 11% participants identify as an abstainer. Former drinker and heavy drinker categories are relatively small,

since only 3% of participants belong to each. Categories differ massively in size, which could cause bias in the study results. Other interesting notions can also be made from Table 5. A relatively large amount of participants reported that they smoked on occasion or regularly (68%). More surprisingly, many participants seemed to have used or tried drugs (21%). Both actions have been linked to harmful effects for health as well as poor labor market outcomes (e. g. Böckerman et al. 2018).

4.2 Measures

Two outcome variables are used to capture the poor labor market outcomes. The main variables are monthly earnings and employment. Monthly earnings are measured as the logarithm of average self-reported monthly earnings over the period of 12 months. In the original data, earnings are reported on a 13-point-scale.² Respondents had to mark the category that best matches their situation. The use of categories creates a problem, since the values can be treated neither as continuous or as binary measures. Therefore, each category is replaced by the mean of the category which leads in gaining a numeric value to be utilized in the model. Furthermore, this method allows logarithmic changes. The second outcome variable measures employment. The variable is calculated as a probability for currently being employed. Each individual is assigned a binary value (1=employed, 0=unemployed).

To capture the alcohol consumption, a self-reported information on consumed alcohol servings from the Health 2000 -study is examined. First, individuals are divided into groups based on their drinking habits. Each individual can only belong to a single category. For example, one cannot at the same time be both a former drinker and a constant abstainer. After this, the group differences are compared.

The initial measure for alcohol consumption is the self-reported average monthly consumption during the previous 12 months. The consumption was calculated from two questions with fixed response alternatives. Respondents had to first answer a question if they consumed alcohol at all or if they had formerly consumed but later stopped. If they answered that they consumed alcohol, they were directed to answer how frequently and how much they drank. The frequency of alcohol consumption was captured using a 7-point-scale. (1="never", 7="more than 6-7 times a week"). Respondents also had to answer how much alcohol they drank on a single occasion, ranging from 1 serving to 15 or more. One serving was defined as 12 grams of pure ethanol and it could be consumed as beer or cider, wine, other mild drinks or spirits.

The limits for moderate drinking and heavy drinking have been debated and therefore vary from country to country. 280 g of pure alcohol per week (24 units of alcohol, one unit=12 g of pure ethanol) is a widely used limit of heavy drinking for men in Finland. Additionally, 190 g of pure alcohol per week (i.e. 16

² The variables picked from the original Health 2000 -study can be found in the appendix.

units of alcohol) is the limit of heavy drinking for women (Aalto 2001; Salonsalmi et al. 2012; Sillanaukee et al. 1992).

Similarly to earlier research, (e.g. Böckerman et al. 2017), the individuals are assigned to one of four mutually exclusive alcohol consumption groups. Those who answered in the first question that they had drunk alcohol, but did not drink anymore are classified as former drinkers. Those who answered in the first question that they consumed alcohol and in the second question their total consumption during the last 12 months was less than 280 (190) g per week are classified as moderate drinkers. Heavy drinkers are those whose total consumption of alcohol during the last 12 months was more than 280 (190) g per week. Additionally, those who answered in the first question that they had not drunk before or during the last 12 months are labelled as constant abstainers. The limits for moderate and heavy consumption are the same as mentioned in section 2.

Measures are based on self-reported data. This may possibly lead to limitations of the reliability since the results are likely to be biased. One problem is that heavy drinkers tend to under-report their consumption and moderate drinkers tend to over-report (Lemmens et al. 1992). Especially young adults are likely to over-report to appear more experienced or to impress their peers. This results in smaller differences between the alcohol consumption groups when the differences might actually be larger. This kind of measurement error may lead to upward bias (Böckerman et al. 2017). Respondents may also fail to answer correctly about their consumption due to calculating the alcohol servings incorrectly or forgetting drinking events. Since the respondents had to evaluate their consumption over a relatively long period of time, it is likely that there are reporting errors. The results are also sensitive to a quite large time-variance in individual drinking behavior (Lemmens et al. 1992). Therefore it is possible for some of the respondents to have both heavy and very light terms of alcohol consumption depending on the study period, which may also lead to bias in the results.

4.3 Descriptive evidence

Average earnings, probability of being employed and average education years are reported in Table 6, conditional on alcohol consumption.

TABLE 6 Descriptive evidence.

	%-Share	Earnings (€)	Emplo- yment	Education years
Former drinker	3.0	1548.98	0.4	13.37
Constant abstainer	10.5	1134.40	0.45	13.04
Moderate drinker	83.5	1594.30	0.59	13.95
Heavy drinker	3.0	1534.20	0.57	13.43
F-statistic		7.94	4.10	5.20
		p<0.001	p<0.01	p<0.005
Observations		1171	1171	1171

Notes: F-test is used to test the hypothesis that the means of a given set of normally distributed populations, all having the same standard deviation, are equal. In this study it is used to test if the means of moderate drinkers and other consumption groups are equal.

All groups seem to have lower earnings compared to moderate drinkers. Especially constant abstainers earn significantly less than others, since their average earnings are only €1134.4 a month whereas other groups earn approximately over €1500 a month. Individuals who are identified as former drinkers or constant abstainers seem to have a slightly lower probability of being employed than moderate drinkers. The probability is lowest for former drinkers. There does not seem to be large differences in the average years of education, but similarly to other results, constant abstainers have the poorest average, only 13.04 years. The null hypothesis of equal group means is rejected for all measures.

Based on descriptive evidence it would seem that moderate drinkers experience the most positive labor market outcomes. Both their level of income and the probability of being employed are higher than those of other groups. They also seem to have the most education years. Constant abstainers seem to have the lowest income and least education, whereas former drinkers have the lowest probability of being employed. However, a simple inspection of means does not provide reliable picture of the phenomenon on its own and further study is needed.

4.4 Method

The aim of this study is to examine whether consumption of alcohol has negative effects on the earnings and employment of young adults. The effect of alcohol consumption on these labor market outcomes will be studied using OLS-regression, as it is commonly used in earlier empirical research (e. g. French & Zarkin 1995; Heien 1996; Hamilton & Hamilton 1997; McDonald & Shields 2001; Sloan and Grossman 2011; Böckerman, Hyytinen & Maczulskij 2015; Böckerman,

Hyytinen, & Maczulskij 2017). OLS-regression, or linear regression, is a commonly used method in econometric analysis due to the versatility it offers. According to Stock and Watson (2003), “OLS minimizes the sum of the squares of the differences between the observed dependent variable in the given dataset and those predicted by the linear function” (Stock & Watson 2003). In other words, OLS-regression is used for examining to which extent explanatory variable X can explain the variation in dependent variable Y . Employment is observed as a probability of being employed and the effect of alcohol consumption on earnings is estimated with a log-linear probability model.

Cawley and Ruhm (2011) argue that identifying the consequences of alcohol consumption on earnings and employment is difficult, since correlation can reflect several factors. It can mean either a causal impact of alcohol consumption on labor market outcomes or an impact of poor outcomes on alcohol consumption. It is also possible that the impact of omitted variables affects both alcohol consumption and outcomes. The first two factors can be called simultaneous causality and the third omitted variable bias. According to Cawley and Ruhm (2011), the most reliable way to estimate the causal effect of an unhealthy behavior to outcomes would be to assign a large group of randomly drawn individuals into treatment group and control group. The individuals would otherwise be similar to each other. The treatment group would then be exposed to an unhealthy behavior, such as excessive drinking, and comparing the differences of the treatment group and the control group would produce a reliable estimate of the impact of the unhealthy behavior. Researchers have been seeking out similar of natural experiments to avoid exogenous variation in health variables and to identify the causal effect. For example twin studies (e. g. Böckerman et al. 2017) have allowed this kind of control over exogenous bias. Natural experiments can also be exploited by using instrumental variables (IV).

Inspired by Böckerman et al. (2018) and Carree et al. (2011), the following econometric specification is used to capture the poor labor market outcomes of alcohol consumption:

$$(8) Y_i = F_i + A_i + H_i + \beta_1 X_i + \varepsilon_i$$

where Y_i is one of the measures for poor labor market outcomes for individual i , binary indicators (F, A, H) are mutually exclusive groups of alcohol consumption, X_1 is a vector of control variables and ε_i is an i.i.d.³ error term

There are a few issues that need to be considered in the study. First, it has been widely studied in earlier empirical literature (see, e. g. Hamilton & Hamilton 1997) that moderate drinkers tend to have most favorable labor market outcomes. Based on this assumption, moderate drinkers are treated as a reference group in this study. Other groups are always compared to moderate drinkers and it is observed if they have more favorable or poorer labor market outcomes. Secondly, one of the assumptions in linear regression models is that there is no heteroskedasticity. All error terms are expected to be independent and identically distributed, hence having the same variance. Violation of this assumption leads

³ Independent and identically distributed random variables

to heteroskedasticity. Even though the OLS estimator still produces unbiased and consistent coefficient estimates under heteroskedasticity, the estimator will be biased for standard errors. To address this problem, robust standard errors are used in the study.

5 RESULTS

In this chapter, the results of the study are presented. The effects of alcohol consumption are examined first on earnings and then on employment. After inspecting the results for main variables, other possibly explanatory variables are added to the model and the results are compared. Finally, the study group is divided based on the choice of education at upper secondary level. The results are compared separately for different education attainments. The results are always examined on the level of the entire study and then separated by gender. Moderate drinkers are constantly used as the reference group of the study. Furthermore, robust standard errors are used throughout the study to obtain unbiased standard errors of OLS coefficients under heteroscedasticity.

5.1 Results from the OLS-regression approach

Table 7 shows the results for the basic OLS-model. The effects are first estimated only for alcohol consumption variables. After that, age, education years and health are added as control variables.

The results show that all groups have lower earnings than moderate drinkers, but only the difference between abstainers and moderate drinkers is statistically significant (1% confidence level). Adding age, education (average years of schooling) and health (self-reported health condition) as control variables does not affect this. As predicted earlier, health seems to also have an effect on earnings, and poorer health is related to lower earnings ($p < 0.01$). The association is also in accordance with the predictions of Grossman's model. Education does not seem to have much significance to the results. On the other hand, age does have a statistically significant effect on the results, and higher age seems to be associated with higher earnings.

When examining the results by gender, the effect of alcohol consumption on earnings differs slightly between men and women. The results for men are similar to the results for the whole study sample, and abstainers earn less than moderate drinkers ($p < 0.01$). However, health does not have a statistically significant effect on earnings for men. For women, none of the groups differ statistically from moderate drinkers. The situation changes after adding age, education and health as controls. In this case both former drinkers ($p < 0.10$) and abstainers ($p < 0.05$) earn less than moderate drinkers. Similarly to the results for the whole study sample, poor health is related to lower earnings ($p < 0.01$).

TABLE 7 OLS Regression results for the relation of alcohol and earnings.

	All	All	Male	Male	Female	Female
Former	-0.089 (0.177)	-0.112 (0.167)	-0.447 (0.391)	-0.525 (0.369)	0.186 (0.129)	0.192* (0.112)
Abstainer	-0.470*** (0.102)	-0.315*** (0.090)	-0.674*** (0.180)	-0.390** (0.157)	-0.294 (0.117)	-0.211** (0.105)
Heavy	-0.039 (0.161)	-0.040 (0.142)	-0.004 (0.288)	0.079 (0.227)	-0.049 (0.169)	-0.097 (0.162)
Age		0.136*** (0.008)		0.160*** (0.011)		0.107*** (0.010)
Education years		0.001 (0.010)		0.011 (0.013)		0.008 (0.015)
Health		-0.093*** (0.034)		-0.069 (0.055)		-0.119*** (0.043)
Observa- tions	1171	1171	549	549	622	622
R ²	0.023	0.272	0.040	0.341	0.014	0.220
Prob>F	0.000	0.000	0.002	0.000	0.027	0.000

Notes: Health is measured as the participants' self-reported health condition, 1 being the best possible health and 5 being the poorest health condition. Prob>F is the p-value of the F-test. Standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01

The results for the effect of alcohol consumption on the probability of being employed are presented in Table 8. When examining the differences in the probability of being employed, constant abstainers seem to be approximately 13,5% less likely to be employed than moderate drinkers (p<0.05). The difference may be considered significant. Adding the controls changes the statistical significance of the results. Former drinkers are now approximately 20.3% less likely to be employed than moderate drinkers at 5% confidence level. Abstainers are 8.7% less likely to be employed than moderate drinkers at 10% confidence level. Both differences are still very large.

The results for men are mostly not statistically significant. Even after adding the control variables, the p-values of the group differences remain relatively high.

Age has a statistically significant positive effect on employment at 1% confidence level. Health also influences employment for men, as poor health is associated with lower probability of being employed ($p < 0.1$). The results for women differ highly from men. Female former drinkers are 31.5% less likely to be employed than moderate drinkers at 1% confidence level. The result stays approximately the same even after adding control variables. Additionally, abstainers also differ significantly from moderate drinkers and are 11.4% less likely to be employed ($p < 0.05$). Health does not seem to have an effect on employment for women.

According to the results, alcohol consumption seems to have quite remarkable effects on employment. Former drinkers and abstainers are mostly much less likely to be employed than moderate drinkers. The differences are especially noteworthy for women. However, since the group differences are mostly not statistically significant for men, gender seems to also matter. Health has also notable effects on employment.

TABLE 8 OLS regression results for the relation between alcohol and employment.

	All	All	Male	Male	Female	Female
Former	-0.187 (0.084)	-0.203** (0.188)	0.038 (0.123)	0.029 (0.140)	-0.315*** (0.089)	-0.316*** (0.091)
Abstainer	-0.135** (0.047)	-0.087* (0.045)	-0.091 (0.071)	-0.030 (0.071)	-0.154 (0.061)	-0.114** (0.057)
Heavy	-0.016 (0.085)	-0.026 (0.084)	-0.113 (0.126)	-0.098 (0.131)	0.073 (0.116)	-0.048 (0.112)
Age		0.055*** (0.044)		0.056*** (0.005)		0.049*** (0.006)
Education years		-0.016 (0.006)		-0.022 (0.008)		0.000 (0.009)
Health		-0.049** (0.020)		-0.049* (0.028)		-0.042 (0.027)
Observa- tions	1171	1171	549	549	622	622
R ²	0.010	0.147	0.005	0.163	0.022	0.142
Prob>F	0.007	0.000	0.479	0.000	0.000	0.000

Notes: Health is measured as the participants' self-reported health condition, 1 being the best possible health and 5 being the poorest health condition. Prob>F is the p-value of the F-test. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

As mentioned in section 2, education has a major effect on future employment and income. When the effect of alcohol consumption on education years is studied, the results indicate that abstainers have approximately one year less education than moderate drinkers ($p < 0.001$).⁴ When men and women are observed separately, the effect is even steeper for men. This indicates that alcohol consumption does have an effect on the length of education.

Moreover, individuals with different educational attainment are very likely to differ in labor market outcomes as well. These differences may have little to do with alcohol consumption. Table 10 contains the results for different education attainments separately. Constant abstainers who have participated in general upper secondary education seem to have both lower earnings than moderate drinkers ($p < 0.01$) as well as a lower probability of employment ($p < 0.05$). When focusing on people who have participated in vocational upper secondary education, constant abstainers also have lower earnings than moderate drinkers. However, only the difference between moderate drinkers and former drinkers is statistically significant when observing employment. Therefore, the effect of alcohol consumption on labor market outcomes depends the educational attainment.

⁴ OLS regression results for the effect of alcohol consumption on education years can be found in the appendix.

TABLE 8 OLS Regression results for different educational attainment.

	Upper Secondary	Vocational
Earnings		
Former	0.140 (0.300)	-0.445 (0.311)
Abstain	-0.635*** (0.167)	-0.350* (0.134)
Heavy	0.181 (0.186)	-0.194 (0.298)
R	0.033	0.025
Prob>F	0.001	0.034
Employment		
Former	-0.102 (0.129)	-0.321** (0.145)
Abstain	-0.203** (0.064)	-0.108 (0.070)
Heavy	-0.073 (0.134)	-0.023 (0.124)
Observations	665	412
R ²	0.014	0.019
Prob>F	0.015	0.078

Notes: Prob>F is the p-value of the F-test. Standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

5.2 Interpretation of results

Abstainers seem to have poorer labor market outcomes than other groups, especially lower level of earnings. One explanation could be that abstainers have never had a good health compared to other groups. Lower health has prevented them from both using alcohol and being productive at the labor market, which

has resulted in lower earnings in adult life. The hypothesis can be tested by controlling health in the basic estimation model. However, when a dummy for health condition was added to the model, it did not explain the phenomenon in this data. Abstainers actually had evaluated their current health condition higher than other groups. The reason why health condition does not explain the poor labor market outcomes here might be because the study sample is too small or because cross-sectional data is used instead of panel data and observation period is too short.

According to the results, constant abstainers have lower earnings than moderate drinkers. Both abstainers and former drinkers are also considerably less likely to be employed than moderate drinkers. The results differ slightly for men and women and also for different educational backgrounds. Nevertheless, the results indicate that moderate drinkers seem to generally have the most favorable labor market outcomes compared to other groups. It has been discovered in some studies (Haseeb et al. 2017; Sabia et al. 2018) that the association between alcohol consumption and health outcomes appears to be J-shaped, which could also explain the more favorable labor market outcomes. The curve is presented in figure 4.

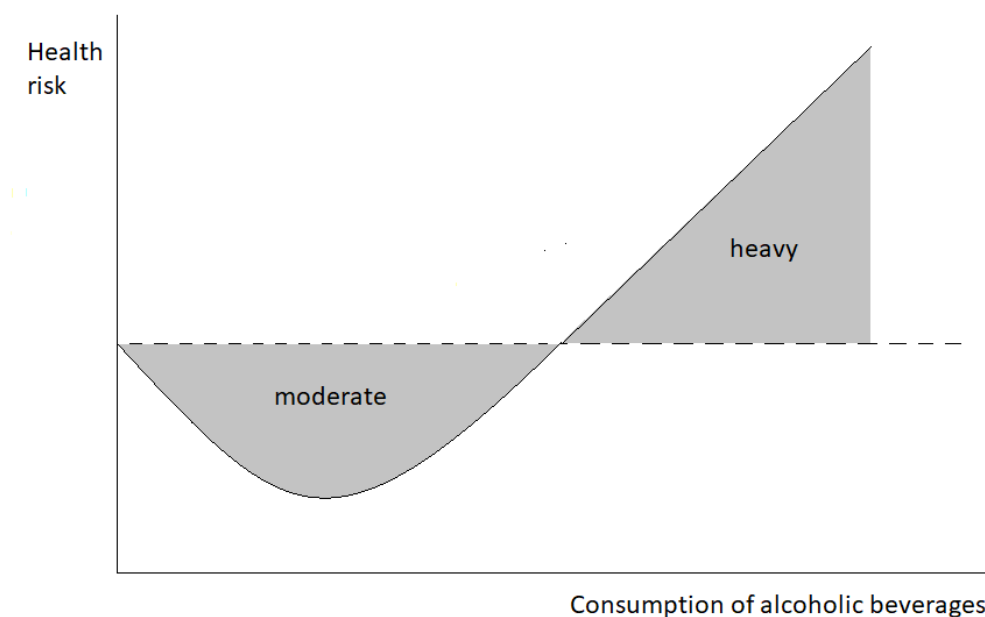


FIGURE 3 The J- shaped association between moderate drinking and health outcomes.

The assumption that moderate drinkers are less likely to die from any cause than abstainers and heavy drinkers is known as the J- or U-curve. As mentioned in section 2, earlier empirical research has found evidence for the J- or U-shaped association between alcohol consumption and earnings (see, e.g. Heien 1996). For example Haseeb et al (2017) claim that the J-curve is attributable to the beneficial effect on cardiovascular health. The health benefit compensates other illnesses, such as cancer, which leads a lower probability of dying from any cause. The

relative risk of death is lowest among moderate and light drinkers and highest among abstainers and heavy drinkers. However, the risk increases dramatically with each alcohol serving above moderation. The risk of dying is highest among heavy drinkers, thus the J-shaped association of alcohol consumption and health risk (Haseeb et al. 2017.)

However, according to a recent study (Burton & Sheron 2018), there is no such level of alcohol consumption that would be safe or beneficial for health. Burton and Sheron (2018) studied to which extent moderate consumption of alcohol is protective against some health conditions. They argue that even though moderate consumption would protect against some health diseases, there is always an increased risk of other equally harmful health conditions, such as cancer. Therefore, it cannot be stated that a certain amount of alcohol would be safe or lead to most beneficial outcomes.

6 DISCUSSION

The aim of this study was to examine the relationship between adolescent alcohol consumption and labor market outcomes. Understanding whether and how economic resources are related to individuals' alcohol consumption might possibly improve the health and wellbeing of the entire population. Moreover, preventing alcohol abuse early on could both improve the quality of life of individuals as well as remarkably reduce health-related costs for the society. Thus, the study was motivated by the fact that identifying the effect of alcohol consumption on the future earnings and employment of young adults could help in preventing harmful outcomes. Existing studies suggest that drinking at young age causes several negative consequences in adulthood and disturbs the transition into labor market (Sloan & Grossman 2012; Rose et al. 2014; Böckerman et al. 2015). It has also been reported that though alcohol consumption in general is linked to negative outcomes (e. g. Hamilton & Hamilton 1997; Böckerman et al. 2017), moderate drinkers often seem to have the most favorable outcomes (Barrett 2002; French & Zarkin 1995; Hamilton & Hamilton 1997; Heien 1996). Some studies have even found evidence for a U- or J-shaped relationship between alcohol consumption and earnings, where moderate consumption seems to lead to the highest earnings (French & Zarkin 1995; Heien 1996). However, a recent study suggests that no level of alcohol consumption can be described as beneficial for health (Burton & Sheron 2018).

The empirical research in this study aimed to analyze the effect of alcohol consumption on the earnings and employment of Finnish young adults. The data was drawn from the Health 2000 -study conducted by the National Institute for Health and Welfare. Individuals aged 18-29 years were chosen for the study and the final estimation sample consisted of 1171 individuals. Those individuals were divided into four consumption groups based on their drinking habits and the group differences were compared using OLS-regression method. The results implied that constant abstainers appeared to have lower earnings and were less likely to be employed than moderate drinkers. When comparing the results by gender, the effect of alcohol consumption on earnings was even stronger for male abstainers than for females. Unlike male former drinkers, female former drinkers seemed to also earn less than moderate drinkers. When examining the effect of alcohol consumption on employment, both former drinkers and abstainers were less likely to be employed than moderate drinkers. The results separately for women were similar to those for the entire estimation sample and both abstainers and former drinkers differed negatively and statistically significantly from moderate drinkers. However, there were no statistical differences between consumption groups when studying the probability of being employed for men. Furthermore, self-reported health seemed to affect both earnings and employment and poor health was associated with lower earnings and lower probability of being employed.

The findings of this study are mostly in line with earlier literature, where moderate drinkers seemed to experience higher earnings (Barrett 2002; French & Zarkin 1995; Hamilton & Hamilton 1997; Heien 1996) and better employment

than others (Böckerman et al. 2017). However, most regression results in this study were not statistically significant. The coefficient of determination in most models was relatively low, thus the variables used were not able to explain a lot of the variation in earnings and employment. For example, heavy drinkers did not differ statistically from moderate drinkers in any of the models. Therefore, it cannot be said with this data set that alcohol consumption has a causal impact on labor market outcomes.

There are several possible explanations why this study was unable to fully capture the effect of alcohol consumption on the earnings and employment of young adults. Labor market outcomes develop over time and the true impact of alcohol consumption on earnings and employment can only be observed after several years of drinking or abstaining from it. This study was conducted with cross-sectional data and participants were aged 18-29 years when data were gathered. Young adults have not yet had the time to consume alcohol for relatively long periods of time and they have not been a part of the labor market for long. The final study estimation sample was also relatively small, which may have caused bias in the results. Descriptive evidence of the data also revealed that most individuals were classified as moderate drinkers (83.5%). Very few participants identified as a former or heavy drinker (3% in each category). This may also be due to the young age of the participants. They have not necessarily had the required time to develop drinking habits and preferences. It is possible that the unequal distribution of groups has caused bias in the results. If the participants were older, the consumption groups may have been more balanced.

The study setting was also limited. Exogenous variation in health variables was largely not controlled due to the lack of suitable control variables in the data set. For example, childhood conditions and parental background may have a significant impact on the educational choices of an individual. Furthermore, earlier empirical research (see, e. g. Sloan & Grossman 2012) shows that genetic and environmental factors also have wide social consequences, which may be in relation with substance abuse behavior. Controlling these factors would possibly produce more reliable results. It must also be noted that a considerable portion of individuals were not a part of the labor force. For example, 33% of participants reported to be still students. Therefore, it is not possible to estimate how alcohol consumption is going to affect their labor market outcomes in the future with this data. Considering the nature of the study, the results cannot be used for accurately estimating the impact of adolescent alcohol consumption in the long-run. To better address the causal impact of alcohol consumption on earnings and employment, further research with panel data is needed.

As discussed in section 3, specifying whether alcohol consumption causes negative labor market outcomes through health or through another variable has received little attention in earlier research. For example, it is possible that consumption of alcohol may cause discrimination in the labor market and consequently lead to lower earnings and unemployment. Discrimination-related poor outcomes may not be linked to health at all. For example, constant abstainers may earn less than moderate drinkers because they may experience discrimination from their employer, other employees or customers at the workplace. It was not

possible to single out the underlying causes behind the effect of alcohol consumption on earnings and employment with this data. Though the regression results indicated that self-reported poor health was associated with lower earnings and weaker probability of being employed, there were no variables measuring the possible effect of discrimination. Therefore, it would be beneficial to study further how discrimination at the labor market affects earnings and employment and whether both health and discrimination are correlated with poor outcomes.

This study contributes to the existing literature by providing additional evidence on the labor market effects of alcohol consumption especially for young adults in Finland. For the time being, the matter has not been widely studied with Finnish data. Alcohol consumption causes severe costs for the entire economy each year through health services and disability pensions to name a few. Addressing funds to prevent harmful drinking habits among adolescents would be more cost efficient than treating the consequences later on. For example, correct taxation of alcohol, increased monitoring of alcohol distribution and spreading awareness of possible health hazards might decrease the problems in the future. Therefore, it is crucially important to study the effects of substance abuse on the future of young people. As this study was unable to fully address the effect of alcohol consumption on the earnings and employment of Finnish adolescence, further research is needed.

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APPENDIX A: FIGURES AND TABLES

TABLE A1 Variable means of the original study estimation sample.

Measure	All	Male	Female
		0.48 (0.50)	0.52 (0.50)
Education (years)	13.70 (0.07)	14.09 (0.09)	13.31 (0.09)
Age	23.41 (0.08)	23.40 (0.12)	23.43 (0.11)
Married	0.15 (0.06)	0.13 (0.01)	0.18 (0.02)
Currently employed	0.56 (0.01)	0.65 (0.02)	0.48 (0.02)
Unemployed	0.03 (0.004)	0.04 (0.01)	0.03 (0.01)
Studying	0.32 (0.01)	0.27 (0.02)	0.37 (0.02)
Finnish matriculation examination (graduated)	0.55 (0.06)	0.45 (0.02)	0.61 (0.02)
Disability pension	0.01 (0.002)	0.01 (0.00)	0.00 (0.00)
Earnings	1548.10 (112.37)	1815.30 (58.50)	1304.10 (32.10)
Smoker (full time or on occasion)	0.67 (0.08)	0.72 (0.03)	0.64 (0.03)
Used or tried drugs	0.20 (0.05)	0.22 (0.02)	0.19 (0.02)
Exercise at least once a week	0.66 (0.17)	0.65 (0.02)	0.67 (0.02)
Former drinker	0.03 (0.18)	0.03 (0.01)	0.03 (0.01)
Abstainer	0.10 (0.35)	0.10 (0.01)	0.11 (0.13)
Moderate drinker	0.83 (0.42)	0.85 (0.03)	0.82 (0.02)
Heavy drinker	0.03 (0.18)	0.03 (0.01)	0.03 (0.01)
Observations	1894	913	981

TABLE A2 OLS-regression results for the relation between alcohol consumption and education years.

	All	Male	Female
Former	-0.575 (0.474)	0.433 (0.704)	-1.340** (0.620)
Abstain	-0.906*** (0.243)	-1.265*** (0.388)	-0.701** (0.294)
Heavy	-0.517 (0.494)	-0.504 (0.602)	-0.556 (0.750)
N	1171	549	622
R ²	0.014	0.024	0.017
Prob>F	0.001	0.009	0.019

TABLE A3 OLS-regression results for the relation between alcohol consumption and earnings, age and education as control variables.

	All	Male	Female
Former	-0.124 (0.169)	-0.547 (0.369)	0.194 (0.115)
Abstainer	-0.309*** (0.090)	-0.385 (0.157)	-0.204 (0.105)
Heavy	-0.082 (0.137)	0.024 (0.217)	-0.118 (0.154)
Age	0.134*** (0.008)	0.158*** (0.012)	0.107*** (0.010)
Education years	0.002 (0.010)	0.013*** (0.013)	0.013 (0.015)

N	1171	549	622
R ²	0.267	0.338	0.211
Prob>F	0.000	0.000	0.000

TABLE A4 OLS-regression results for the relation between alcohol consumption and employment, age and education as control variables.

	All	Male	Female
Former	-0.209** (0.088)	0.014 (0.141)	-0.315*** (0.091)
Abstainer	-0.083* (0.046)	-0.026 (0.071)	-0.111 (0.057)
Heavy	-0.048 (0.084)	-0.135 (0.127)	0.041 (0.113)
Age	0.054*** (0.004)	0.055*** (0.005)	0.049*** (0.006)
Education years	-0.014** (0.006)	-0.021*** (0.008)	0.002 (0.008)
N	1171	549	622
R ²	0.141	0.158	0.139
Prob>F	0.000	0.000	0.000

APPENDIX B: HEALTH 2000 QUESTIONNAIRE FORMS

The original questionnaire forms from the Health 2000 study are public and available at: <https://thl.fi/fi/tutkimus-ja-kehittaminen/tutkimukset-ja-hankkeet/terveys-2000-2011/tutkimuslomakkeet/terveys-2000-tutkimuksen-suomenkieliset-lomakkeet> (Referred May 8th, 2019)

The following variables from the original study were used in this study:

Demographics

IKA2, SYNTVUOSI, SP2, NUORKH_OLO2, NR_KYSELY_OLO2, AA01

Employment

NKYS_K3501, NKYS_K3502, NKYS_K3503, NKYS_K3504, NKYS_K3505, NKYS_K3506, NKYS_K3507, KYS1_K28, KYS1_K83, AD01, AE00N, AG01, AH01

Earnings

AJ00N, AJ01N

Alcohol consumption

KYS1_K38, KYS1_K3801, KYS1_K3802, KYS1_K3803, KYS1_K39, KYS1_K40, KYS1_K41, KYS1_K4101, KYS_K43, KYS1_K44, KYS1_K4401, KYS1_K46, KYS1_K47, KYS1_K51, NKYS_K8001, NKYS_K8002, NKYS_K8003, NKYS_K8004, NKYS_K8005, NKYS_K8006, NKYS_K8007, NKYS_K8008, NKYS_K81, NKYS_K8101, NKYS_K82, NKYS_K83, NKYS_K84, NKYS_K85, KYS1_K52

Other substance abuse

NKYS_K90, NKYS_K94, KYS1_K6704, KYS1_K6705, FB05

Health condition

KYS1_K28, BA01

Education

AC01N, AC00AN, AC00AN, AC01X, AC02N, AC03