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# Long-Term Effects of Job Loss on Male Health: BMI and Health Behaviors<sup>1</sup>

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Running Head: Long-Term Effects of Job Loss on Male Health

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## Abstract

Employment is one of the most critical determinants of health and health behaviors for adults. This study focuses on Ukraine and measures how an involuntary job loss – defined as job loss due to business closures, reorganizations, bankruptcies, or privatization – affects BMI, being overweight or obese, smoking, alcohol consumption, and physical activity. There are three reasons to study Ukraine in the aftermath of an enormous economic transition that resulted in employment contraction as high as 40% compared to 1990. First, nearly all published studies on the relationship between job loss and health and health behaviors have been on developed countries, meaning that our study fills the gap in the literature on transition economies. Second, the job losses that we study are plausibly exogenous and affected a significant share of the population. Third, the longitudinal survey follows individuals for up to 10 years starting from 2003, allowing us to capture the long-term effects of past job loss on outcomes at a specific point in time and their trajectories across the life cycle. Applying growth-curve models, we show that past involuntary job loss significantly alters the age trajectories of all considered outcomes at both extensive and intensive margins.

**Keywords:** involuntary job loss; growth curve; obesity; health behaviors

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# Long-Term Effects of Job Loss on Male Health: BMI and Health Behaviors<sup>2</sup>

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## 1. Introduction

Employment is one of the most critical determinants of health and health behaviors for adults (Bartley et al., 2009). Hence, job loss can affect health through a variety of channels. For example, a significant reduction in household income may lead individuals to spend less on non-urgent health care needs and preventive measures. It also may lead to increases in serious diseases, such as tuberculosis (Arinaminpathy and Dye, 2010). Emotional effects from job loss include shock and denial, anxiety and fear, sadness and depression, and anger and shame, leading to elevated stress levels and a higher risk of hypertension, heart problems, and generally poorer health outcomes. Loss of a habitual social environment also may cause loneliness and isolation that may lead to higher body-mass index (BMI) (Lauder et al., 2006) and smoking prevalence (DeWall and Pond, 2011). While the effects of job loss on health are generally adverse, it theoretically could improve health if it stimulates a more balanced lifestyle via allowing more time to engage in health-benefiting activities, such as better diet and exercise.

The interest in the effect of being out of the labor market on health and wellbeing in social sciences has a long history, both concerning unemployment (for reviews and meta-analysis see McKee-Ryan et al., 2005; Paul and Moser, 2009; Wanberg, 2012) and job insecurity (Cheng and Chan, 2008; De Witte, 2005, 1999). It has intensified with the Great Recession, as outlined in the comprehensive review by Margerison-Zilko et al. (2016). The findings show a great degree of variation both among disciplines and between the aggregate and the individual levels of analysis (Stuckler et al., 2015). Most aggregate-level studies show a positive effect of unemployment on health (e.g., Gerdtham and Ruhm, 2006; Neumayer, 2004; Ruhm, 2000; Tapia Granados, 2008, 2005; Tapia Granados and Diez Roux, 2009; Tapia Granados and Ionides, 2017), with few finding no significant effect (e.g., Economou et al., 2008<sup>3</sup>; Svensson, 2007). For a review and discussion, see Ruhm (2016) and Tapia Granados

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<sup>3</sup> Economou et al.'s paper should be considered here with caution, as they used measures of alcohol and cigarettes consumption and caloric intake as controls in their regressions.

(2017). Studies focusing on individual experiences found that unemployment significantly increases mortality (Gerdtham and Johannesson, 2005, 2003; Ungváry et al., 1999) and lowers socioeconomic status, leading to worse physical health (Wagstaff et al., 2001).

Several studies investigated changes in individual behavior that lead to aggregate patterns. Some considered the importance of deaths due to road accidents and mortality patterns among the elderly (e.g., Konetzka et al., 2018; Miller et al., 2009; Stevens et al., 2015). Others explored the effect of economic downturns on individual health outcomes and behaviors. For example, Hessel and Avendano (2016) examined the evidence for 11 European countries and found that “exposure to economic downturns at ages 40-49 is associated with poorer health in older ages, possibly by increasing risk of unhealthy behaviors and low incomes persisting into older age”. Ásgeirsdóttir et al. (2014a) found that in Iceland, the 2008 crisis led to significant reductions in unhealthy behaviors such as smoking, consuming alcohol, soft drinks, and eating sweets. At the same time, it had varying effects on health-promoting behaviors — a decrease in eating fruits and vegetables and an increase in the consumption of fish oil and sleep.

Moreover, all health-compromising behaviors, except the consumption of sweets, continued to decline during the period of economic recovery (Ásgeirsdóttir et al., 2016). Ásgeirsdóttir et al. (2014b) estimated statistically significant, albeit minor, positive effects from the economic crisis on hypertension in Iceland among men, but not among women, and Birgisdóttir et al. (2017) found that the sharp change in economic conditions in 2008 increased the probability of cardiovascular events in both men and women in the long term. Kaiser et al. (2018) documented that economic downturns in Germany increased the propensity of becoming a smoker but decreased the consumption of cigarettes among current smokers. Disaggregating the unemployment rate by education groups, Crost and Friedson (2017) showed that the group-specific unemployment rate is associated with a higher group-specific mortality rate. This is consistent with the hypothesis that, despite potential indirect health benefits of unemployment at the macro level, “being personally affected by a recession has a detrimental effect on health.”

One challenge when analyzing individual-level data is finding exogenous sources of variation in labor market participation. Yet, recent studies that use involuntary job loss as a source of exogenous labor market shock support earlier findings of adverse health effects. For example, Schröder (2013), using the Survey of Health, Ageing, and Retirement in Europe (SHARE), found that involuntary job loss negatively affects health even after 25 years, controlling for socioeconomic status and health in childhood. Similarly, Voßemer et al. (2018) showed that an involuntary job loss in the first ten years after the labor market entry increased the likelihood of fair or poor self-rated health in later life by about six percentage points. Only a tiny share of this effect explained by the subsequent unemployment risks and employment instability.

Studies based on administrative records have documented that workers affected by mass layoffs faced many adverse outcomes: (i) significant excess mortality (Browning and Heinesen, 2012; Eliason and Storrie, 2009a; Sullivan and Von Wachter, 2009); (ii) higher risk of hospitalization due to alcohol-related conditions, traffic accidents, self-harm, and mental health issues (Browning and Heinesen, 2012; Eliason and Storrie, 2009b); (iii) worse self-reported health, activity limitations, and worse mental health (Schaller and Stevens, 2015); (iv) increased expenditure on antidepressants and related drugs as well as hospitalizations due to mental health problems among men, but not among women (Kuhn et al., 2009); and (v) lower health as measured by biomarkers (Michaud et al., 2016). In addition, Salm (2009) showed that after controlling for the subjective probability of job loss, there was no effect of job loss on a range of health measures among the US elderly. However, one should treat this study with caution. Along with basic demographics, this study controls for several characteristics that might have been affected by the job loss, including marital status, income, wealth, health behaviors, and health insurance. Falba et al. (2005) find that involuntary job losses increase the intensity of cigarette consumption among current smokers and the probability of relapse among past smokers. Recent evidence stemming from job losses during the Great Recession indicates a significant increase in the likelihood of smoking (Golden and Perreira, 2015). Moreover,

Strully (2009) and Sullivan and Von Wachter (2009) provided evidence that the harmful effects of job loss go beyond the possibility for unhealthy people to be selected for layoffs.

Only a few studies considered BMI together with other health-affecting behaviors in the context of exogenous job loss. Marcus (2014) used a non-parametric matching strategy to study the effects of exogenous job losses in Germany and found that job losses from business closures result in a higher likelihood of smoking initiation and a small but significant increase in body weight. Deb et al. (2011) used finite mixture modeling to find that job loss results in higher BMI and alcohol consumption among the elderly in the U.S., albeit only among individuals already at risk. Schmitz and Conley (2016) confirmed Deb et al. (2011) findings regarding the effect of job loss on weight gain among at-risk individuals based on the genetic data.

In this paper, we study longitudinal data on individuals to estimate the long-term effects of involuntary job loss on health and health behaviors among working-age Ukrainian men. Ukraine's tumultuous economic transition from central planning toward a market economy provides plausibly exogenous shocks to study. We focused on three questions. First, does an individual's history of job loss significantly alter that person's future trajectory of BMI and obesity? Second, does job loss affect trajectories of other health-promoting and compromising personal behaviors, such as physical exercise, smoking, and alcohol consumption? Third, do the effects of job loss differ by whether they occurred before or after 2000, the year when Ukraine started on its path toward economic recovery, or at younger versus older ages? To answer these questions, we used growth-curve models, within the random coefficients framework (Bliese and Ployhart 2002). Growth-curve models investigate how outcomes for units of analysis (e.g., individuals, firms) evolve over time and whether there are any differences in the pattern of this change. These models originally were used in developmental psychology, but with time entered other research domains, which involved analysis of longitudinal data.



The Ukrainian setting is important from both methodological and policy perspectives. From a methodological point of view, it allows us to focus only on the effects of plausibly exogenous job losses. Like the other former Soviet republics, before independence, Ukraine was part of the centrally planned economy, where “enterprises were state-owned, protected from competition, shielded from failure by soft budgets, and managed by production engineers with incentives oriented towards the plan or politics” (Djankov and Murrell, 2002). The transition to a market economy was accompanied by an unprecedented restructuring and a large-scale reallocation of labor across sectors — away from manufacturing and towards services and agriculture (Boeri and Terrell, 2002). Compared to 1992, by 1999, Ukraine experienced a drop in employment by 40% (Brown and Earle, 2006). Moreover, most men in our sample made their occupational and workplace choices during the Soviet period. That was the period of legally enforced “anti-parasitic laws,” “eradicated” unemployment (albeit estimated by Gregory and Collier (1988) to be under 1.5% in the 1970s), with employment, which was guaranteed for their lifetimes. Thus, for them, a job loss resulting from plant closures, layoffs, and bankruptcies in the 1990s was a genuinely exogenous labor market shock. More than two-thirds of displaced workers in Ukraine had a long spell of non-employment after the job loss (Lehmann et al., 2006).

From a policy perspective, our study may help explain why Ukraine has one of the fastest rates of depopulation in Europe.<sup>4</sup> Premature mortality of Ukrainian prime-age men is one of the major contributors to this pattern (McKee and Shkolnikov, 2001). The leading cause of death and disability is cardiovascular disease, responsible for 67% of all deaths in 2009. In 2012, Ukraine had the second-worst mortality in the world related to cardiovascular diseases (CVD) and high population morbidity from CVDs, hypertension, and diabetes (Lekhan et al., 2015) linked to obesity. Available WHO data reports that in 2016, 58.4% of adult men in Ukraine were overweight, and 24.1% were obese compared to 58.6% and 21.9% for the

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<sup>4</sup> <https://blog.euromonitor.com/ukraines-population-in-rapid-decline/> (accessed 5.06.21).

WHO/Europe region (World Health Organization, 2019a). The three other health behaviors under investigation — alcohol drinking, smoking, and physical exercise — also affect the onset and progression of CVDs (Martínez-García et al., 2018).

We restrict our analysis to men for two reasons. First, it is often argued that work is crucial for the identity of men (van der Meer, 2014), so their reactions to shocks related to work are expected to be stronger than those for women (Blanchflower and Oswald, 2004). Second, in Ukraine, life expectancy for men is only 66 years, which is ten years shorter than that for women, and of those 66 years, only 60 are expected to be healthy years (World Health Organization, 2019b).

This paper makes three contributions to the literature on the health effects of individual job loss. First, our study provides some of the first evidence for transition economies. Brainerd and Cutler (2005) found negative health effects from a recession in Russia. Life expectancy fell 6.6 years for men and 3.3 years for women after the USSR collapsed, with the results, from indirect evidence, attributed to increases in alcohol abuse. Lipowicz et al. (2016) considered men in Poland over the period from 1985 to 1993. They concluded that stress in adult men, measured by the Allostatic Load, increased significantly due to the socioeconomic deterioration during the first part of the economic transition. Only Lazareva (2020) relied on an involuntary job loss measure. This paper used propensity score matching to investigate the effect of an involuntary job loss over the period from 1991-1995 on a range of health outcomes (self-rated health, EQ-5D score, chronic health conditions) and health-compromising behaviors (alcohol and tobacco consumption) among Russian population in the year 2006. It found negative effects on health and significantly increased incidence of smoking and alcohol consumption. However, one should treat these results with caution because the analysis included years of education and an indicator for urban residence as controls, which themselves might have been affected by the experience of job loss or other types of labor market shocks considered. One of the benefits of studying a transition economy, as we do, is that the job losses are due to severe economic disruptions (Suhrcke and

Stuckler, 2012). Prior studies of developed countries exploit minor business-cycle fluctuations. In contrast, we studied a population in which more than a quarter of men have had an involuntary job loss.

Second, we used a plausibly exogenous measure of job loss as opposed to endogenous job loss, which may be related to health behaviors. This expands the evidence regarding the effect of job loss on obesity and health-related behaviors (Deb et al., 2011; Marcus, 2014). However, compared with these papers, our estimates are (i) based on a much higher proportion of affected individuals, (ii) focus on men only, and (iii) come from a transition country setting where the cumulative decline in real GDP reached 62% (Kravchuk, 2002) and the employment decline – 40% (Brown and Earle, 2006).

Third, we considered the effect of job loss on the age trajectories for the outcomes of interest and not on the snapshot of the outcome at any specific time, using growth-curve modeling. This is because an individual's weight and BMI are not static; they can fluctuate over time. For example, nutritional studies show that, as people age, their metabolism slows down, yet their energy intake typically remains constant or may even increase (Bosy-Westphal et al., 2003; Elia et al., 2000). Moreover, the growth-curve model accounts for the BMI-age trajectory's unobserved heterogeneity. Such heterogeneity may be due, for example, to a genetic predisposition or other unobserved concurrent health conditions.

## **2. Methods**

The economics literature mainly focuses on how job loss affects health and health behaviors at a specific point in time. However, the epidemiology literature stresses that individuals' health is not static (Haas, 2008) and that life-course events (both positive and negative) not only change health levels but also may influence health-age trajectories. This has been documented in the epidemiology literature (Kim and Durden, 2007) and is supported by some economics studies. For example, Case and colleagues found that the gap in children's health from different socioeconomic backgrounds increases as children age (Case et al., 2002).

Four main theoretical perspectives exist on health's life-course dynamics: the *critical period* model; the *critical period model with later effect modifiers*; the *accumulation-of-risk* model; and the *chain-of-risk* model (Kuh et al., 2004). The critical-period model links early life events and environment to later-life health trajectories, starting from Barker's (1994) well-known example of the fetal origins of diabetes and cardiovascular diseases. The critical-period model with later effect modifiers is an extension of the first, incorporating exposure to various factors in later life that may enhance early life events' effects or diminish them. The first two models are in contrast with the accumulation-of-risk model, which stipulates that risks to health gradually accumulate over time. The chain-of-risk model is a variation of the third model, emphasizing not only the number of adverse or positive events, but also the sequence of these events. Sometimes it also is referred to as a *pathway model* (Kuh et al., 2004). None of the models contradicts the others, and they may operate simultaneously. It may not be feasible to distinguish between them in empirical work. Still, these models carry three implications that are directly useful to our current investigation of involuntary job loss's effects on health outcomes.

First, they imply that it is necessary to use a life-course approach to model health because shocks may affect current health and future health-age trajectories. Second, because each individual arrives at adulthood with an individual health trajectory, which has been formed early in life, we should allow for heterogeneity in these trajectories. Third, involuntary job loss may not have uniform effects across individuals. For example, job strain can have bi-directional effects on BMI. Some studies found that slim workers lost weight in response to job stress, while obese workers gained weight (Kivimäki et al., 2006a, 2006b). We developed our empirical strategy following these implications. We used a simple, two-level, random intercept and random slope (growth curve) model for an individual  $i$  at time  $t$  to show how health ( $H$ ) changes over time as a quadratic function of age for the period from 2003 to 2012:

$$H_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 age_{it}^2 + u_{i0} + u_{i1} age_{it} + u_{i2} age_{it}^2 + \epsilon_{it} \quad (1)$$

In this model,  $u_{i0}$  represents individual random effects,  $u_{i1}$  and  $u_{i2}$  represent the random parts of the coefficients on age and age squared,  $\epsilon_{it}$  is the random error, and the  $\beta$ s are the coefficients. We chose a quadratic function for age after carefully examining three different possibilities – quadratic polynomial, age spline, and a set of dummy variables for age groups. We used graphical examination, Vuong’s (1989) test, and AIC/BIC criteria to discriminate between the models with the different functional forms. Appendix Table A3 provides a summary of this investigation that supports the choice of the quadratic polynomial. Standard errors are robust to heteroskedasticity and are clustered at the individual level. Because the regression analysis is implemented at the individual level, the survey weights are not used.

Given the other two implications from the theoretical models, i.e., that heterogeneity exists in both the trajectories and the effects from any shocks, we extend the basic model (1) to allow for the initial conditions  $\beta_{i0}$  and the slopes  $\beta_{i1}$  and  $\beta_{i2}$  to change, depending on experienced involuntary job losses (*IJL*):

$$H_{it} = \beta_{i0} + \beta_{i1}age_{it} + \beta_{i2}age_{it}^2 + u_{i0} + u_{i1}age_{it} + u_{i2}age_{it}^2 + \epsilon_{it} \quad (2)$$

$$\beta_{ik} = \alpha_{0k} + \alpha_{1k}IJL_i, \quad k = 0,1,2 \quad (3)$$

where  $k$  refers to the order of the coefficient in the quadratic age polynomial. This approach allows individual health-age trajectories to be heterogeneous ( $u_{i0} \neq 0$ ;  $u_{i1} \neq 0$ ;  $u_{i2} \neq 0$ ), elicits involuntary job loss’ effects on health, irrespective of age ( $\alpha_{10}$ ), and estimates the effects of interest not only on health levels but also on health-age trajectories ( $\alpha_{11}$ ,  $\alpha_{12}$ ). To allow for a meaningful interpretation of the main effect of the involuntary job loss, we center the age and age-squared variables on age 18 (Wooldridge, 2019). This way, the main effect of involuntary job loss can be interpreted as the effect at age 18.

We also test whether the involuntary job loss’ effects on the health-age trajectory are heterogeneous across individuals by amending the random part of the model in the following way:

$$u_{ik} = \vartheta_{0k} + \vartheta_{1k}IJL_i, \quad k = 0,1,2 \quad (4)$$

We measure BMI based on self-reported weight and height at each wave of the survey. Although we are aware of the issue with weight misreporting raised in the recent literature (Courtemanche et al., 2015), we conducted the main analysis without correction for two reasons. One is that to do this properly, the corrections have to come from the same data set (Dutton and McLaren, 2014) or at the very least from the same country. Yet, no such correction estimates exist in the literature for Ukraine. If we were to use the available corrections estimated from other countries (USA, Canada, Australia), they would be based on the misreporting patterns among the population of those countries. In that case, we would not know whether the differences were due to an inappropriate correction or due to the measurement error bias. Moreover, Dutton and McLaren (2014) conclude that the correction is essential when measuring BMI distribution, the prevalence of those above and below the obesity threshold of BMI 30 kg/m<sup>2</sup>, or any other cut-point. In addition, there is an agreement that the correction generally does not affect the signs of coefficient estimates or statistical significance (Courtemanche et al., 2015). Therefore, in our main results, we report uncorrected BMI. However, we provide the results from the main analysis with weight correction using the Canadian correction estimates (Dutton and McLaren, 2014) in Appendix Figure A5.

We also explore two other extensions beyond our primary interest in BMI as a measure of health: the probability of being overweight or obese and both the extensive and intensive margins of related health behaviors (consuming alcohol, smoking, and physical activity). A person is defined as being physically active if they engage in at least light physical activity. At the intensive margin, this variable is equal to 1 for light physical activity (< three times a week for 15 minutes or more), 2 for moderate physical activity (< three times a week or at least three times a week for 15 minutes or more), and 3 for vigorous physical activity (>= three times a week for 15 minutes or more intensely or daily >= 30 min). The probability of smoking and drinking and the number of cigarettes smoked per day is reported directly in the data. The total alcohol consumption is estimated based on the reported

amounts and frequency of consumption of various alcoholic beverages and converted into the ethanol equivalent grams per week.<sup>5</sup>

Involuntary job loss is constructed from information about each individual's experience with job separations initiated by the employer for reasons unrelated to the individual worker's job performance (e.g., business closure, reorganization, bankruptcy, privatization of enterprise). Although there potentially may be differences in the effects of these types of job separations, we pool them together following Voßemer et al. (2018) findings of almost identical effects of plant closure and layoffs on self-rated health in later life.<sup>6</sup> In addition, we include other covariates: cohort (a categorical variable ranging from 1 to 6 and corresponding to the 10-year intervals for the year of birth, starting in 1931 and ending in 1991) and ethnicity (Ukrainians represent 77.5% of the population, with Russians being the second-largest group, at 17.2%).

To understand whether the effect of individual experiences with involuntary job losses differs depending on the macroeconomic conditions, we modified the model to allow for heterogeneous effects across the two periods – before and after year 2000, given that after 2000, Ukraine began its economic recovery. Although the 2008 crisis affected Ukraine, eliciting a GDP decline of 15%, it bounced back to 3.8% growth in 2010 and 5.5% in 2011.<sup>7</sup> Thus, we altered Equation (3) in the following way:

$$\beta_{ik} = \alpha_{0k} + \alpha_{1k}IJJL[1990s]_i + \alpha_{2k}IJJLShock[2000s]_i, \quad k = 0,1 \quad (5)$$

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<sup>5</sup> <https://www.alcohol.org/statistics-information/abv/> (accessed 5.06.21) 1

<sup>6</sup> We have investigated separately the five reasons for exogenous job loss pulled together in the main analysis (closure, reorganisation, bankruptcy, privatisation of the enterprise and personnel reduction). Overall, the effects are not different at 5% level of significance. Only the privatisation of the enterprise has shown an effect different from all the other reasons at some ages. However, the contribution of this reason to the total share of exogenous job losses is only 0.43% and excluding it completely from the main analysis has no effect on the main findings for all the considered outcomes. The results from this investigation are available upon request.

<sup>7</sup> World Development Indicators: <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=UA> (accessed 5.06.21).

Another source of heterogeneity that we explored is whether the involuntary job loss' effects differ depending on age at first exposure.

### **3. Data**

Individual-level data were taken from four waves of the Ukrainian Longitudinal Monitoring Survey (ULMS) from 2003, 2004, 2007, and 2012 (IZA, 2014). The ULMS is a nationally representative survey of the working-age (ages 15–72) population, providing a wide range of information on individuals and households, including detailed working history since 1986, the year of the Chernobyl nuclear catastrophe (Lehmann et al., 2012). In total, the four waves of the survey include 12,305 individuals from 4,138 households.

The 2003 wave's retrospective section allowed us to build individual labor market histories with a sufficient number of cases of exogenous job separation during the turbulent transition period from the 1990s onward. The retrospective data section refers to labor market circumstances at specific, memorable points in time: December 1986 (after the Chernobyl catastrophe); December 1991 (after the collapse of the Soviet Union); December 1997; and every December after that. While the labor market history refers to the period from 1986 to 2003, the outcomes are measured at the interviews (2003, 2004, 2007, and 2012), hence the focus on the long-term effect. The sample was restricted to men who met the following criteria: (i) 18 or older in 2003 (informed by the fact that the majority of people would not be working before that age and that sales of either alcohol or tobacco products are only allowed from age 18); (ii) started their first job no later than 2001; (iii) worked for pay for at least two consecutive years; and (iv) have all data available on reasons for job separations. These restrictions reduce the number of available observations from 9,994 to 8,444. Further excluding people who experienced at least one job separation by choice and no exogenous job separations, yields the main analytic sample comprising 3,505 observations (Appendix Table A1). This effectively restricted the control group to those who did not experience any job separations in the past. This strategy avoided a contaminated control group if the causes of voluntary separations relate



to outcome variables. Appendix Table A2 compares the characteristics of the analytic sample to the excluded observations.

The outcome variables include BMI, the likelihood of being overweight or obese, drinking alcohol, smoking, engaging in physical activity, total alcohol and tobacco consumption, and intensity of physical activity.

Involuntary job loss — the primary variable of interest — was measured as a binary variable equal to one if a person had at least one such exogenous labor market shock. Involuntary job losses were identified for those who experienced any job separations from 1986 onwards based on a series of questions about job separations, as described earlier.

It is instructive to compare summary statistics stratified by the presence of past involuntary job loss experience across time (see Table 1). As can be seen from the simple comparison of pairs of columns for each year, men who experienced at least one involuntary job loss in the past are, on average, similar to others in terms of BMI in 2003. Still, over time, the difference becomes statistically significant, reaching more than 1 unit on the BMI scale in 2012. A similar situation is observed for the probability of being overweight or obese, reaching a difference of about 13% by 2012. The differences in smoking behavior are substantial both at the extensive and intensive margins. So is the probability of being physically active. Those who experienced an involuntary job loss are about 7-11% more likely to have smoked throughout this period—roughly 2-3 more cigarettes per day—while being 5-9% less physically active. Furthermore, for alcohol consumption, no statistically significant difference exists between those who did and did not experience an involuntary job loss at either margin.

Figure 1 offers a non-parametric analysis of the age trajectories for different outcomes between those with and without past involuntary job losses. As can be seen, the BMI curve for those with a past involuntary job loss is significantly higher than for other men at younger ages. However, by middle age, the BMI-age trajectories for the two groups converge, and the difference becomes insignificant after age 35. The situation is strikingly similar concerning smoking behavior, while for alcohol consumption and physical activity, the convergence is

observed earlier — around 25-30 years old. However, these are raw comparisons that require further investigation.

Men who experienced an involuntary job loss are older than those who did not (see Table 1). This difference increases over time, which is consistent with older workers being more likely to have experienced at least one involuntary job loss. Correspondingly, the treated group comes from earlier population cohorts, with the difference in the average cohort reaching more than a decade by the end of the observed period. Those who experienced an involuntary job loss are less likely to be Ukrainian and are more likely to be married. No statistically significant difference exists in terms of educational attainment, except in 2012.

## 4. Results

Before discussing the main results, we provide evidence that the exogenous job loss affected labor market outcomes in later years. If we found no evidence that job loss reduced later labor market outcomes, then we would not expect to find any health effects either. Therefore, we performed our main analysis for employment status, log hourly wages, self-rated health, and life satisfaction using our preferred specification, which is described below. The results showed significant negative effects on all these outcomes, as expected (see Appendix Figures A1-A2).

Having shown a direct effect of job loss on later labor market outcomes, we next explore whether the job loss also affected health outcomes. To choose which model fits the data best, we compared the BMI results from the ordinary least squares (OLS) to the growth-curve models (see Table 2), implemented through the **mixed**<sup>8</sup> procedure in Stata 16 (StataCorp, 2019). The growth pattern differed depending on the estimation model (Columns (1)-(3)). The likelihood ratio test favored the growth-curve models. Columns (2)-(3) showed significant variation in both the individual BMI-age trajectories' starting points and their shape between individuals who experienced involuntary job losses and those who did not. Compared with

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<sup>8</sup> For binary outcomes in further analysis we used **melogit** procedure.

OLS, the results from the growth-curve model's fixed part revealed slightly slower growth in BMI with age, with a somewhat slower reduction in the speed of this growth.

We also found that past involuntary job loss increased BMI and changed the whole BMI-age trajectory. However, after allowing for individual random coefficients, those effects were somewhat reduced, suggesting that the OLS-estimated effects were explained partly by individual heterogeneity in BMI-age trajectories.

To decide on the model specifications (Columns (1)-(3)), we considered information criteria. The minimum magnitude of the BIC criteria, which imposes a penalty for the inclusion of additional parameters, was found in Column (3). Since we found no support for the random coefficient for age squared, we did not report this specification. Hence, we adopted the growth curve model with a random coefficient for age only as our most preferred specification (Column (3)) for the rest of the analysis.

Column (3) shows a significant level effect on BMI – at age 18, an involuntary job loss leads to approximately 0.9 more units on a BMI scale (a difference of roughly 2.8 kg for a man about 1.75 meters tall). This is equivalent to a BMI gain over the next ten years from 18 to 28 for a man who has not experienced involuntary job losses. At the same time, at age 40, the effect is the opposite — a loss of 0.04 units on a BMI scale ( $0.901 - 0.065 \cdot (40 - 18) + 0.001 \cdot (40 - 18)^2$ ), which is not statistically different from zero. Moreover, it shifts the BMI-age trajectory toward a flatter relationship, though this effect is significant only at the 10% level and not significant for the interaction with the age squared. In comparison, Marcus (2014) found an effect from a job loss of about 0.3 kg (average across all ages, controlling for gender in the overall sample).

Column (4) in Table 2 presents the results, including indicators for higher education and marital status. As is evident from the comparison to the previous specification, this weakens the statistical significance of involuntary job loss' effects and reduces the main effect's magnitude by 10% (compared with the most preferred specification in Column (3)), while completely removing any effect on the BMI-age trajectory's shape. This suggests that

part of the past involuntary job loss effect can be explained by adjustments in education and marital dynamics.

The last Column in Table 2 shows that a significant variation in the effect from an involuntary job loss exists in individual BMI (standard deviation: around 1.5 BMI units), i.e., for some people, BMI increases drastically, but for others, it may even decrease in response to the experience of involuntary job loss.

Although Table 2 shows statistical significance for some coefficients, it is not easy to understand the overall effect due to the complex nature of the involved interactions. Thus, for further discussion, we also offer estimates of the marginal effects at ages 20, 40, and 60 in Table 5 (see Norton and Dowd (2018) for recommendations on reporting results from logistic regressions) and a graphical representation of the results using the predicted shape of the BMI-age trajectories and the marginal effects from involuntary job loss. We have chosen to group them by the nature of the outcome measures — Figure 2-Figure 3 for binary outcomes and Figure 4-Figure 5 for continuous outcomes.

We found that an involuntary job loss also affects the probability of being overweight or obese, drinking, and smoking (see Table 3). We expressed the results as odds ratios because we estimated logistic regression with individual effects (Equation [2]). As can be seen in Column (1), at age 18, men who had experienced an exogenous job separation have 4.6 times higher odds of being overweight or obese than those in the control group, and this effect changes with age significantly. Similarly, involuntary job losses affect the probability of consuming alcohol, i.e., those with adverse labor market experiences have 2.7 times higher odds of being a drinker (Column (3)) and 3.2 times higher odds of being a smoker at age 18 (Column (5)), compared with those without job separations. However, the latter effect is only significant at the 10% level. No statistically significant main effects were found for physical activity (Column (7)). Comparing the estimates of interest in odd columns with those in even columns (the latter including controls for marital status and education) shows a smaller magnitude of involuntary job loss' effects. This suggests a relationship between past

involuntary job losses and these additional controls (Norton and Dowd, 2018) and, thus, potential mediating roles for education and marriage concerning involuntary job loss' effects. However, because the coefficients do not differ in a statistically significant way, and given concerns regarding these variables' endogeneity, we did not include them in the analysis that follows.

We explored the effect of unemployment at the small administrative region level based on the place of residence using three specifications: (i) with the region fixed effect, (ii) with the contemporaneous unemployment rate in the region, and (iii) with both the contemporaneous region-level unemployment rate and the average unemployment rate in the region since 1996 to the year prior to the interview year. The latter is to capture the severity of the recession in the region of residence. The results from these analyses are available in Appendix Tables A5-A6. They show that our main findings do not change qualitatively, and, where the region level variables are statistically significant (alcohol consumption and physical activity), the effect of the involuntary job loss is larger in magnitude. However, given that we do not know individual residential history, the assumption that individuals have lived in the current place of residence since 1990 is somewhat tenuous, so we treat the estimates of the effect of region level unemployment with caution.

In terms of the intensive margin of health-related behaviors, no significant effect exists either in the number of cigarettes consumed daily or in the intensity of physical exercise at age 18 (see Table 4). However, alcohol consumption responds significantly to involuntary job losses. On average, an 18-year-old who experience such a loss is expected to be drinking about 108 grams more alcohol per week, as measured in ethanol-equivalent grams. This is a considerable amount by the world standards — for example, in the UK the recommended maximum of ethanol intake is 112 grams per week.<sup>9</sup>

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<sup>9</sup> <https://iard.org/science-resources/detail/drinking-guidelines-general-population/> (accessed 5.06.21).

Figure 2-Figure 5 offer a visualization of the effect for an average person in the sample across the life cycle. The figures show the marginal effects of age trajectory and involuntary job loss (computed assuming random effects equal zero). For example, the figures confirm involuntary job loss' detrimental effects on the likelihood of being obese and consuming alcohol at a young age (at both extensive and intensive margins). It also increases the likelihood of being a smoker in the middle ages, as well as the intensity of smoking in middle ages (ages 30 to 60). Table 5 shows the marginal effects of involuntary job losses at three ages (20, 40, and 60 years old) to allow comparison. At age 20, a man who has experienced an involuntary job loss is 3.7% more likely to be overweight or obese, 5.6% more likely to smoke, and 20% less likely to be physically active. There is also a statistically significant effect on the intensity of alcohol consumption, with approximately 95 more grams per week of ethanol equivalent alcohol consumption. For middle-aged men, the most pronounced effects are the 10.5% lower probability of being overweight or obese, 20% higher probability of being a smoker with 1.4 more cigarettes smoked per day, and a 10% lower likelihood of being physically active. At age 60, only the number of cigarettes per day is affected at a 10% level of significance.

To understand whether the effects on labor market outcomes partially explain the findings, we also repeated the main analysis controlling for various measures of the current individual work status. This produced qualitatively similar results for the coefficients of interest. The results from these specifications are available upon request.

We also explored possible heterogeneity in involuntary job loss' effects on BMI and health behaviors along two dimensions – whether the first experience of an involuntary job loss occurred (i) before year 2000 or afterwards, and (ii) when the respondent was younger than 35 or older. Over the 1990s, the Ukrainian economy contracted from 9.7 to 22.7% per year, with GDP per capita reaching the lowest level of 636 USD in 1999 and 2000 and the highest unemployment levels of 11.9% in 1999. From 2000 to 2008, it grew at 7.4% per year, reaching the GDP per capita of 3887 USD and the unemployment rate dropping to 6.4% in 2008 (World Bank, 2020). Considering these two periods allowed us to test for moderating

effects of macroeconomic conditions (Pearlman, 2015). For most outcomes, the effects were more pronounced if the first experience of an involuntary job loss occurred in the earlier period, except for physical activity at both extensive and intensive margins and alcohol consumption at the intensive margin. However, the differences in the effects across the two periods were not statistically significant for all outcomes, but smoking. People who experienced their first involuntary job loss in 1990s were more likely to smoke and smoke more cigarettes per day starting from middle age onward. We also compared the differences in the effects depending on whether the first involuntary job loss was experienced at age 35 or earlier and found no evidence that the long-term detrimental effects of job loss were more substantial if experienced at a younger age. Results for these analyses are available upon request.

## **5. Discussion**

This study's goal was to measure the effect of involuntary job loss on health and health behaviors across the life cycle. We used a unique data set from Ukraine to examine the long-term effects of past involuntary job losses on BMI, smoking, alcohol consumption, and physical activity. Indeed, we showed that previous literature had been limited because of ignoring the long-term effects on the trajectories of BMI, obesity, and health behaviors across the life cycle. It is difficult to compare our estimates, especially their magnitude, to those available in the literature for several reasons – most of the existing studies of the effects of involuntary job losses come from the developed countries, do not study men and women separately, and analyze certain population age groups at specific points in time. To make the comparison more meaningful, we refer in the discussion to the estimates of the marginal effects at three ages – 20, 40, and 60 – as presented in Table 5.

### **BMI and Being Overweight/Obese**

Involuntary job loss's effect on BMI and the likelihood of being overweight or obese is the most detrimental at young ages. However, by age 40, men who experienced an

involuntary job loss have a BMI, which is not statistically different from the BMI of those who had not experienced job separations but have a 10-percentage point's lower probability of being overweight or obese. This finding is qualitatively in line with Maclean's (2016) findings for men – a one percentage point increase in the school-leaving state's unemployment rate leads to a 2.5 (3.7) percentage points lower likelihood of being overweight (obese) by age 40. For men at age 60, our results are comparable to Deb et al. (2011), which also found no difference for the overall sample regardless of job loss experience. Although we could not replicate Deb et al. (2011) analysis for people with an already elevated risk of higher BMI, we found a statistically significant variation in the direction and magnitude of the effect on BMI. Column (5) in Table 2 shows that the variation around the main effect of an involuntary job is 1.56 units on a BMI scale.

Our finding of the involuntary job loss increasing the likelihood of being overweight or obese at a young age is consistent with the previous literature. For example, the purchase and consumption of cheaper, higher-calorie foods are rising during economic recessions and in areas with higher unemployment (Dave and Kelly, 2012; Griffith et al., 2013). The finding that the most noticeable effects from job loss are on weight gain and the likelihood of being obese among the young may be explained by the particular vulnerability to energy imbalance during the period of transition from adolescence to adulthood (Poobalan and Aucott, 2016). The disappearance of this effect at older ages corresponds with the present study's findings, which show that most of the effects from job loss on BMI and obesity at older ages happen among at-risk individuals (Deb et al., 2011; Schmitz and Conley, 2016). Because we allow for individual-specific age trajectories, we effectively removed this source of heterogeneity.

### **Examination of health-related behaviors**

Concerning health behaviors, we found that past negative labor market experiences change the age trajectories' shapes of alcohol consumption and smoking. However, the results are not similar across the life cycle. Involuntary job loss's effect on alcohol consumption is



most pronounced for people before age 30 and after age 65. We find no significant difference in the alcohol consumption trajectories in the middle ages. Deb et al.'s (2011) finding of a significant effect of job loss on alcohol consumption for people age 50 and above is qualitatively similar (although the comparison should be treated with caution, given that life expectancy for men in Ukraine is 66). Yet, this finding is in contrast with Maclean's (2015) that a higher unemployment rate in the school-leaving state leads to more drinks consumed per month and a higher probability of being a binge drinker at age 40. The absence of the significant effect at middle ages may be due to the bias caused by differential mortality. This bias, out of all considered outcomes, may be most relevant for alcohol consumption – Ukraine is among the few countries in the world with the largest alcohol-attributable fraction of mortality (>30%).<sup>10</sup> In our sample, we only have individuals who survived until the start of the survey in 2003. This means that we do not pick up the effect on those who might have been affected most severely and did not survive long enough. The highest increase in mortality rates in the 1990s was among middle-aged men, coinciding with a spike in accidental poisoning by alcohol (Levchuk, 2005; Lisenkova, 2009). Lazareva (2020) potentially offers the closest comparison in terms of the country setting but refers to both men and women from age 29 onwards. Moreover, concerning alcohol, this paper does not specify which base is chosen for the logarithm, making it impossible to compare the magnitude of the effect on alcohol consumption. However, qualitatively our findings for ethanol-equivalent alcohol consumption are similar.

The effect on smoking is most noticeable between ages 20 and 60 (e.g., at age 40, men with experience of involuntary job loss are 20 percentage points more likely to smoke, and, if smoking, smoke 1.4 more cigarettes per day than those without such experience). This is much larger than the 2.5-3 percentage point increase in smoking participation found in Lazareva

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<sup>10</sup> <https://ourworldindata.org/alcohol-consumption> (accessed 5.06.21).

(2020). However, as pointed earlier, this lower figure is estimated for both men and women and is an average effect across all ages.

Although we found no statistically significant effect of the involuntary job loss on the probability of being physically active, we did find some decrease in the intensity between ages 20 and 45. In addition, in line with the prior literature showing that alcohol consumption is related to obesity in men (Chou et al., 2004; French et al., 2010), we found a similar pattern in effects on obesity and alcohol consumption: the largest effects occur at younger ages. At the same time, consistent with the protective effect of smoking from obesity (Dare et al., 2015; Pieroni and Salmasi, 2016), we found that smoking exerts the most considerable effect in middle age when the effect on obesity and alcohol consumption is the smallest.

The greater effect of an involuntary job loss experienced in the year 2000 or earlier on smoking in the middle ages may be due to the macroeconomic situation and addictive nature of this health behavior. Given that unemployment persistently grew over that time, those, who lost jobs, had slim chances of re-employment for long periods. These psychosocial pressures combined with the myth that smoking helps to reduce stress could explain more potent effects of an involuntary job loss on smoking in the earlier period than in the later period of economic growth.

### **Methodological considerations and limitations**

As the first to apply growth-curve modeling to investigate the effect of an exogenous job loss on health dynamics across the life cycle, we addressed some methodological concerns in the literature. First, we used an exogenous measure of labor market shocks – involuntary job losses. Second, we found that age trajectories of various outcomes we examined are heterogeneous across individuals. Third, we found support for the heterogeneity of the involuntary job loss' effects on age trajectories across all outcomes considered. Finally, we explored the heterogeneity of effects, depending on the era when the job separation occurred, finding a stronger negative effect from involuntary job losses

experienced in the 1990s—an era of the most profound economic crisis with hyperinflation, wage arrears, and high levels of unemployment and underemployment.

The present study contains several limitations. First, despite using current measures for weight, height, and health-related behaviors, we relied on retrospective data on the labor market history, which may suffer from a recall bias. However, given the design of the survey instrument linked to memorable events over the period and the importance of job loss in life, we think that the degree of this bias is minimal. Besides, if anything, a measurement error in the dependent variable would cause attenuation bias, making our estimates lower bounds of the true effects. Second, we used only four waves of data — only marginally larger than the minimum requirement of three time periods for consistency in growth-curve modeling. However, the Ukrainian data are the best available data to answer this important research question. Third, our results are subject to selectivity bias due to differential mortality. Still, this bias likely points to an underestimation of the true effects of involuntary job losses on health and health-related behaviors. As job loss is related to higher alcohol consumption, and excessive consumption can lead to a range of diseases and premature mortality, people alive in 2003 who were interviewed for the ULMS may not be the most severely affected. Fourth, there may still be concerns about the exogeneity of the job loss measure. For example, based on the individual labor market history data, we cannot distinguish the early leavers who tend to be more productive (Schwerdt, 2011). However, the kind of scenario that would have to happen for a job loss to be endogenous in our model is when a worker's job loss experience was a function of his prior (poorer) health (in our case, e.g., being obese). Yet, Sullivan and Von Wachter (2009) exploration of the administrative data from massive layoffs revealed that firms with a greater ability to select particular workers for layoff did not seem to lay off less healthy employees. Although it may be plausible to think of such a possibility for alcohol consumption and smoking, employment contracted by 40% over the 1990s, which makes the selectivity of job loss based on the BMI and health-related behavior quite unlikely. Finally, the transition period for Ukraine after the independence was characterized by the deepest

economic recession in the country's history but was not limited to it. The social transformation included the decolonization and decentralization of governance, evolution from the totalitarian to a democratic regime, and the denationalization of the economy (Kuczabski and Michalski, 2014), the collapse of the "cradle to grave" welfare system, hyperinflation, erosion of social trust, and development of new social norms which allowed people to avoid mass starvation (Round and Williams, 2010). It is impossible to disentangle the implications of each of these changes on the effect of interest in this paper. However, one should be aware of the multitude and complexity of these changes, especially when comparing to the estimates from other countries.

## **6. Conclusions**

A large body of literature has investigated the effect of job loss on health using data from developed nations, but it has elicited criticism related to potential endogeneity. Our findings from Ukraine document that the relationship exists and that it is explained potentially by changes in health-related behaviors. This highlights our findings' importance from a policy perspective, indicating the need for timely interventions targeted at health-related behaviors. The results from this paper are of particular policy importance, both for Ukraine, where health effects from job loss are absent from the policy dialogue, and for the other countries for several reasons. First, our results show that an involuntary job loss increases BMI, the prevalence of being overweight or obese, and alcohol consumption among young people while significantly increasing the prevalence and intensity of smoking in the middle ages. Second, particularly detrimental effects on smoking behavior are observed when an involuntary job loss occurs during a severe recession. Finally, our results show that the effects differ across the life cycle, informing the design of more targeted policies to support displaced workers.

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# Figures

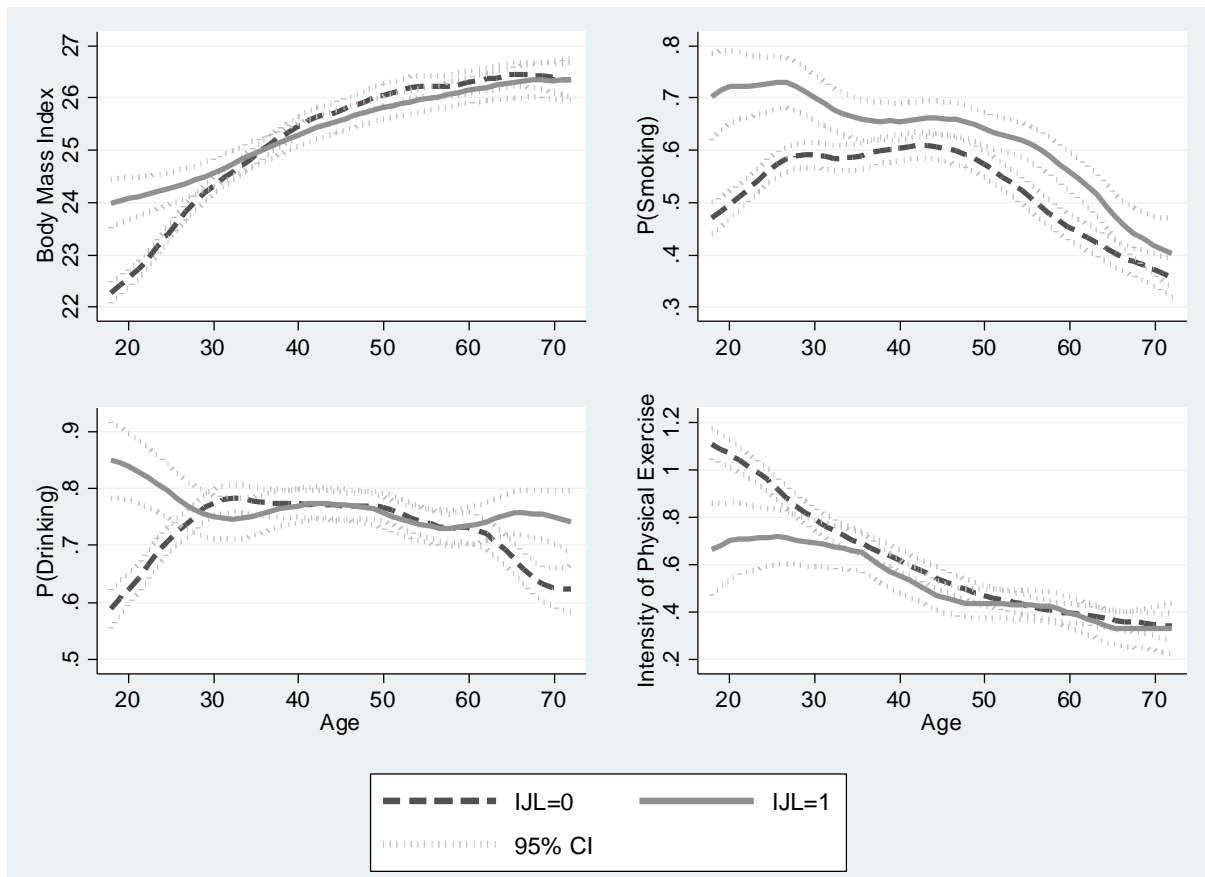


Figure 1: Non-parametric representation of the BMI-age trajectories by past experience of involuntary job loss (IJL).

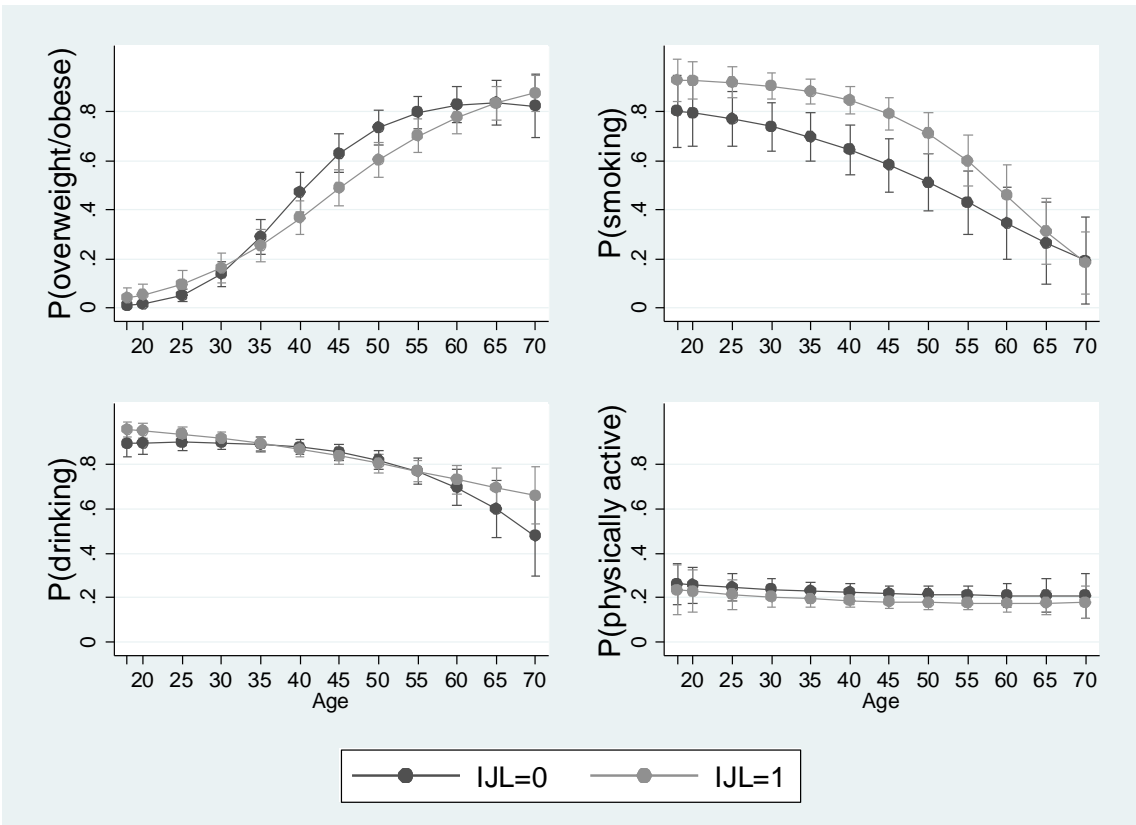


Figure 2: Predicted age trajectories for main outcomes (extensive margin) with and without past involuntary job loss (IJL).

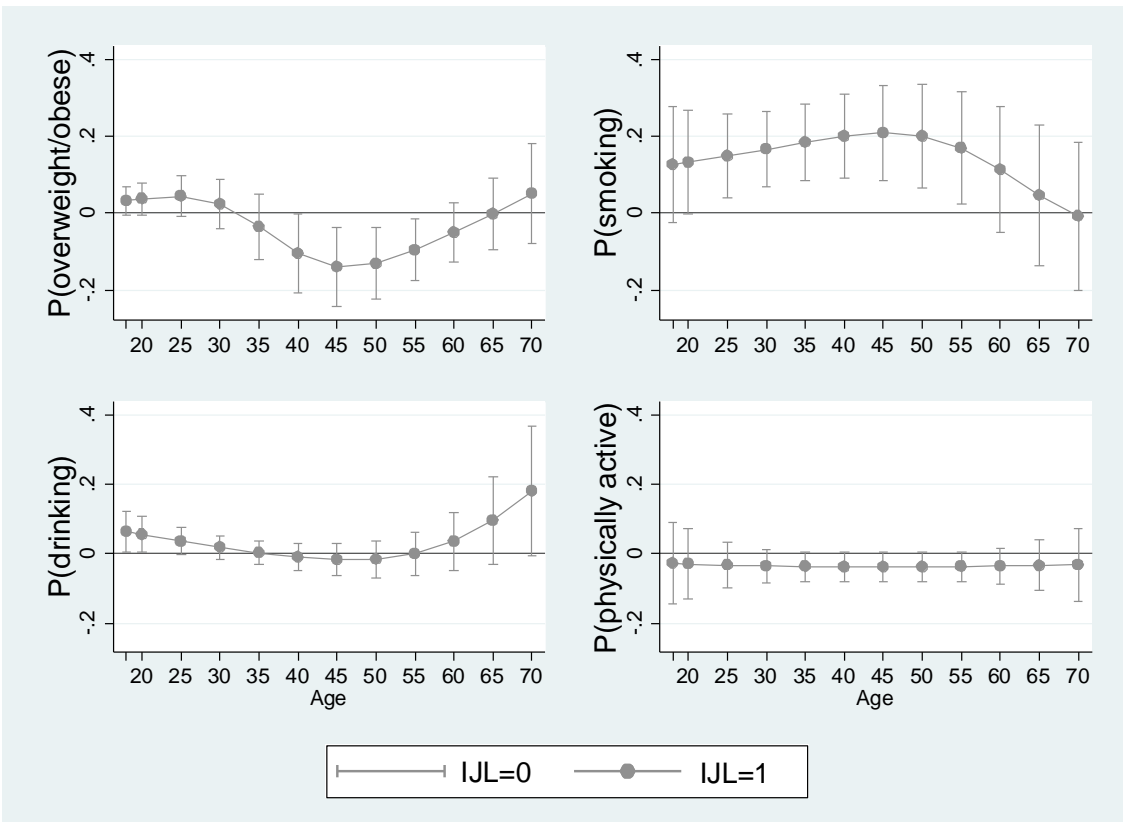


Figure 3: Predicted marginal effects of involuntary job loss on age trajectories for main outcomes (extensive margin).

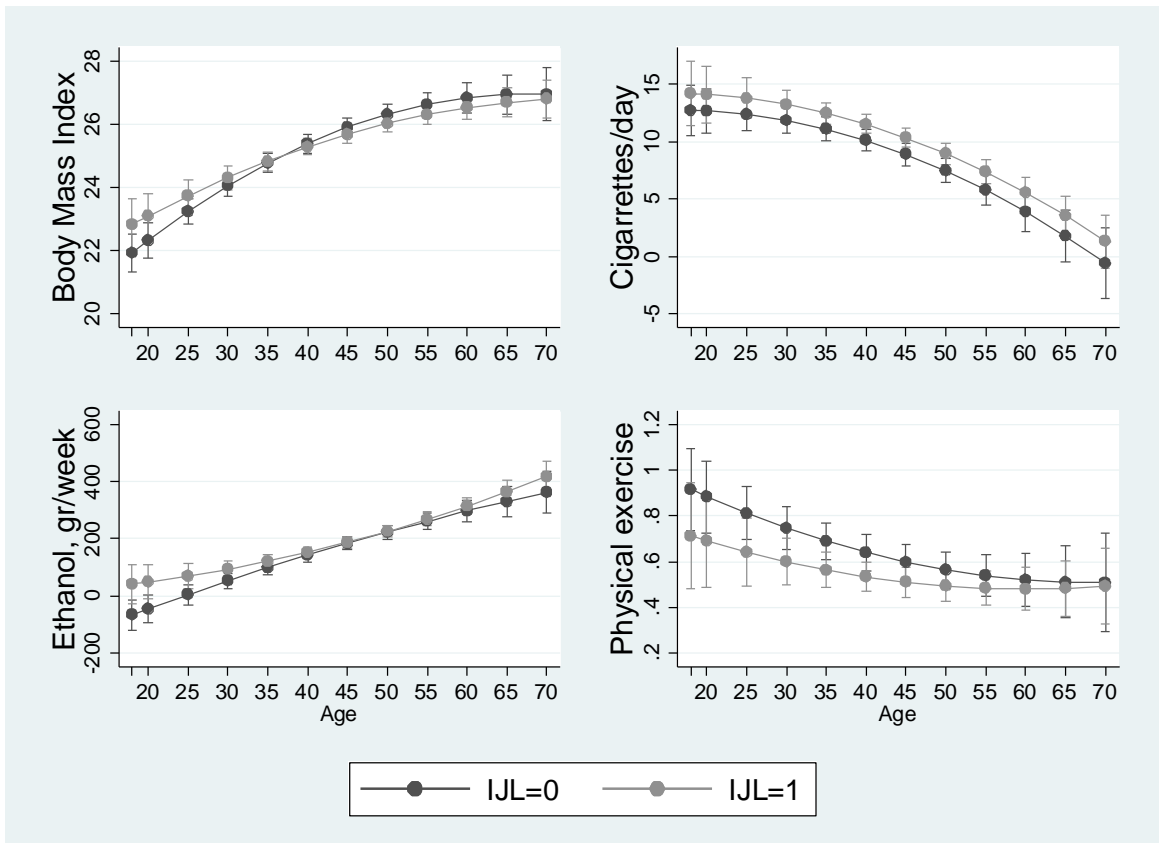


Figure 4: Predicted age trajectories for main outcomes (intensive margin) with and without past involuntary job loss.

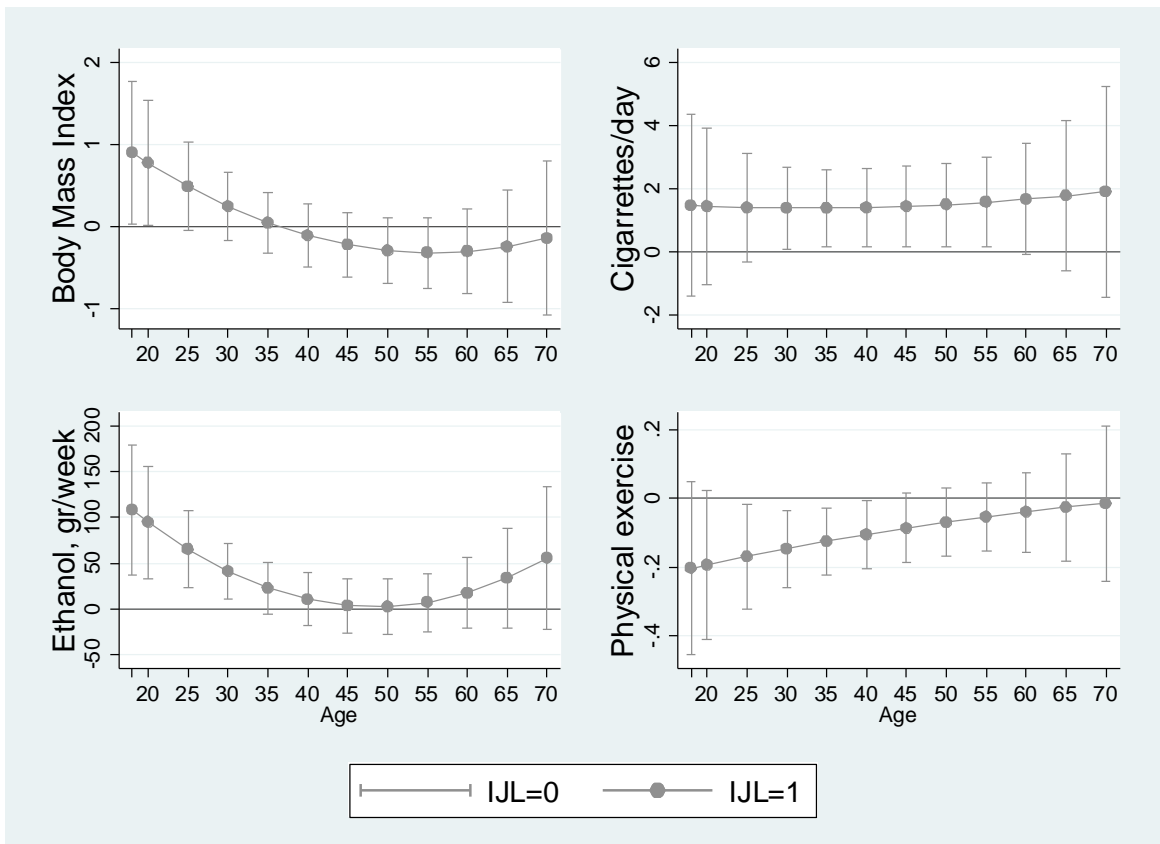


Figure 5: Predicted marginal effects of involuntary job loss on age trajectories for main outcomes (intensive margin).

## Tables

**Table 1: Summary statistics by year and by involuntary job loss (IJL) status.**

	2003		2004		2007		2012	
	IJL=0 (1)	IJL=1 (2)	IJL=0 (3)	IJL=1 (4)	IJL=0 (5)	IJL=1 (6)	IJL=0 (7)	IJL=1 (8)
<b>BMI</b>	25.28 (3.87)	25.26 (3.99)	24.84 (3.36)	25.21 (3.73)	24.96*** (3.56)	25.69*** (3.90)	25.34*** (3.64)	26.52*** (3.94)
<b>Alcohol per week (ethanol equivalent, gr) §</b>	94.56 (134.45)	108.86 (210.76)	91.42 (178.84)	99.23 (150.81)	194.24 (261.36)	218.48 (366.73)	290.64* (415.35)	348.14* (417.87)
<b>Cigarettes per day§</b>	8.75*** (9.85)	11.23*** (10.72)	9.81** (10.91)	11.30** (10.66)	8.89*** (9.54)	11.80*** (16.93)		
<b>If overweight/obese</b>	0.45	0.43	0.43	0.44	0.42***	0.51***	0.49***	0.62***
<b>If drinker</b>	0.79	0.80	0.73	0.77	0.78	0.76	0.64	0.70
<b>If smoker</b>	0.54***	0.65***	0.55***	0.65***	0.55**	0.62**	0.45*	0.52*
<b>If physically active</b>	0.29***	0.21***	0.24**	0.19**	0.25***	0.17***	0.34***	0.25***
<b>Age</b>	39.84*** (14.48)	44.94*** (12.12)	39.88*** (14.73)	47.25*** (12.68)	38.46*** (13.50)	49.66*** (12.19)	40.47*** (13.99)	51.46*** (12.02)
<b>Cohort</b>	3.64*** (1.48)	3.09*** (1.18)	3.93*** (1.53)	3.14*** (1.23)	4.51*** (1.38)	3.38*** (1.23)	4.90*** (1.33)	3.82*** (1.16)
<b>If Ukrainian</b>	0.85**	0.79**	0.84**	0.77**	0.84*	0.80*	0.88**	0.82**
<b>Higher education</b>	0.15	0.13	0.15	0.15	0.16	0.14	0.30***	0.17***
<b>Married</b>	0.77***	0.84***	0.72***	0.83***	0.71***	0.82***	0.66***	0.78***
<b>N</b>	402(44%)	520(56%)	381(43%)	508(57%)	463(50%)	458(50%)	365(46%)	408(54%)

Heteroskedasticity robust standard errors in parentheses, clustered at the individual level. \* p<0.05, \*\* p<0.01

§ The sample sizes for the number of cigarettes per day and alcohol consumption slightly differ from those for the other outcomes in most years, and information on numbers of cigarettes is entirely missing for 2012.

**Table 2: Regression coefficients: Comparing OLS and Growth-Curve models for Body Mass Index.**

BMI	OLS (1)	GCM (2)	GCM (3)	GCM (4)	GCM (5)
<b>Involuntary job loss (IJL)</b>	1.173* (0.524)	0.901+ (0.472)	0.903* (0.447)	0.855+ (0.444)	0.861+ (0.462)
<b>(Age-18)</b>	0.216** (0.026)	0.210** (0.024)	0.202** (0.024)	0.177** (0.024)	0.203** (0.023)
<b>(Age-18)<sup>2</sup></b>	-0.002** (0.001)	-0.002** (0.000)	-0.002** (0.001)	-0.002** (0.001)	-0.002** (0.000)
<b>IJL × (Age-18)</b>	-0.098* (0.043)	-0.065+ (0.036)	-0.065+ (0.035)	-0.055 (0.035)	-0.066+ (0.035)
<b>IJL × (Age-18)<sup>2</sup></b>	0.001+ (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
<b>Ukrainian</b>	0.015 (0.253)	0.038 (0.220)	0.054 (0.217)	0.072 (0.215)	0.052 (0.218)
<b>Cohort (10 years)</b>	0.132 (0.119)	0.212* (0.090)	0.163+ (0.090)	0.199* (0.091)	0.143 (0.090)
<b>Higher education</b>				0.687** (0.192)	
<b>Married</b>				0.694** (0.167)	
<b>Constant</b>	21.451** (0.793)	20.964** (0.604)	21.273** (0.609)	20.773** (0.621)	21.394** (0.609)
<b>sd (Constant)</b>		2.821** (0.070)	2.393** (0.111)	2.2890** (0.036)	2.201** (0.122)
<b>sd (Age-18)</b>			0.051** (0.006)	0.051** (0.006)	0.048** (0.006)
<b>sd (LM shock)</b>					1.557** (0.237)
<b>sd (Residual)</b>		2.2935** (0.0359)	2.287** (0.036)	2.342** (0.110)	2.281** (0.036)
<b>N</b>	3505	3505	3505	3505	3505
<b>R2/chi-square</b>	0.076	261.29	259.65	302.26	270.42
<b>p-value chi-square</b>		0.000	0.000	0.000	0.000
<b>LR (vs. OLS)</b>		1067.50	1091.69	1076.35	1103.38
<b>p-value LR</b>		0.000	0.000	0.000	0.000

Note: Heteroskedasticity robust standard errors in parentheses, clustered at the individual level. + p<0.10, \* p<0.05, \*\* p<0.01

**Table 3: Regression coefficients for being overweight or obese and related behaviors—Odds Ratios.**

	Overweight/Obese		Drinking		Smoking		Physically Active	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Controls for marital status and education</b>	N	Y	N	Y	N	Y	N	Y
<b>Involuntary job loss (IJL)</b>	4.566** (2.565)	4.484** (2.532)	2.684* (1.256)	2.563* (1.197)	3.226+ (2.289)	3.025 (2.115)	0.864 (0.284)	0.947 (0.305)
<b>(Age-18)</b>	1.311** (0.041)	1.275** (0.040)	1.019 (0.024)	1.010 (0.024)	0.977 (0.034)	0.999 (0.035)	0.988 (0.018)	0.993 (0.018)
<b>(Age-18)<sup>2</sup></b>	0.997** (0.001)	0.998** (0.001)	0.999** (0.000)	0.999* (0.000)	0.999 (0.001)	0.999 (0.001)	1.000 (0.000)	1.000 (0.000)
<b>IJL × (Age-18)</b>	0.871** (0.037)	0.879** (0.038)	0.922* (0.033)	0.926* (0.033)	1.013 (0.053)	1.006 (0.052)	0.994 (0.027)	0.991 (0.026)
<b>IJL × (Age-18)<sup>2</sup></b>	1.002** (0.001)	1.002** (0.001)	1.002* (0.001)	1.001* (0.001)	0.999 (0.001)	1.000 (0.001)	1.000 (0.001)	1.000 (0.001)
<b>N</b>	3505	3505	3505	3505	3505	3505	3505	3505
<b>chi-square</b>	176.009	194.496	35.147	39.051	64.017	104.249	76.678	124.466
<b>p-value chi-square</b>	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
<b>LR (vs. OLS)</b>	539.40	527.35	211.21	207.12	931.37	887.72	24.67	15.69
<b>p-value LR</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: Coefficients report odds ratios from the regression coefficients on binary outcomes of interest. [Heteroskedasticity robust standard errors](#) in parentheses, [clustered at the individual level](#). + p<0.10, \* p<0.05, \*\* p<0.01.

**Table 4: Regression coefficients: Continuous measures of health behaviors.**

	BMI (1)	Cigarettes per day (2)	Alcohol, ethanol equivalent grams per week (3)	Exercise intensity (3)
<b>Involuntary Job Loss (IJL)</b>	0.903* (0.447)	1.470 (1.473)	108.274** (36.543)	-0.204 (0.128)
<b>(Age-18)</b>	0.202** (0.024)	-0.017 (0.084)	10.409** (2.084)	-0.016* (0.007)
<b>(Age-18)<sup>2</sup></b>	-0.002** (0.001)	-0.005** (0.002)	-0.042 (0.040)	0.000 (0.000)
<b>IJL × (Age-18)</b>	-0.065+ (0.035)	-0.011 (0.121)	-6.985* (3.032)	0.005 (0.010)
<b>IJL × (Age-18)<sup>2</sup></b>	0.001 (0.001)	0.000 (0.002)	0.115* (0.057)	-0.000 (0.000)
<b>N</b>	3505	3101	3422	3505

Note: Coefficients are from growth curve models for continuous outcomes of interest. [Heteroskedasticity robust standard errors](#) in parentheses, [clustered at the individual level](#). + p<0.10, \* p<0.05, \*\* p<0.01.

**Table 5: Marginal effects of involuntary job loss at different ages.**

	Age=20 (1)	Age=40 (2)	Age=60 (3)
<b>Pr(Overweight/obese)</b>	0.037+ (0.022)	-0.105* (0.052)	-0.051 (0.040)
<b>Pr(Drinker)</b>	0.056* (0.027)	-0.010 (0.020)	0.036 (0.043)
<b>Pr(Smoker)</b>	0.133+ (0.070)	0.201** (0.056)	0.113 (0.083)
<b>Pr(Physically Active)</b>	-0.194+ (0.111)	-0.106* (0.051)	-0.040 (0.059)
<b>BMI</b>	0.777* (0.390)	-0.108 (0.194)	-0.302 (0.265)
<b>Cigarettes per day</b>	1.272 (1.138)	1.406* (0.638)	1.670+ (0.896)
<b>Alcohol per week, ethanol equivalent, gr</b>	94.762** (31.448)	10.155 (14.805)	17.378 (19.963)
<b>Exercise intensity (from 0 to 3)</b>	-0.029 (0.051)	-0.037+ (0.022)	-0.035 (0.027)

Note: [Heteroskedasticity robust standard errors](#) in parentheses, [clustered at the individual level](#). + p<0.10, \* p<0.05, \*\* p<0.01.