

Correlates of Frequent Alcohol Consumption among Middle-Aged and Older Men and Women in Russia: A Multilevel Analysis of the PrivMort Retrospective Cohort Study

Alexi Gugushvili (corresponding author)

Department of Social Policy and Intervention and Nuffield College, University of Oxford

Barnett House, 32 Wellington Square, Oxford OX1 2ER, UK

alexi.gugushvili@spi.ox.ac.uk

Aytalina Azarova

Department of Sociology, University of Cambridge, Cambridge, UK

Darja Irdam

Department of Sociology, University of Cambridge, Cambridge, UK

Whitney Crenna-Jennings

University College London, London, UK

Michael Murphy

London School of Economics and Political Science, London, UK

Martin McKee

London School of Hygiene and Tropical Medicine, London, UK

Lawrence King

University of Massachusetts, Amherst, MA, USA

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Background: A large proportion of premature deaths in Russia since the early 1990s, following the transition from communism, have been attributed to hazardous drinking. Rather less is known about the correlates of alcohol consumption. We present new data on the consumption of alcoholic beverages among middle-aged and older Russians and identify socio-demographic, socio-economic, and life-course correlates of frequent drinking.

Methods: Within the framework of the PrivMort project, conducted in 30 industrial towns in the European part of Russia, we acquired information on the frequency of drinking among 22,796 respondents and 57,907 of their surviving and deceased relatives. We fit three-level mixed-effects logistic regression models of frequent drinking in which respondents' relatives, aged 40 and over, are nested in their families and towns.

Results: Deceased male relatives consumed alcohol significantly more often, while deceased female relatives significantly less often than the respondents of corresponding gender. In a multivariable analysis we find that individuals' education, communication with family members, labour market status, history of unemployment, and occupational attainment are all significant correlates of frequent drinking in Russia. These associations are stronger among men rather than among women.

Conclusion: There are significant differences between frequency of drinking among surviving and deceased individuals and frequent drinking is associated with a wide array of individual socio-demographic, socio-economic, and life course factors that can partially explain high alcohol consumption in post-communist Russia.

Keywords: Alcohol, Russia, retrospective cohort study, multilevel analysis, life course.

1. Introduction

The post-communist transition in Russia in the beginning of the 1990s was associated with the greatest surge in mortality in recorded history of humanity outside of war, famine or pestilence (Gustafson, 1999). There is now extensive evidence that many of these premature deaths were linked directly to hazardous alcohol consumption, from conditions such as alcohol poisoning, heart disease, and cirrhosis (Leon et al., 2009, 2007; McKee, 1999; Stickley et al., 2011), or indirectly, from alcohol-related suicides, homicides, accidents, and risky health behaviours (Cepeda et al., 2013; Nemtsov, 2003; Shkolnikov et al., 2001; Stickley et al., 2013). Nonetheless, our understanding of patterns and correlates of alcohol consumption in post-Soviet Russia is limited, with many studies using indirect estimates derived from mortality data (Leon et al., 2009; Saburova et al., 2011; Tomkins et al., 2007).

The availability of quality data on alcohol consumption is important to reveal the individual-level correlates of frequent drinking in Russia. The sharp post-collapse increase in impoverishment and economic marginalization after the collapse of the Soviet Union, coupled with the availability of cheap alcohol (Treisman, 2010), appears to be one of the main causes of increased alcoholism (McKee, 1999), but certain individual and family characteristics have been also shown to be significantly associated with alcohol consumption. For instance, married men are least likely and divorced and separated men are most likely to have drinking problems (Malyutina et al., 2003; Tomkins et al., 2007). Perceived social support and good family relations have been shown to be negatively related to drinking (Carlson and Vagero, 1998; Peirce et al., 1994). Educational level is associated with alcohol consumption in Russia (Bobrova et al., 2010; Shkolnikov, 2006), drinking being more prevalent in people with lower levels of education (Carlson and Vagero, 1998; Cockerham, 2007; Cornia and Paniccchia, 2004). Material deprivation, financial strain and other income-related problems can contribute to more frequent drinking

(Bobak et al., 1999; Bobrova et al., 2010; Luoto, 1998). Lastly, a direct association has also been found between unemployment and drinking, while among employed individuals, low occupational status and work strain are related to frequent alcohol consumption (Bobak et al., 2005; Tomkins et al., 2007). Nonetheless, we are not aware of any studies which simultaneously account for all of these correlates of drinking in Russia.

In this study, using a novel large individual-level dataset collected in 2014-2015, we present the new estimates of the frequency of drinking among middle-aged and older Russian respondents and their surviving and deceased relatives. The latter improves our understanding of the patterns of alcohol consumption in post-transition Russia and of the quality of self-reported accounts of drinking. Since our multivariable analysis of frequency of drinking among relatives also includes individuals who are always or usually omitted in conventional self-reported modes of surveys such as deceased individuals and typically unreachable heavy drinkers, using three-level mixed-effects logistic regression models, we are able to provide more robust estimates of correlates of frequent drinking than in previously conducted studies. Our dataset not only includes a wide array of individuals' socio-demographic and socio-economic characteristics but it also allows us to see if individuals' life course trajectories of unemployment, material deprivation, and occupational attainment between the 1980s and 2000s explain their propensity for frequent drinking in post-communist Russia. Indirect estimation of mortality collected through surviving relatives was deployed previously in Russia to explore socio-economic and lifestyle factors and their relationship with mortality. However, this is the first time when this sampling approach is combined with investigation of correlates of hazardous behaviours.

2. Method

2.1. Dataset

To understand the frequency of alcohol consumption in Russia and ascertain which factors are associated with frequent drinking, we use the PrivMort convenience cohort study that was conducted in 30 towns of the European part of Russia in 2014-2015. At each randomly selected household only one respondent was selected. A respondent had to have at least one family member living in the same settlement for a prolonged period during and after the transitions and who was born before 1972. The latter is the reason why the sample includes only those aged 40 and over. In addition to collecting information on respondents, the PrivMort survey collected data on their relatives. This data collection method, which gathers information not directly but through relatives, was originally developed by demographers and often referred to as the “Brass method”. The convenience cohort in this study relies on collecting data for three types of relatives of the respondents: parents, siblings and spouses/partners. Information was collected for a maximum of two siblings who survived to the age of 20. The third group of relatives consists of the first partners (married or long-term cohabiters) of female respondents. Only male spouses were included in the convenience cohort, as the relevant literature suggests that women are more likely to report better on their former partners due to social pressures, cultural perceptions, and other factors (Murphy et al., 2006). 22,796 individuals were interviewed yielding information on the frequency of drinking among 57,907 relatives. The overall response rate was 48 per cent, using the Response Rate 1 as defined by the American Association for Public Opinion Research. Full details concerning the selection of towns and other aspects of the PrivMort methodology are given in Online Supplement A and elsewhere (Azarova et al., 2017; Gugushvili et al., 2018a, 2018b; Irdam et al., 2016).

2.2. Frequency of drinking

Respondents were asked how often they and their fathers/mothers/siblings/partners consume/consumed alcoholic beverages. This method addresses some important shortcomings of alternative datasets on alcohol consumption based on alcohol sales statistics (Radaev, 2015). Previous research also indicates that people tend to underreport their own alcohol consumption in surveys (see Online Supplement B on self-reported data on alcohol consumption), while information reported by relatives can often be more reliable than self-reported data (Bobrova et al., 2010; Laatikainen et al., 2002; Tomkins et al., 2007). We are able to include in our analytical sample two groups that are typically not captured in conventional surveys of the frequency of drinking. The survey collected information about both surviving and deceased relatives, which means that the proportion of deceased is higher in parents, who are much older on average, and lower in partners and siblings; the overall proportion of deceased relatives is 58 per cent. Our survey also includes those individuals, reported by their relatives, who would be otherwise unreachable or unresponsive in face-to-face interview mode because of alcohol-related problems.

Unsurprisingly, Figure 1 shows that drinking in Russia is much more prevalent among men than among women. Among respondents about 40 per cent of men and 4 per cent of women report drinking 2-4 times a month or more often. Male respondents are significantly less likely to report frequent drinking than the levels reported for their male relatives. For instance, only 2.2 per cent of respondents reported that they drink almost every day and 4.7 percent several times a week, but the corresponding figures for all relatives are 4.0 and 10.6 per cent. The disaggregation of the relatives by their vitality status suggests that these differences stem from significantly higher frequencies of drinking among deceased relatives, 19.1 per cent of whom consumed alcohol several times a week or more often. Among women, we also observe significant differences between respondents' and their relatives' frequencies of drinking. In this case,

however, female respondents report higher levels of drinking. For instance, 41.3 per cent of them drink up to once a month, only 35.2 and 24.4 per cent of surviving and deceased relatives drink alcohol this often. Female respondents are also less likely to report that they have never drank (32.8 per cent) than their relatives (48.8 per cent).

2.3. Analytic strategy

The reported frequencies of drinking among respondents and their relatives suggest that there are non-trivial differences in alcohol consumption patterns between these two groups, with more frequent drinking among deceased men and less frequent drinking among deceased women. Based on the previous research showing a strong link between alcohol consumption and mortality in Russia (Nemtsov, 2002; Norström, 2011; Pridemore, 2013; Pridemore and Chamlin, 2006), it is likely that the sample of surviving relatives does not include individuals who were frequent drinkers but died due to alcohol-related causes. Therefore, to derive more robust estimates of individual-level correlates of frequent drinking we analyse the sample of both surviving and deceased relatives. To study individual-level correlates of the frequency of alcohol consumption, we create a dummy variable for frequent drinking among male relatives which takes a value of 1 if they drink alcoholic beverages “almost every day” or “several times a week” and 0 otherwise. For women, the frequent drinking variable also takes a value of 1 if they drink “about 2-4 times a month”. This definition is necessary because the share of female relatives consuming alcohol several times a week or more often is about 0.7 per cent, which makes meaningful analyses of its individual-level explanations unfeasible among women.

To account for the dependence between individuals in the same families and towns, we fit three-level mixed-effects logistic regressions as commonly used in such analyses (Gibbons

and Hedeker, 1997). Models are run separately by gender, with level 1 consisting of individuals, level 2 of their families, and level 3 of the 30 towns in which the PrivMort survey was conducted. We employ essentially three-level models with two random-effects equations in which the first is a random intercept at the settlement level, and the second is a random intercept at the family level. The estimations are performed with the procedure “Melogit” in Stata 14 which achieves optimization using the original metric of variance components, while the conditional distribution of the response given the random effects is assumed to be Bernoulli with a logit link function. For informative purposes we also calculate town-level and family-level variance components and intraclass correlation coefficients (ICC) for each multivariable regression model. Although the latter measure is sub-optimal for binary outcome variables, the variance and ICC estimates jointly suggest that, controlling for fixed-effects on individual-level, within the same town the correlation of frequent drinking among individuals is weaker than the correlation of frequent drinking within the same families.

2.4. Correlates of frequent drinking

Individual-level correlates included in our multilevel logistic regression models correspond to the explanations of drinking discussed in the introductory section. The age of individuals, at death for decedents and at survey for survivors, is collapsed into five categories: 40-49, 50-59, 60-69, 70-79 and 80 and more years old. We control for the type of relative included in the analytical sample. The variable on education is operationalized in the following five categories: elementary; secondary; vocational secondary; vocational higher; and complete academic higher education. Marital status consists of singles (i.e. never-married), married, separated/divorced, and widows/widowers. The survey respondents were asked to report the frequency of

communication between them and their relatives including face-to-face, phone, internet, telegraph, and letters. The labour market variable is divided into individuals who are in work, were redundant/fired, cannot work because of ill health, already retired, or do not work for other reasons.

The PrivMort survey asked about unemployment spells lasting for 6 months or longer or if respondents' relatives ever had to go without things people really need, like food, heat or clothes in the 1980s, 1990s, and 2000s. Their answers are used as the proxy for material deprivation. The survey also inquired into individuals' occupational status, which is collapsed into four major groups of the International Standard Classification of Occupation (ISCO-88). ISCO 1-2 includes legislators, senior officials, managers, and professionals and is the most advantaged group of occupations. The most precarious jobs are, in turn, included in the ISCO 9 major group consisting of occupations such as agricultural, mining, manufacturing labourers, sales and services elementary occupations. All remaining types of jobs are collapsed together into the ISCO 3-8 groups. We also separate individuals with occupations related to state security and the military as they might exhibit different patterns of drinking. Lastly, respondents were also asked if their relatives ever had to go without things people really need, like food, heat or clothes in the 1980s-2000s (descriptive statistics are reported in Online Supplement C).

3. Results

3.1. Socio-demographic correlates, education, and social support

Table 1 shows multivariable odds ratios (OR) from multilevel mixed-effects logistic regressions with corresponding 95 per cent confidence intervals (CI). After list-wise deletion of missing data, men constitute 55.9 per cent of relatives and models are run separately by gender. Our multivariable analysis, in line with the bivariate estimates (reported in Online Supplement D), suggest that different relatives have varying odds of being frequent drinkers. Among men, the first brothers have significantly lower odds ratios of 0.51 (CI 0.38–0.68) and first partners significantly higher odds ratios of 3.56 (CI 2.20–5.57) of consuming alcohol frequently than fathers. Among women, when compared with mothers, both the first and the second sisters are more likely to consume alcohol more frequently with the corresponding odds ratios of 2.36 (CI 1.86–3.00) and 1.69 (CI 1.08 – 2.64). As expected, younger individuals are more likely to consume alcohol frequently, however we have to emphasise once again that the older age groups contain a higher ratio of decedents to survivors than the younger groups. Among men aged 40–49, the odds of frequent drinking are 2.85 (CI 1.31–6.17) times higher than for those aged 80 and older, while for women this effect is even stronger with the odds ratio of 4.35 (CI 2.16–8.75).

Low educational attainment is associated with more frequent drinking among men but not among women. Men with low educational attainment are at the higher risk of alcohol consumption with the odds ratios of 2.12 (CI 1.46–3.09), 1.72 (CI 1.15–2.59), 1.95 (CI 1.35–2.80), and 1.85 (CI 1.26–2.72) for respectively elementary, secondary, vocational secondary, and vocational higher education when compared with academic higher education. As regards marital status, women are much more likely to be widowed than men, but only separated/divorced men have higher odds of drinking than married ones (OR 1.32 CI 1.03–1.69). Men who do not communicate with respondents or communicate about once a year have, respectively, the odds ratios of 2.51 (95% CI 1.49–4.23) and 1.86 (95% CI 1.23–2.81) of being frequent drinkers compared with those who

stay in touch daily with their relatives. Similarly, women who are in touch with their family members only a few times a year drink more often (OR 1.81 CI 1.08–3.03) than those who stay in touch on a daily basis.

3.2. Labour market and life course correlates

The results for labour market characteristics suggest that, in comparison to working men, those who were made redundant due to enterprise closure, about 2 per cent of the sample, have an odds ratio of 3.03 (CI 2.13–4.31) of drinking at least several times a week. In addition, we find that men who do not work because of ill health are more likely to consume alcohol more often (OR 1.48 CI 1.12–1.95) than working individuals. Adjusting for all covariates, those men who experienced 6 or more months of unemployment in the 1990s have the odds ratio of 1.97 (CI 1.42–2.75) and long-term unemployed women in the 2000s have odds ratios of 2.29 (CI 1.30–4.04) to drink frequently. We also find that in the 2000s those men who were economically inactive have higher chances of being frequent drinkers.

Unlike bivariate analysis, our three-level multivariable logistic regressions do not suggest that men or women who experienced material deprivation anytime in the 1980s-2000s have higher odds of frequently consuming alcohol. Lastly, men in the unskilled working class have a higher bivariate odds of frequent drinking when compared with those in the types of jobs that are collapsed together into the ISCO 3-8 groups. We find that those with elementary occupations in the 1980s have an odds ratio of 1.42 (CI 1.11–1.82) of drinking frequently when compared with men in the intermediate group of occupations. In the 2000s, men in professional occupations had 43 per cent (OR 0.57 CI 0.38–0.86) lower odds of frequent drinking. At the other end of the occupational hierarchy, individuals with unskilled working occupations have odds ratio of 1.61

(CI 1.17–2.22) of consuming alcohol at least several times a week (further robustness checks are reported in Online Supplement E).

4. Discussion

In this study, we presented new data on the frequency of drinking among middle-aged and older Russian men and women and attempted to explain the frequent consumption of alcoholic beverages in 30 towns of the European part of Russia. We observe that the reported frequency of drinking among male respondents is only marginally lower than levels reported for their surviving male relatives. The lack of difference between self-reports and reports for non-deceased relatives suggests that self-reported measure might accurately reflect real frequency of alcohol consumption among surviving male population. Our results, however, also indicate that those relatives who are deceased have a much higher level of alcohol consumption and therefore should be included in the analysis of correlates of frequent drinking. Among women, self-report estimates are somewhat greater than reports for female relatives. Based on the results of cognitive testing we have carried out in the field in 2014, we assume that this at least partially has to do with respondents under-reporting alcohol consumption, particularly for older female relatives (i.e. mothers) because of the negative cultural context with traditional gender normativity, where drinking is seen as derogatory in women and acceptable in men.

We also find that different correlates are independently associated with frequent alcohol consumption. Our results indicate an inverse association between education and frequent drinking in Russia but we do not observe this effect among women. We find that married people and those with strong family ties are less likely to drink than the divorced and individuals without family connections. The results also reveal the significant associations of long-term

unemployment and occupational status in the 1990s-2000s with frequent drinking. Accounting for other correlates, material deprivation does not contribute to frequent alcohol consumption, which is a novel finding contradicting the earlier studies on a salient effect of material deprivation, financial strain and other income-related problems for frequent drinking (Bobak et al., 1999; Bobrova et al., 2010; Luoto, 1998). These reported associations are stronger among men rather than among women. One of the reasons for this could be the gender-specific coding of frequent drinking (for other study limitations, see Online Supplement F). The reported findings are important in the context of previous research for three main reasons. First, this is one of the most comprehensive studies of correlates of alcohol consumption in Russia to date as it includes more correlates than in previous studies using an unusually large sample of individuals. Second, methodologically the Brass method used to build a retrospective convenience cohort allows us to take account of the potential bias of misreporting of alcohol consumption commonly present in self-reported surveys. Third, substantively this study demonstrates that in addition to current socio-demographic and socio-economic explanations, individuals' life course trajectories of losing a job, long-term unemployment, and occupational attainment in transition explain their propensity of frequent drinking in post-communist Russia.

One of the major findings of this study is that most of the correlates of frequent drinking, with individuals' age being one exception, demonstrate effects that are more salient for men than for women. The latter suggests that men are especially vulnerable to inequality in educational and occupational attainment, labour market conditions and social support in Russia. To remedy inequalities in drinking stemming from factors such as individuals' education, labour market status and unemployment requires systemic intervention, probably at the national level, but local governments could also play a positive role. For instance, there might be few settings to facilitate

positive, non-alcohol dominated space for social interaction in small towns that were included in the PrivMort dataset. Policy measures that can promote a culture of more frequent communication among relatives and encourage more active participation in social, cultural and recreational activities such as participating in sport clubs or visiting cinemas and theatres may positively affect the levels of substance abuse (Orozco et al., 2017; Zoorob and Salemi, 2017).

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Figure 1: Frequencies of responses on the question: “Do you/does/did your father/mother/siblings/partner drink alcoholic beverages?” Respondents and their survived and deceased relatives aged 40 and above

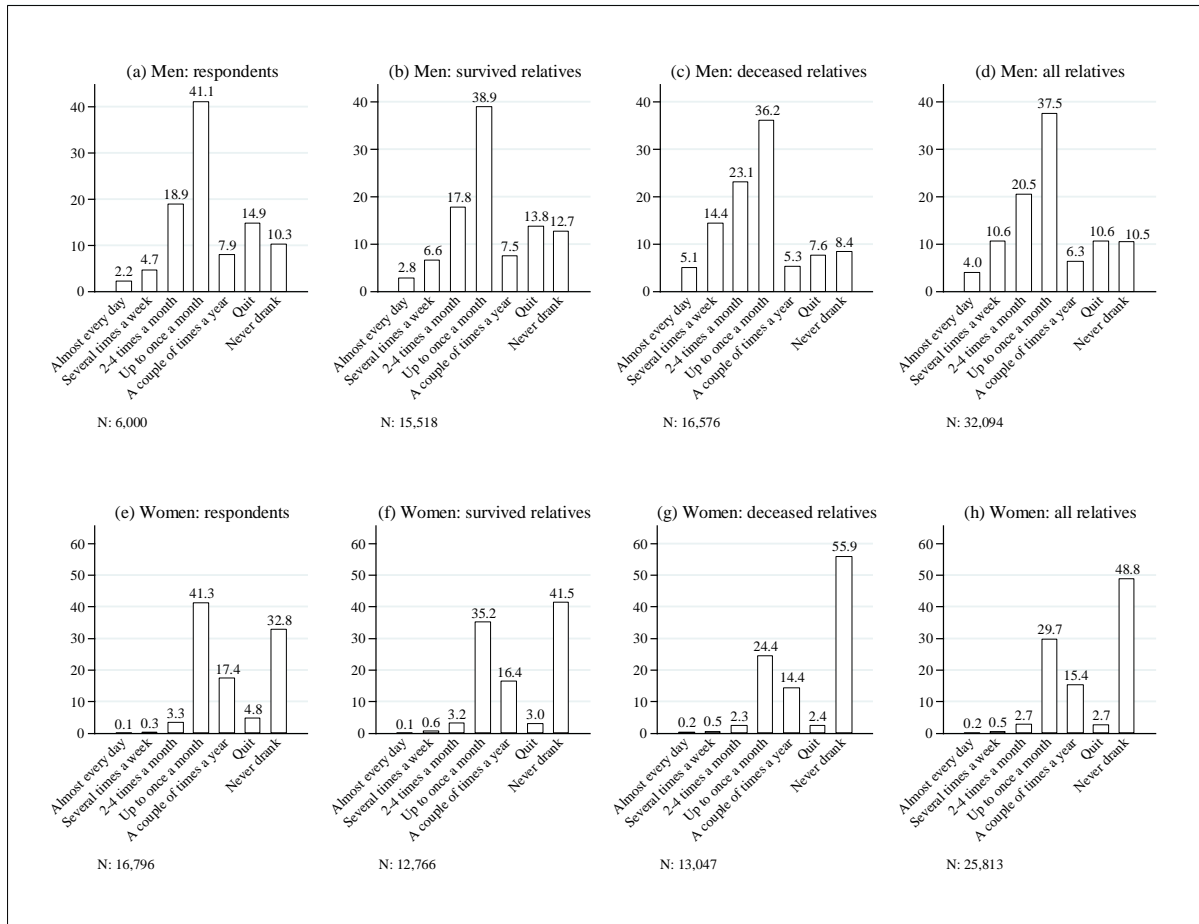


Table 1: Multivariable odds ratios from three-level mixed-effects logistic regressions of frequent drinking among respondents' relatives

	Males	Females
	OR (95% CI)	OR (95% CI)
Relatives		
Father	1.00	—
Mother	—	1.00
First sibling	0.51 (0.38-0.68)	2.36 (1.86-3.00)
Second sibling	0.74 (0.53-1.04)	1.69 (1.08-2.64)
First partner	3.56 (2.20-5.76)	—
Age groups		
42-49	2.85 (1.31-6.17)	4.35 (2.16-8.75)
50-59	2.54 (1.23-5.26)	3.95 (2.15-7.24)
60-69	1.73 (0.85-3.55)	1.97 (1.20-3.21)
70-79	1.11 (0.65-1.90)	1.72 (1.19-2.47)
80+	1.00	1.00
Education		
Elementary	2.12 (1.46-3.09)	1.27 (0.79-2.05)
Secondary	1.72 (1.15-2.59)	0.98 (0.60-1.61)
Vocational secondary	1.95 (1.35-2.80)	1.03 (0.65-1.65)
Vocational higher	1.85 (1.26-2.72)	0.65 (0.46-0.91)
Academic higher	1.00	1.00
Marital status		
Single	1.15 (0.57-2.31)	1.60 (0.80-3.19)
Married	1.00	1.00
Separated/divorced	1.32 (1.03-1.69)	1.40 (0.95-2.06)
Widow/widower	0.85 (0.55-1.33)	1.34 (0.99-1.81)
Communication		
Live in the same household	1.20 (0.94-1.55)	0.98 (0.63-1.51)
Every day	1.00	1.00
Once a week	1.01 (0.81-1.26)	1.17 (0.83-1.63)
Once a month	0.96 (0.74-1.26)	1.36 (0.97-1.91)
A few times a year	1.36 (0.97-1.91)	1.81 (1.08-3.03)
Once a year	1.86 (1.23-2.81)	0.80 (0.20-3.16)
Less	1.78 (1.05-3.02)	0.91 (0.21-3.90)
No communication	2.51 (1.49-4.23)	—
Labour market		
Working	1.00	1.00
Redundant/fired	3.03 (2.13-4.31)	1.25 (0.48-3.27)
Ill health	1.48 (1.12-1.95)	1.19 (0.62-2.29)
Early retirement	1.27 (0.88-1.84)	1.49 (0.94-2.36)
Retired	1.36 (1.02-1.81)	1.29 (0.89-1.88)
Other reasons	2.50 (1.71-3.65)	1.38 (0.50-3.85)
Long-term unemployment		
In the 1980s		
Was not unemployed	1.00	1.00
Unemployed	1.63 (0.83-3.19)	2.41 (0.84-6.95)
Was not working	0.75 (0.47-1.19)	0.64 (0.37-1.10)
In the 1990s		
Was not unemployed	1.00	1.00
Unemployed	1.97 (1.42-2.75)	1.40 (0.81-2.42)
Was not working	0.91 (0.75-1.10)	0.81 (0.57-1.15)
Was not alive	0.97 (0.74-1.28)	0.58 (0.31-1.08)
In the 2000s		
Was not unemployed	1.00	1.00
Unemployed	1.65 (0.91-3.01)	2.29 (1.30-4.04)

	Males	Females
	OR (95% CI)	OR (95% CI)
Was not working	1.91 (1.56-2.36)	1.26 (0.76-2.10)
Was not alive	1.83 (1.37-2.44)	1.65 (1.04-2.62)
Material deprivation		
In the 1980s		
Never	1.00	1.00
Sometimes	1.24 (0.67-2.30)	1.18 (0.70-2.00)
In the 1990s		
Never	1.00	1.00
Sometimes	1.03 (0.72-1.46)	1.16 (0.60-2.22)
Was not alive	—	—
In the 2000s		
Never	1.00	1.00
Sometimes	1.33 (0.71-2.51)	1.46 (0.71-3.01)
Was not alive	—	—
Occupations		
In the 1980s		
Managers & professionals	0.96 (0.60-1.55)	0.57 (0.32-1.02)
Intermediate occupations	1.00	1.00
Unskilled working class	1.42 (1.11-1.82)	1.02 (0.79-1.34)
Armed forces	0.91 (0.39-2.10)	0.74 (0.15-3.81)
Was not working	—	—
In the 1990s		
Managers & professionals	0.73 (0.46-1.14)	1.19 (0.65-2.18)
Intermediate occupations	1.00	1.00
Unskilled working class	0.97 (0.64-1.48)	1.08 (0.72-1.62)
Armed forces	0.67 (0.24-1.84)	9.72 (1.05-89.7)
Wasn't working	—	—
Wasn't alive	—	—
In the 2000s		
Managers & professionals	0.57 (0.38-0.86)	0.67 (0.29-1.53)
Intermediate occupations	1.00	1.00
Unskilled working class	1.61 (1.17-2.22)	1.27 (0.75-2.17)
Armed forces	0.99 (0.39-2.54)	1.13 (0.00-5.19)
Wasn't working	—	—
Wasn't alive	—	—
Variance		
Town-level	0.42 (0.24-0.74)	0.94 (0.45-1.96)
Family-level	1.30 (0.70-2.43)	1.96 (1.20-3.22)
Statistics		
ICC on settlement-level	0.08 (0.05-0.14)	0.15 (0.09-0.25)
ICC on family-level	0.34 (0.26-0.44)	0.47 (0.34-0.60)

Notes: Statistically significant associations are shown in bold.

Supplementary Material for the Article:

This material supplements, but does not replace, the peer-reviewed paper in

Drug and Alcohol Dependence.

Correlates of frequent alcohol consumption among middle-aged and older men and women in

Russia: A multilevel analysis of the PrivMort Retrospective Cohort Study

Alexi Gugushvili¹, Aytalina Azarova², Darja Irdam², Whitney Crenna-Jennings³, Michael Murphy⁴, Martin McKee⁵, Lawrence King⁶

¹Department of Social Policy and Intervention and Nuffield College, University of Oxford
Barnett House, 32 Wellington Square, Oxford, UK OX1 2ER,

²Department of Sociology, University of Cambridge, 16 Mill Lane, Cambridge, UK CB2 1SB

³University College London, Gower Street, London, WC1E 6BT, UK

⁴London School of Economics and Political Science, Houghton Street, London, WC2A 2AE, UK

⁵London School of Hygiene and Tropical Medicine, Keppel Street, London, WC1E 7HT, UK

⁶University of Massachusetts, 300 Massachusetts Ave, Amherst, MA 01003, US

Correspondence:

Alexi Gugushvili

Department of Social Policy and Intervention and Nuffield College

University of Oxford

Barnett House, 32 Wellington Square, Oxford OX1 2ER, UK

alexi.gugushvili@spi.ox.ac.uk

Online Supplement A

Selection of towns

Towns were selected using propensity score-matching on the pre-transition demographic and socio-economic characteristics (see previously published study protocol for details (Irdam et al., 2016)). We used a “random walk” procedure for sampling the households. First, a map of each settlement was divided into numbered cells, and the starting points for “random walk” routes were identified by a random number generator. Second, an interviewer started a route from a primary sampling unit located at the centre of the selected cell, ensuring that at least three eligible households were between the household where the interview took place and the next household. He or she continued the “walk” until 25 interviews were conducted.

Deviation from random sampling

The PrivMort study design has certain features that enable robust estimations without employing conventional methods of correction for the survey’s possible deviation from random sampling. First, the towns were not randomly selected, but matched on mortality rates, population size, demographic structure, average wages, number of physicians, floor area per person, death rates from alcohol poisoning, and emission of pollutants into the atmosphere. Second, within the towns, all individuals had an equal selection probability which was achieved, as described above, by grid method and the “random walk” procedure. Third, to further equalize the probabilities for selection, the sampling sizes for each town were adjusted proportionally to the sampled populations. Fourth, Taylor series linear approximation is one of the variance estimation methods for the survey data, along with replication methods such as Balanced Repeated Replications, jackknife, and bootstrapping. The Taylor series linear approximation method is analytically analogous to the Huber/White estimation employed for non-survey

settings. We used the latter in all our models to account for the violation of homogeneity of variance assumption. Finally, by using the mixed effects specification, we not only explicitly deal with the sampling issues such as multi-level clusters, but account for some over-dispersion as an alternative to robust standard errors.

Cognitive tests and back-checks

The cognitive tests were carried out in a controlled environment with respondents sampled from survey towns to identify problematic wording and sensitive questions. During the cognitive tests we discovered that respondent sensitivity was less of a problem than initially anticipated, consistent with previous experience in Russia where people often appreciated the opportunity to talk about their deceased relatives. Interviewers made up to five attempts to enter the identified household and four attempts at interviewing the person who matched the screening criteria if he or she was temporarily unavailable. We have performed back-checks for at least 10 per cent of complete interviews conducted in each settlement and 15 per cent of unsuccessful interview attempts. The back-checks were mostly performed by phone, while in some cases the regional supervisors carried them out by visiting individual households in person. The questionnaire took about 50-60 minutes to complete and questions on respondents' own alcohol consumption and alcohol consumption by their relatives were set apart to mitigate the potential bias of correlated responses.

Online Supplement B

Self-reported data on alcohol consumption

Self-reported data on alcohol consumption from surveys is known to underestimate actual consumption and frequency of drinking, with respondents tending to underreport their own levels of alcohol intake (Laatikainen et al., 2002; Midanik, 1988; Stockwell et al., 2004). This has led some to seek data from proxy informants, with evidence that it may be more accurate, at least to the extent that alcohol-related behaviours, such as drunkenness, can be observed (Midanik, 1982). There are a number of cross-sectional surveys available since the 1990s in Russia, which suggest that, for instance, in 1996 only about 10 per cent of men and 2 per cent of women consumed alcoholic beverages a few times a week or more often (Bobak et al., 1999), while in 2001 59 per cent of men and 19 per cent of women consumed alcohol once a week or more often (Pomerleau et al., 2005). More recently, in the study of middle aged and older population of Novosibirsk, the third-most populous city in Russia, 42 per cent of men and 8 per cent of women reported drinking 1–4 times a week or more often (Bobrova et al., 2010). It is unclear, however, what is the extent of bias in the described and other related self-reported estimations of drinking.

Online Supplement C

Table a1: Descriptive statistics of predictors of frequent drinking among respondents' relatives

	Males		Females	
	Per cent	Number of individuals	Per cent	Number of individuals
Relatives				
Father	37.1	12,359	—	—
Mother	—	—	68.3	18,291
First sibling	14.4	4,800	22.8	6,116
Second sibling	6.5	2,154	8.9	2,389
First partner	42.0	13,986	—	—
Age groups				
42-49	11.3	3,748	4.5	1,211
50-59	24.5	8,144	12.1	3,244
60-69	31.3	10,436	24.9	6,681
70-79	22.9	7,627	30.8	8,256
80+	10.0	3,344	27.6	7,404
Education				
Elementary	29.1	9,428	44.3	11,450
Secondary	17.5	5,656	14.8	3,814
Vocational secondary	19.2	6,218	11.8	3,041
Vocational higher	23.7	7,669	21.2	5,445
Academic higher	10.5	3,381	8.1	2,088
Marital status				
Single	1.0	370	3.0	781
Married	84.7	27,894	48.4	12,677
Separated/divorced	8.1	2,668	10.9	2,854
Widow/widower	6.2	2,028	37.7	9,872
Communication				
Live in the same household	13.9	2,852	19.9	5,123
Every day	23.6	4,823	33.8	8,684
Once a week	27.4	5,604	25.9	6,639
Once a month	15.4	3,157	11.8	3,016
A few times a year	8.1	1,649	5.3	1,362
Once a year	2.9	588	1.7	447
Less	3.4	702	1.6	404
No communication	5.3	1,090	—	—
Labour market				
Working	34.3	10,447	15.5	3,881
Redundant/fired	1.9	591	1.6	412
Ill health	8.4	2,551	4.3	1,075
Early retirement	18.1	5,510	6.7	1,697
Retired	33.1	10,097	67.4	16,937
Other reasons	4.3	1,322	4.5	1,124
Long-term unemployment				
In the 1980s				
Was not unemployed	93.2	26,288	94.1	17,397
Unemployed	1.3	357	0.6	116
Was not working	5.5	1,548	5.3	985
In the 1990s				
Was not unemployed	70.0	20,780	56.8	11,804
Unemployed	4.1	1,218	1.7	350
Was not working	14.5	4,308	28.0	5,814
Was not alive	11.4	3,396	13.5	2,807

	Males		Females	
	Per cent	Number of individuals	Per cent	Number of individuals
In the 2000s				
Was not unemployed	44.7	13,918	30.5	7,040
Unemployed	2.2	691	0.7	159
Was not working	23.8	7,399	38.7	8,935
Was not alive	29.2	9,080	30.1	6,948
Material deprivation				
In the 1980s				
Never	95.7	30,415	94.9	24,443
Sometimes	4.3	1,376	5.1	1,322
In the 1990s				
Never	82.9	26,267	82.4	21,304
Sometimes	6.4	2,028	6.8	1,747
Was not alive	10.7	3,396	10.9	2,807
In the 2000s				
Never	68.9	21,759	70.6	18,308
Sometimes	2.4	755	2.6	677
Was not alive	28.7	9,080	26.8	6,948
Occupations				
In the 1980s				
Managers & professionals	10.1	2,769	20.0	3,547
Intermediate occupations	75.1	20,684	58.6	10,410
Unskilled working class	7.1	1,953	15.7	2,782
Armed forces	2.2	594	0.2	33
Was not working	5.6	1,548	5.5	985
In the 1990s				
Managers & professionals	9.0	2,608	14.9	3,008
Intermediate occupations	58.1	16,815	35.3	7,121
Unskilled working class	4.8	1,399	7.1	1,426
Armed forces	1.6	461	0.1	28
Wasn't working	14.9	4,308	28.8	5,814
Wasn't alive	11.7	3,396	13.9	2,807
In the 2000s				
Managers & professionals	6.4	1,930	9.0	2,033
Intermediate occupations	34.9	10,525	17.3	3,901
Unskilled working class	3.3	987	3.3	743
Armed forces	0.8	236	0.1	24
Wasn't working	24.5	7,399	39.6	8,935
Wasn't alive	31.1	9,080	30.8	6,948

Online Supplement D

Table a2: Bivariate odds ratios from three-level mixed-effects logistic regressions of frequent drinking among respondents' relatives

	Males	Females
	OR (95% CI)	OR (95% CI)
Relatives		
Father	1.00	—
Mother	—	1.00
First sibling	0.56 (0.50-0.63)	2.38 (2.06-2.75)
Second sibling	0.80 (0.70-0.92)	2.12 (1.72-2.61)
First partner	1.29 (1.21-1.38)	—
Age groups		
42-49	1.97 (1.71-2.27)	4.02 (2.99-5.40)
50-59	1.79 (1.58-2.04)	3.99 (3.17-5.02)
60-69	1.42 (1.25-1.61)	2.41 (1.94-3.00)
70-79	1.15 (1.01-1.32)	1.80 (1.44-2.24)
80+	1.00	1.00
Education		
Elementary	2.73 (2.37-3.15)	0.84 (0.65-1.08)
Secondary	2.57 (2.21-2.99)	1.27 (0.96-1.68)
Vocational secondary	2.61 (2.25-3.03)	1.50 (1.13-1.99)
Vocational higher	1.86 (1.60-2.16)	0.86 (0.65-1.14)
Academic higher	1.00	1.00
Marital status		
Single	1.38 (1.03-1.85)	2.01 (1.47-2.75)
Married	1.00	1.00
Separated/divorced	1.19 (1.05-1.34)	2.06 (1.71-2.48)
Widow/widower	0.87 (0.75-1.01)	1.03 (0.88-1.20)
Communication		
Live in the same household	1.80 (1.58-2.05)	0.83 (0.66-1.04)
Every day	1.00	1.00
Once a week	1.08 (0.96-1.22)	1.50 (1.25-1.79)
Once a month	1.12 (0.97-1.29)	1.89 (1.53-2.34)
A few times a year	1.80 (1.54-2.11)	2.40 (1.85-3.11)
Once a year	1.98 (1.58-2.48)	1.23 (0.71-2.14)
Less	2.44 (1.98-3.01)	2.69 (1.74-4.15)
No communication	7.71 (6.63-8.97)	—
Labour market		
Working	1.00	1.00
Redundant/fired	5.04 (4.22-6.00)	1.42 (0.95-2.12)
Ill health	1.45 (1.29-1.64)	0.66 (0.46-0.95)
Early retirement	1.17 (1.06-1.29)	0.68 (0.50-0.91)
Retired	1.06 (0.97-1.15)	0.57 (0.48-0.67)
Other reasons	2.60 (2.27-2.97)	0.51 (0.35-0.76)
Long-term unemployment		
In the 1980s		
Was not unemployed	1.00	1.00
Unemployed	4.67 (3.79-5.76)	3.66 (2.08-6.45)
Was not working	0.63 (0.53-0.74)	1.14 (0.84-1.54)
In the 1990s		
Was not unemployed	1.00	1.00
Unemployed	2.57 (2.25-2.93)	2.43 (1.69-3.51)
Was not working	1.15 (1.04-1.26)	0.64 (0.53-0.77)
Was not alive	1.48 (1.35-1.63)	0.56 (0.45-0.74)

	Males	Females
	OR (95% CI)	OR (95% CI)
In the 2000s		
Was not unemployed	1.00	1.00
Unemployed	2.26 (1.87-2.73)	3.68 (2.35-5.76)
Was not working	1.55 (1.43-1.69)	0.68 (0.58-0.81)
Was not alive	1.93 (1.79-2.08)	0.67 (0.56-0.80)
Material deprivation		
In the 1980s		
Never	1.00	1.00
Sometimes	2.05 (1.81-2.33)	1.74 (1.36-2.23)
In the 1990s		
Never	1.00	1.00
Sometimes	2.10 (1.88-2.34)	1.45 (1.15-1.83)
Was not alive	1.50 (1.37-1.65)	0.72 (0.56-0.92)
In the 2000s		
Never	1.00	1.00
Sometimes	2.87 (2.43-3.39)	2.06 (1.51-2.80)
Was not alive	1.78 (1.66-1.90)	0.88 (0.75-1.03)
Occupations		
In the 1980s		
Managers & professionals	0.50 (0.43-0.57)	0.52 (0.41-0.66)
Intermediate occupations	1.00	1.00
Unskilled working class	1.70 (1.52-1.90)	0.96 (0.78-1.18)
Armed forces	0.63 (0.48-0.82)	1.46 (0.35-6.14)
Was not working	0.57 (0.48-0.67)	0.98 (0.72-1.33)
In the 1990s		
Managers & professionals	0.42 (0.35-0.49)	0.61 (0.48-0.78)
Intermediate occupations	1.00	1.00
Unskilled working class	1.78 (1.56-2.03)	1.20 (0.93-1.53)
Armed forces	0.62 (0.45-0.84)	1.56 (0.37-6.60)
Wasn't working	1.01 (0.92-1.11)	0.56 (0.46-0.67)
Wasn't alive	1.31 (1.19-1.44)	0.50 (0.39-0.65)
In the 2000s		
Managers & professionals	0.32 (0.25-0.41)	0.53 (0.39-0.70)
Intermediate occupations	1.00	1.00
Unskilled working class	1.83 (1.54-2.17)	1.29 (0.94-1.76)
Armed forces	0.72 (0.46-1.15)	0.75 (0.10-5.58)
Wasn't working	1.47 (1.35-1.61)	0.55 (0.46-0.66)
Wasn't alive	1.83 (1.69-1.98)	0.54 (0.45-0.66)

Notes: Statistically significant associations are shown in bold.

Online Supplement E

Additional tests

The reported findings in the main analysis are insensitive to plausible alternative specifications. For instance, a multilevel ordered or generalised ordered logistic regression model might be a more parsimonious functional form of regression analysis with the categorical answer options of the survey question on frequency of drinking. However, the main concern with employing these types of regressions would be appropriately ranking answer categories in frequency of drinking. For instance, answer options “quit” and “never drank” are not necessarily hierarchically ranked (see Stockwell *et al.* 2016), while collapsing them into a single category might lead to the misinterpretation of results. To check the robustness of our findings, we have fitted multinomial logistic regressions with town-level fixed-effects and answer option drinking “up to once a month” as the reference category. Odds ratios from the latter models suggest that the results are very similar to the reported findings from the three-level mixed-effects logistic regression models.

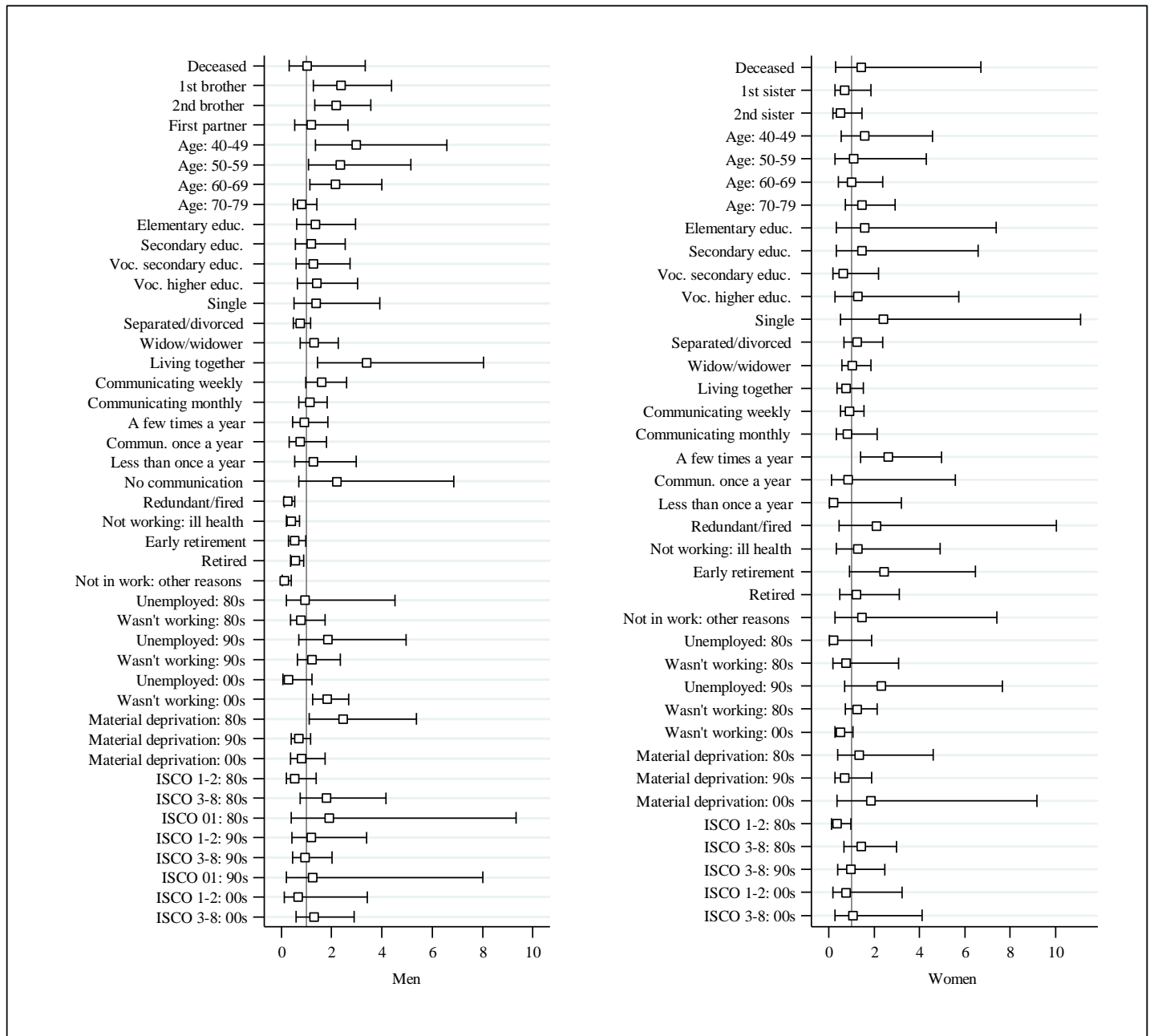
The results of the main analysis are also unaffected when the unreported regression models include some additional correlates. First, respondents’ religious denomination appears to have a statistically significant effect on their relatives’ likelihood of drinking. Both being non-Orthodox Christian and Muslim is associated with lower odds of drinking among men but the effects of other explanations in the main model remain unaffected. Second, controlling for individuals’ other health-related behaviour, smoking, does not change the reported association between the dependent and the independent variables, but smoking itself is a significant correlate of frequent drinking.

Vitality status

In order to ascertain whether our results reported in the main analysis are affected by pooling both surviving and deceased individuals, in Figure 2 we present interaction coefficients between deceased individuals and all other correlates. We note that decedents’ data are more likely to refer to some earlier period, whereas survivors’ data are more likely to refer to present, implicitly assuming no change over time. Although we find that among men and women several categories of deceased individuals have varying odds of frequent drinking when compared with surviving individuals, the majority of interaction terms are not statistically significant. Finally,

the results are essentially similar to those reported above when we restrict analytical sample to working age individuals 65 and younger.

Figure a1



Notes: Bars show 95% confidence intervals of point estimates. Reference categories are shown in Table 2. All specifications are identical to multivariate regressions in Table 2 in the main text.

Figure Legend

Figure a1: Odds ratios of interaction terms between decedents and other explanatory variables.

Coefficients from three-level mixed-effects logistic regression of frequent drinking among male and female relatives aged 40 and above

Online Supplement F

Study limitations

Our study has a number of limitations. The dataset is not a nationally representative survey of Russia, only covering a specific type of medium-size towns in its European part, excluding the territories of North Caucasus as those have significantly different drinking practices and the latter region was also torn by several conflicts in the 1990s and 2000s. Although more than 70 per cent of Russia's population live in the European part of the country, which makes data collection in this region reasonable in terms of costs and generalisation, it is nevertheless important to account for potential variation in drinking patterns in remote and scarcely populated regions of the geographically largest country of the world. Furthermore, in the convenience cohort survey employed the chance of inclusion is not uniform, but since we obtain information from a range of different types of individuals, very few people are excluded.

Another limitation of this study is recall bias that can stem from asking questions about events occurring over an extended period in pre- and post-transition Russia. The issue of potential bias in reporting alcohol behaviour in relatives and its dependence on self-reporting of alcohol consumption might also deserve an investigation of its own. However, we do not have any reason to believe that these variables were correlated. The questionnaire was developed by a multidisciplinary team of researchers, followed by a comprehensive cognitive testing with respondents sampled from survey towns. The questionnaire took about 50-60 minutes to complete and questions on respondents' own alcohol consumption and alcohol consumption in their relatives were set apart to avoid any cross-influence.

Finally, even though we do not find major differences in correlates of frequent drinking between surviving and deceased individuals, future research should also address what is

probably the major shortcoming of the PrivMort dataset as regards the frequency of drinking: namely, the survey design only allows for tracing whether or not and how often respondents and their relatives consumed alcohol at the time of interview or while they were alive, but it cannot help determine at what point in time, for how many years, and what type of alcohol beverages the subjects consumed. More temporal differentiation of the alcohol consumption variable in the survey would open new and potentially fruitful research horizons on hazardous drinking in Russia.

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