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Abstract: While the adverse health and economic consequences attributable to alcohol consumption are widely acknowledged, its impact on psychological wellbeing is less well understood. This is to a large extent due to the challenge of establishing causal effects of alcohol consumption when using standard single-equation econometric analyses. Using a unique dataset collected in 2010/11 of 18000 individuals and also community characteristics from nine countries of the former Soviet Union, a region with a major burden of alcohol related ill health, we address this problem by employing an instrumental variable approach to identify any causal effects of alcohol consumption on mental well-being. The availability of 24-hour alcohol sales outlets in the neighbourhood of the individuals is used as an instrument, based on theoretical reasoning and statistical testing of its validity. We find that increased alcohol consumption decreases well-being and that ignoring endogeneity leads to underestimation of this effect. This finding adds a further and previously under-appreciated dimension to the expected benefits that could be achieved with more effective alcohol policy in this region.

Title: Estimating the causal effect of alcohol consumption on well-being for a cross-section of 9 former Soviet Union countries

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Estimating the causal effect of alcohol consumption on well-being for a cross-section of 9 former Soviet Union countries

Research highlights:

- Examination of the causal links between alcohol consumption and well-being in the former Soviet Union.
- Instrumental variable analysis indicates that increased volume of alcohol consumption decreases well-being.
- Ignoring the endogeneity of alcohol leads to underestimation of its effect on well-being.

Estimating the causal effect of alcohol consumption on well-being for a cross-section of 9 former Soviet Union countries

February 2013

Abstract

While the adverse health and economic consequences attributable to alcohol consumption are widely acknowledged, its impact on psychological wellbeing is less well understood. This is to a large extent due to the challenge of establishing causal effects of alcohol consumption when using standard single-equation econometric analyses. Using a unique dataset collected in 2010/11 of 18000 individuals and also community characteristics from nine countries of the former Soviet Union, a region with a major burden of alcohol related ill health, we address this problem by employing an instrumental variable approach to identify any causal effects of alcohol consumption on mental well-being. The availability of 24-hour alcohol sales outlets in the neighbourhood of the individuals is used as an instrument, based on theoretical reasoning and statistical testing of its validity. We find that increased alcohol consumption decreases well-being and that ignoring endogeneity leads to underestimation of this effect. This finding adds a further and previously under-appreciated dimension to the expected benefits that could be achieved with more effective alcohol policy in this region.

Keywords: former Soviet Union; alcohol consumption, well-being; instrumental variables; causal effects

JEL: C26, I18

Introduction

Alcohol is major contributor to the global burden of disease; accounting for about 3.8% of all global deaths and 4.6% of global disability-adjusted life-years (Rehm, Mathers, Popova, Thavorncharoensap, Teerawattananon, & Patra, 2009). In addition to its adverse health effects, alcohol has serious economic consequences. Of the estimated 1% of gross national product in high and middle income countries attributable to alcohol related harm, the largest shares were due to productivity loss, costs of law enforcement and other indirect costs (Rehm, Mathers, Popova, Thavorncharoensap, Teerawattananon, & Patra, 2009).

The costs, both human and economic, associated with alcohol are far greater in the former Soviet Union (fSU), where the long tradition of hazardous drinking has been exacerbated in recent years by the large-scale production of cheap, easily available sources of alcohol in a population that has faced massive social and economic dislocation. It is now clear that alcohol is the main proximal cause of the large fluctuations in life expectancy that have characterised this region in the past two decades (Leon, et al., 1997; Shkolnikov, McKee, & Leon, 2001) and research using individual-level data has found that approximately 40% of deaths of working age men in a typical Russian city could, conservatively, be attributed to hazardous alcohol consumption (Leon, Shkolnikov, & McKee, 2009; Tomkins, et al., 2012). In Ukraine it was estimated that alcohol was responsible for 24% of male deaths and 6% of female deaths in 2004 at all ages (Krasovsky, 2009).

Beyond its association with premature mortality, there is an extensive literature on its detrimental effects on psychological well-being and mental health; alcohol dependent adults face an increased likelihood of major depression, phobias, anxiety and personality disorders among others (Cargiulo, 2007). These problems are common even among moderate drinkers, who are more likely to develop psychosocial problems than organ damage (Thakker, 1998). In contrast, some research reports better physical health among light and moderate consumers, although the association is less consistent for mental health (Green, Perrin, & Polen, 2004). Lang et al. (Lang, Wallace, Huppert, & Melzer, 2007) reported better cognition and subjective well-being and fewer depressive symptoms for moderate drinkers when compared to those who never had a drink, while Leigh reported beneficial effects on outcomes of stress, mood elevation and relaxation (Leigh & Stacy, 1991),

However, establishing causal pathways between alcohol consumption and well-being is not straightforward. Issues of reverse causality - e.g. individuals with low well-being (i.e. ill-being) self-medicate or are more prone to increased alcohol consumption - can bias estimates and thus lead to misguided policy recommendations. This endogeneity problem is rarely acknowledged or accounted for in the literature, so that existing studies of associations between alcohol and mental well-being must be viewed with caution. Such problems have recently been discussed in a study of the link between major depression and alcohol consumption in New Zealand, which used structural equation modelling in a birth cohort to argue that associations between alcohol and well-being were best explained by a causal model where problems with alcohol increased the risk of depression (Fergusson, Boden, & Horwood, 2009).

The aim of this paper is to examine the influence of alcohol use on psychological wellbeing while addressing the endogenous relationship between alcohol consumption and individual mental well-being using an instrumental variable (IV) approach. We utilise a unique dataset with information on individuals from 9 fSU countries, as well as information on their neighbourhood characteristics. The latter provides the opportunity to identify and use variables exogenous to the individual to estimate a causal effect of alcohol on the respondents' reported well-being.

Methods

Data source

For the analysis we use data collected in 2010/11 for the Health in Times of Transition (HITT) study (http://www.hitt-cis.net/) which was a follow-up to the 2001 Living Conditions, Lifestyles and Health (LLH) study. Standardised information on socio-economic, demographic, health and lifestyle characteristics was collected using cross-sectional surveys of 18000 individuals (aged 18+) in 9 fSU countries (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, and Ukraine). Multistage random sampling with stratification by region and rural/urban settlement type was used, while within each primary sampling unit (approximately 100–200 per country), households were selected by standardized random route procedures. The research was approved by the ethics committee of the London School of Hygiene and Tropical Medicine. For more on the survey methods please see (Balabanova, Roberts, Richardson, Haerpfer, & McKee, 2012).

Outcomes of interest

As measures of well-being we utilise two commonly used subjective well-being questions that follow Likert response formats. "Life satisfaction" asks individuals, "How satisfied are you with your life as a whole?", and presents them with a visual analogue scale (VAS) between 1 = Not at all satisfied and 10 = Extremely satisfied, while "Happiness with life" is similarly framed: "Taking all things together, how would you say things are these days – would you say you are?", again with a VAS between 1 = Very unhappy and 10 = Very happy (Table 1). These questions draw upon a longstanding literature in psychology (Diener, Suh, Lucas, & Smith, 1999) and their use is rapidly expanding and gaining prominence within economics more generally (Di Tella & MacCulloch, 2006) and health economics in particular (Oswald & Powdthavee, 2008). Subjective well-being questions have been validated and modelled across contexts and countries (Blanchflower & Oswald, 2004) and are regarded as good empirical approximation of individual well-being and utility (Frey & Stutzer, 2002; Oswald & Powdthavee, 2008). Previous applications of well-being on Eastern European countries (Blanchflower & Oswald, 2007; Hayo & Seifert, 2003) have confirmed the findings of past literature, further validating the implementation of such instruments among fSU countries.

Alcohol exposure

For the alcohol consumption measure, a continuous variable of the amount of alcoholic drinks consumed in a typical drinking session (with a recall period of the previous 1 year) was used. Individuals are specifically asked "How much strong spirits such as vodka do you usually drink on one occasion?" and their consumption is coded in grams. Using an average alcohol content of 43 cl of alcohol per litre of drink we convert the variable into an alcohol consumption indicator (with results reported in Table 1). As this is a linear transformation it does not influence our

findings but only affects the scale of the coefficients (i.e. an increased in the assumed alcohol content per litre would reduce the size of the coefficient). Further, given the possibility that increased alcohol consumption is correlated with higher recall bias (i.e. inebriated individuals are less likely to be able to accurately report their consumption) we cap alcohol consumption per occasion to 1 litre for all those individuals reporting consumption higher or equal to 1 litre (reducing the capping threshold of alcohol consumption per occasion or removing it altogether does not alter our findings).

Adjustment for confounding

The estimations control for a number of demographic and socio-economic factors common in well-being analyses, including age, gender, marital status, employment, household size, employment status, economic situation and health, as well for country effects (Table 1 for sample descriptive statistics and definitions). Such variables are considered exogenous to well-being and act as their own instruments in the IV estimation. Specifically, we use two proxies for economic status: a) a self-assessed question on financial situation (using a survey question of: "How would you describe the economic situation of your household at present time?", with five response categories ranging from Very bad to Very good), which has been found in previous work to perform better than self-reported income in these countries (Balabanova, et al., 2012; Roberts, et al., 2012) and more general contexts (McBride, 2001; Mentzakis & Moro, 2009) and b) a wealth index composed of responses to 10 questions on possessing certain objects or comforts (i.e. fridge, TV, washing machine (not automatic), mobile telephone, computer, car produced before 2005, automatic washing machine, home cinema, dishwasher and car made since 2005). Assigning a value of one for each affirmative response and summing up the 10 responses for each individual, the wealth index takes values ranging from 0 to 10.

Instrumental variable

Finally, for the implementation of the IV approach we use as our instrument the availability of 24-hour alcohol sales outlets (i.e. shops, kiosks, a person on the street or someone's private house) in the individual's neighbourhood (the validity of the instrument is discussed in the next section). The question used on the survey was: "Are there any places (shops, kiosks, a person on the street, someone's private house) where you can buy alcohol 24 hours in the day"?, with yes/no responses. This information is taken from the community information that was collected alongside the individual questionnaires by means of community profiles undertaken in a random sample of 300 of the sampling units used for the main household survey. These consist of trained data collectors walking around the selected community and completing a structured observation form on a range of community characteristics related to health and lifestyles. The community profiling methodology is based upon that used in a related study which has shown good results for validity and reliability (Chow, et al., 2010). These community profile data were then merged with the individual-level data from respondents living in these 300 communities. Unfortunately, the increased level of information this affords us comes at a cost in terms of sample size (Table 2). Therefore, as will be discussed in the next section, we explore different modelling specifications to test for the potential selection problems arising.

There is little reason to suspect that the availability of 24-hour alcohol selling outlets has a direct effect on individual well-being. Note that our instrument refers to 24-hour alcohol selling outlets which are measured separately from standard alcohol shops, and hence concerns of indirect

correlation between well-being and our instrument (through alcohol outlet density and violence or crime) are mitigated. Such correlation is certainly a problem when considering standard alcohol outlets, but in the case of 24-hour outlets the correlation would have to be significant over and above the effect of the standard outlets, which is unlikely. In other words, the indication of a "bad" neighbourhood is predominantly shown by the number of traditional alcohol outlets and at a much smaller degree by the number of the 24-hour alcohol outlets. In fact, conditioning on the number of standard alcohol outlets in the estimation, we find no change in the results (see Supplementary Material). On the other hand, there is a small literature on the effects of alcohol availability on alcohol consumption (Bryden, Roberts, McKee, & Petticrew, 2012; Hahn, et al., 2010). A recent review (Hahn, et al., 2010) of 10 studies on the effect of restricting hours of selling alcohol on alcohol consumption concluded that an increase in hours of sale by 2 or more significantly increases consumption and related harms. However, all studies were focusing on on-premise consumption (e.g. bars, restaurants) and were conducted on high-income countries (i.e. UK, Australia, Iceland). In the literature on off-premise alcohol outlet density (but not specifically on sales times), a large study in Australia found that higher density of off-premise outlets was associated with significant increases in the chances of heavy drinking (Livingston, Laslett, & Dietze, 2008), while a similar study in California, US, found an increased outlet density lead to increased likelihood of heavy drinking but not of drinking per se (Truong & Sturm, 2009). Studies of adolescents in New Zealand (Huckle, Huakau, Sweetsur, Huisman, & Casswell, 2008) and in California (Chen, Grube, & Gruenewald, 2010) report a positive association between consumption and total and off-premise density respectively, whereas for similar age groups in Switzerland Kuntsche et al (Kuntsche, Kuendig, & Gmel, 2008) find increased on-site drinking with increased density, but no link with off-premise outlets. However, a study in the Netherlands, using a representative population sample reports the opposite, with the association being strong for alcohol shops but not bars (van Oers & Garretsen, 1993), which is confirmed by an older (before privatisation of alcohol stores) Canadian study (Rootman & Oakey, 1973). Finally, a recent review of alcohol use and availability of alcohol, suggested that although the results were not conclusive, there was an indication that higher density of alcohol outlets in a local community is associated with an increase in alcohol use (Bryden, et al., 2012).

Despite a large number of studies observing or pointing towards a positive relationship between availability and alcohol consumption our analysis accounts for the possibility of a potential weak correlation between the two (i.e. implying that the link between the endogenous variable and the chosen instrument is not as strong) by means of robust statistics for inference in the covariate of interest (Moreira, 2003).

Statistical analysis

When the assumptions of a linear model are violated, the estimated parameters and marginal effects are biased. Such violations happen when the error of the regression is correlated with one of the covariates (i.e. $E(u \mid x) \neq 0$). The possibility of reverse causality between mental well-being and alcohol consumption (i.e. those who drink have lower levels of well-being or those with lower levels of well-being drink) is such a case. Hence we implement an IV approach to generate an unbiased estimation of the causal links. If the IV methodology is to produce consistent estimates, it must employ an exogenous variable (i.e. an instrument) that will be correlated directly with alcohol consumption but not with well-being. The correlation of the instrument with the problematic/endogenous variable, i.e. alcohol consumption, (but lack of

correlation with the outcome of interest, i.e. well-being) is used to substitute this endogenous variable with its predicted value (alternatively one can keep the endogenous variable in the equation but also add the generalised residual of the regression of the instrument on this problematic variable) and hence correct for the reverse causality problem. The validity of such an instrument requires support both from a theoretical and a statistical point of view (Cameron & Trivedi, 2005).

Taken together, for each of our two well-being outcomes we estimate two OLS (one for the full and one for the restricted sample) and one IV (using the restricted sample) models. The OLS estimations help us assess whether estimated parameters between full and restricted samples change and act as a crude sample selection test, while Wald tests are also computed for the statistical difference of coefficients across the two samples. Further we estimate two (one for each well-being indicator) standard two stage least square (2SLS) IV estimations for which we also compute robust (to weak instruments) confidence intervals for the effect of alcohol consumption (Baum, et al., 2012; Moreira, 2003). Estimations are performed in Stata with user-written routines, -ivreg2- (Baum, Schaffer, & Stillman, 2012) and -condivreg- (Moreira & Poi, 2003).

Results

Table 1 presents summary statistics for the well-being indicators, alcohol consumption, instrument and covariates for the restricted estimation sample (N=2124). On average, individuals report about 5.9 and 6.5 out of 7 as satisfaction with life and happiness, respectively, while on average (across individuals and countries) individuals report consuming about 2 cl of alcohol on a regular drinking session, with a high standard deviation of 5.3. About 80% of the sample has a 24-hours alcohol sales outlet in their neighbourhood. With respect to demographic and socio-economic characteristics, 44% are male, with age ranges from 18 to 95 with an average of 43, while 62% are married and 20% single. Average household size is 3.6 individuals, with an average of less than one child per household. 26% have had some higher education (completed and incomplete), 45% are employed and 20% unemployed. 23% of respondents reported being in a good or very good financial position, while the mean value for the wealth index was 4.2 out of 9. Finally, 41% indicated that they had good or very good health, with 74% and 65% stating that they can easily or fairly easily walk 1 kilometre or climb two or three flights of stairs without getting out of breath, respectively.

Moving on to the estimations in Tables 3 and 4, we first consider the OLS models to examine whether significant variations are observed when sample size changes. As the results in Tables 3 and 4 are very similar, both in sign and in magnitude, we will discuss them simultaneously to avoid repetition. Comparing the full and restricted sample we see that, despite the sizeable reduction in sample size, both estimations seem to fit equally well, with the estimated parameters largely comparable and with no indication of consistent up- or downward bias. Performing Wald tests for the equality of each coefficient between the two samples finds no difference to be statistically significant. Further, looking at the relationship between alcohol consumption and well-being, no significant link is observed in any OLS estimation, implying a lack of statistical or economical (judging by the size of the coefficients) effect.

Turning to the IV estimations, from the first stage estimations we observe that males on average drink considerably more than females per occasion, while consumption further increases with age, employment and wealth. Although first stage results are not important for our research question, they are paramount for the validity of our instrument. As expected, having a 24-hour alcohol sales outlet in one's neighbourhood does significantly increase alcohol consumption: in our case by about 1 cl at any given drinking session. To determine a significant correlation between alcohol consumption and availability also requires ascertaining the validity of our instrument and F-statistics of over 18 indicate that issues of weak identification are unlikely to be a problem in our application. Stock and Yogo (2002) argue that, as a rule of thumb, a value of 10 or more for the F-statistic is adequate in cases of one endogenous variable and homoskedastic errors). Formal testing of the IV specification cannot reject the null of homoskedasticity (Pagan & Hall, 1983), while we also cannot reject the null of lack of omitted variables as tested by Ramsey's specification test (RESET) for second and up to fourth order polynomial terms (Baum, et al., 2012; Hashem Pesaran & Taylor, 1999).

Focusing on the estimates from the second stage of the IV models, once endogeneity is taken into account the magnitude of the estimated coefficient drastically increases, implying an underestimation of the effect for the naive OLS specification. We find alcohol consumption has a significant and negative effect on well-being, with every 1 cl increase in alcohol per session leading to a 0.25 decrease in well-being. This translates to a 4.3% and 4.4% drop in life satisfaction and happiness, respectively for every extra cl of alcohol. To also take account of the possibility of potentially weak instruments, we calculate a robust confidence interval (using the conditional likelihood ratio approach) for the effect of alcohol, which also confirms its significance and large negative magnitude. A sensitivity analysis estimating the effect "average daily consumption" has on our outcomes obtains comparable conclusions although the effect is now more pronounced (more than doubled in size). The effect is marginally insignificant ($p=0.10$) for well-being but is significant ($p=0.048$) for happiness. This increase in size is consistent with those who drink heavily every day reporting lower well-being. However, such additional analysis faces strong limitations imposed by our measures of consumption (grouped in categories) and missing observations (using just a third of our sample). Further, as a robustness check we restrict the sample to individuals who drink below the average (i.e. Pure alcohol consumed per occasion < 2cl). As expected, for light drinkers, we find that alcohol does not affect well-being, which potentially also implies a heterogeneous effect of alcohol on well-being.

Regarding the rest of the estimated parameters, signs and magnitudes are largely comparable, without any systematic differences. Males seem to report higher well-being compared to females, while age has an inverted U-shape effect with an increase in well-being for younger individuals and then a reduction as age continues to rise.

Marriage has a beneficial effect on well-being, with an increased score compared to the reference category and those still single, while there is no significant association with higher education, larger household sizes and more children. On the other hand, compared to those inactive or retired, employed individuals report significantly higher satisfaction and happiness, while the same is true for wealthier individuals (measured either through the financial situation question or the wealth index). Finally, as expected, most physical health indicators are positively and highly significant with large magnitudes, implying healthier individuals reporting increased well-being.

Discussion

This study presents the first attempt to estimate causal links between alcohol consumption and mental well-being using an instrumental variable approach for a large sample of individuals in the fSU. We instrument alcohol consumption through the availability of 24-hour alcohol outlets in the neighbourhood of the individuals. The instrument performs well, with past theoretical/empirical evidence and statistical testing supporting its validity. In brief, we find that alcohol consumption increases with availability of 24-hour alcohol outlets, that well-being significantly drops with such increased alcohol consumption and that ignoring the endogeneity of alcohol consumption leads to underestimation of its effect. This is an important result in that it adds a further, and previously under-appreciated, dimension to the expected benefits that could be achieved with more effective alcohol policy in this region.

Indeed, while the link between alcohol consumption and mental well being has been speculated upon in the fSU (Leon & Shkolnikov, 1998), to the best of our knowledge, no studies have empirically linked the two. The findings from our study provide the first such data from the region. In doing so, they provide additional support for stronger measures to tackle alcohol abuse in this region (Roberts, Stickley, et al., 2012; WHO, 2011), especially as, in many of the countries concerned, they have so far been weak and poorly enforced. A key goal must be to restrict alcohol availability, whether in terms of outlet density or opening hours, which, along with higher taxes and restrictions on marketing, are the most effective measure in reducing alcohol-related harm (Anderson, Chisholm, & Fuhr, 2009). The countries concerned vary greatly in the extent to which they have even recognised hazardous drinking as a problem, let alone demonstrate any will to do anything about it. However, the tide may now be turning with evidence that the Russian government is tackling the promotion of alcohol (Ria Novosoti, 2012), following a 2006 law that instituted controls on the sale and distribution of alcohol (Levintova, 2007). Elsewhere, progress has been decidedly limited.

Our findings confirm similar associations reported in the literature from elsewhere (Cargiulo, 2007; Thakker, 1998) and at the same time contradict some previous studies on the links between alcohol and mental health (Green, et al., 2004; Lang, et al., 2007) who find insignificant or even positive results for moderate alcohol consumption. However, we should note that these are mostly correlational studies that potentially fail to identify causal links. Such criticism has been set out before in the literature (Fergusson, et al., 2009) with suggestions for the need of structural or other causal effect modelling.

Our results are consistent with theory and with the large empirical well-being literature, adding to the convergent and theoretical validity of our results. An early meta-analysis (Haring, Stock, & Okun, 1984) found that males tend to report better well-being, while longitudinal studies also concluded that marriage supported psychological well-being (Kim & McKenry, 2002; Mentzakis, McNamee, Ryan, & Sutton, 2011). Similarly, increased well-being is commonly associated with higher absolute and relative income (Clark & Oswald, 1996; Mentzakis & Moro, 2009; Oswald, 1997), although consistent indicators for the latter are hard to identify. Finally, a strong positive link between better physical and mental health is reported consistently in

previous studies (Clark & Oswald, 2002; Mentzakis, 2011), although potential adaptation effects cannot be controlled for in our cross-sectional setting (Groot, 2000; Heyink, 1993).

The study has certain limitations. First, the lack of longitudinal data prevents us from controlling for unobserved heterogeneity and time-invariant omitted variables that might be important in determining the relationship between mental well-being and alcohol consumption. For example, concerns at how environmental factors might affect our findings, can be addressed by conditioning on such variables in the estimation. Performing sensitivity checks using access to public parks and the total number of alcohol outlets in the neighbourhood, we find that our results do not change, while the IV weak instrument statistics even improve (see Supplementary Material). Further, our failure to reject the null of the Ramsey test should provide some confidence in our specification. Secondly, in order to perform the necessary IV estimation, the sample size is significantly reduced, which could create selection bias problems. However, tests of equality in the descriptive statistics and estimated parameters between the full and restricted samples show that such problems are less likely for our case. Although, this drop in sample size unfortunately prohibits us from any country specific analysis, we note that the composition, in terms of individual country sizes, between the original and restricted data is very similar, apart perhaps from Russia and Ukraine which are slightly over and under-represented respectively. Finally, our data potentially suffers from problems common to household surveys related to under-reporting of alcohol consumption, exclusion of socially marginalised groups (who are likely to constitute heavier drinkers) and/or of the heaviest drinkers (who may not be present/willing or able to participate in such surveys).

Conclusions

This study has shown that alcohol consumption among individuals of the fSU has detrimental effects on mental well-being and that ignoring the reverse causality between the two significantly underestimates the size of those effects. Future research should examine this association using more robust panel data and larger sample sizes.

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Table 1: Descriptive statistics for the restricted sample (N=2124)

	Mean	S.D.	Min	Max
Satisfaction with life (How satisfied are you with your life as a whole? 1 = Not at all satisfied – 10 = Extremely satisfied)	5.907	2.265	1	10
Happiness with life (Taking all things together, how would you say things are these days – would you say you are? 1 = Very unhappy – 10 = Very happy)	6.456	2.025	1	10
Pure alcohol consumed per occasion (in cl) [a, b]	1.914	5.314	0	43
24 hour alcohol selling shop/kiosk/house/outlet in the neighbourhood	0.799		0	1
Male	0.444		0	1
Age	43.30	17.41	18	95
Married	0.617		0	1
Single	0.203		0	1
Higher education	0.275		0	1
Household size	3.607	1.802	1	15
Number of children	0.760	1.057	0	10
Employed	0.451		0	1
Unemployed	0.203		0	1
Wealth Index	4.223	1.479	0	9
(Very) good financial situation	0.232		0	1
Very good/good health	0.407		0	1
(Fairly) easy to walk 1 kilometre distance	0.741		0	1
(Fairly) easy to climb stairs	0.654		0	1

[a] Converted from amount of strong spirits such as vodka usually consumed per occasion, where half litre of vodka assumed to contain 21.5 cl of pure alcohol

[b] Stated consumption of >1litre of strong spirits was fixed at 1 litre.

Table 2: Number of observations by country

	Full sample		Restricted estimation sample	
	Freq.	Percent	Freq.	Percent
Armenia	1,800	10.00	218	7.99
Azerbaijan	1,800	10.00	304	11.14
Belarus	1,800	10.00	244	8.94
Georgia	2,200	12.22	387	14.18
Kazakhstan	1,800	10.00	295	10.81
Kyrgyzstan	1,800	10.00	290	10.62
Moldova	1,798	10.00	231	8.46
Russia	3,000	16.67	563	20.62
Ukraine	2,000	11.11	198	7.25
Total	17,998	100.00	2,730	100.00

Table 3: Results from OLS and IV estimations of alcohol consumption on life satisfaction

	OLS		IV	
	Full sample	Restricted sample	IV First stage	IV Second Stage
Alcohol consumed per occasion (in cl)	0.00102	-0.00165		-0.281**
	(0.00325)	(0.00809)		(0.113)
24 hour alcohol selling outlet			1.032***	
			(0.242)	
Male	-0.128***	-0.208**	3.044***	0.640*
	(0.0339)	(0.0836)	(0.203)	(0.357)
Age	-0.0659***	-0.0729***	0.0779**	-0.0511***
	(0.00636)	(0.0154)	(0.0368)	(0.0198)
Age Squared	0.000654***	0.000766***	-0.000958**	0.000505**
	(6.72e-05)	(0.000163)	(0.000380)	(0.000211)
Married	0.425***	0.510***	-0.709**	0.313*
	(0.0498)	(0.123)	(0.291)	(0.161)
Single	0.188***	0.332**	-0.761*	0.126
	(0.0689)	(0.165)	(0.413)	(0.216)
Higher education	0.105***	0.207**	-0.299	0.124
	(0.0360)	(0.0897)	(0.226)	(0.114)
Household size	0.0127	0.0278	-0.108	-0.00737
	(0.0132)	(0.0313)	(0.0795)	(0.0408)
Number of children	-0.0508**	-0.0739	0.0492	-0.0578
	(0.0214)	(0.0519)	(0.133)	(0.0642)
Employed	0.0428	0.0396	0.929***	0.302*
	(0.0425)	(0.105)	(0.265)	(0.166)
Unemployed	-0.422***	-0.395***	0.531*	-0.245
	(0.0507)	(0.123)	(0.305)	(0.159)
Wealth Index	0.273***	0.287***	0.261***	0.365***
	(0.0122)	(0.0305)	(0.0753)	(0.0480)
(Very) good financial situation	1.152***	1.246***	-0.353	1.163***
	(0.0364)	(0.0912)	(0.242)	(0.121)
Very good/good health	0.618***	0.614***	-0.400*	0.505***
	(0.0363)	(0.0883)	(0.233)	(0.121)
(Fairly) easy to walk 1 kilometre distance	0.310***	0.369***	-0.0115	0.369**
	(0.0560)	(0.134)	(0.337)	(0.162)
(Fairly) easy to climb stairs	0.0690	0.104	0.578*	0.265
	(0.0511)	(0.123)	(0.309)	(0.162)
Constant	5.025***	4.647***	-2.879***	4.077***
	(0.168)	(0.418)	(1.047)	(0.547)
Observations	16,840	2,757	2,757	
First stage F-statistic			18.37***	
Het test			0.857	
RESET test			3.70	
Conditional LR			(-0.56, -0.08)***	

(Robust) standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 4: Results from OLS and IV estimations of alcohol consumption on happiness

	OLS		IV	
	Full sample	Restricted sample	IV First stage	IV Second Stage
Alcohol consumed per occasion (in cl)	-0.00412	-0.00990		-0.254**
	(0.00304)	(0.00773)		(0.104)
24 hour alcohol selling outlet			1.039***	
			(0.242)	
Male	-0.178***	-0.167**	3.046***	0.575*
	(0.0320)	(0.0796)	(0.204)	(0.329)
Age	-0.0500***	-0.0702***	0.0798**	-0.0509***
	(0.00605)	(0.0141)	(0.0369)	(0.0184)
Age Squared	0.00048***	0.000742***	-0.000975**	0.000511***
	(6.48e-05)	(0.000149)	(0.000382)	(0.000196)
Married	0.560***	0.545***	-0.756***	0.361**
	(0.0487)	(0.118)	(0.293)	(0.152)
Single	0.242***	0.201	-0.765*	0.0183
	(0.0656)	(0.155)	(0.416)	(0.201)
Higher education	0.162***	0.223***	-0.284	0.155
	(0.0337)	(0.0849)	(0.227)	(0.105)
Household size	0.0488***	0.00335	-0.101	-0.0256
	(0.0122)	(0.0293)	(0.0799)	(0.0376)
Number of children	0.0529***	0.0346	0.0406	0.0467
	(0.0204)	(0.0477)	(0.133)	(0.0594)
Employed	-0.0167	0.0331	0.927***	0.261*
	(0.0401)	(0.0989)	(0.266)	(0.153)
Unemployed	-0.113**	-0.0536	0.519*	0.0746
	(0.0480)	(0.117)	(0.305)	(0.146)
Wealth Index	0.168***	0.189***	0.258***	0.256***
	(0.0115)	(0.0278)	(0.0755)	(0.0442)
(Very) good financial situation	0.889***	0.917***	-0.346	0.846***
	(0.0342)	(0.0850)	(0.244)	(0.112)
Very good/good health	0.316***	0.242***	-0.381	0.151
	(0.0336)	(0.0833)	(0.234)	(0.111)
(Fairly) easy to walk 1 kilometre distance	0.294***	0.329**	-0.0394	0.323**
	(0.0522)	(0.128)	(0.341)	(0.152)
(Fairly) easy to climb stairs	0.176***	0.229*	0.605*	0.377**
	(0.0473)	(0.118)	(0.312)	(0.152)
Constant	5.488***	5.899***	-2.911***	5.397***
	(0.157)	(0.391)	(1.051)	(0.506)
Observations	16,678	2,730	2,730	
First stage F-statistic			18.49***	
Het test			1.534	
RESET test			0.21	
Conditional LR			(-0.61, -0.09)***	

(Robust) standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1