Mental health inequalities in 9 former Soviet Union countries: Evidence from the previous decade

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Abstract

In the previous two decades, countries of the former Soviet Union underwent substantive economic and social changes. While there has been some limited evidence on the relationship between socioeconomic well-being and mental health in the developing and transitional economies, the evidence on economic inequalities in mental health has so far been scarce. In this paper, we analyse two unique datasets collected in 2001 (\(N = 18,428\)) and in 2010 (\(N = 17,998\)) containing data on 9 countries of the former Soviet Union, exploring how mental health inequalities have changed between 2001 and 2010. Using regression analysis, as well as the indirect standardization approach, we found that mental health appears to have substantially improved in most studied countries during the past decade. Specifically, both the proportion of people with poor mental health, as well as wealth-related inequalities in poor mental health, decreased in almost all countries, except Georgia. Hence, we did not find evidence of a trade-off between changes in average and distributional mental health indicators between 2001 and 2010. Our findings give ground for optimism that at least on these measures, the most difficult times associated with the transition to a market economy in this region may be coming to an end.

1. Introduction

People living in the countries of the former Soviet Union have experienced an extremely troubled transition. The new political and economic regimes created some winners, such as the oligarchs, but also many losers (Balabanova et al., 2003). Guaranteed employment became a thing of the past and the communist era social safety nets were torn apart (Field and Twigg, 2000). These changes had profound implications for mental health, with suicides rates rising dramatically, especially in the regions undergoing the most rapid pace of transition (Brainerd, 2001; Pietila and Rytkonen, 2008; UNICEF, 2001; Walberg et al., 1998; WHO/Europe, 2013). Two decades after the transition, relative stability has returned, albeit with intermittent interruptions, such as the ongoing economic crisis since 2008, events in Ukraine in 2014, the 2010 disturbances in Kyrgyzstan, and the 2008 conflict between Georgia and Russia. Each country has made the transition to some form of market economy, however imperfect. Yet, as is apparent from the continuing toll of suicides, poor mental health is widespread (Ferrari et al., 2013; IHME, 2013; WHO/Europe, 2013). It seems likely, given experience elsewhere (Friedli, 2009; Patel et al., 2013), that mental health is socioeconomically patterned, with those whose position is most precarious at greatest risk. A recent study on psychological distress in the former Soviet Union indicated that the prevalence of high psychological distress had declined across the region between 2001 and 2011, but that socially and economically marginalized populations continued to bear the brunt of poor mental health in the region (Roberts et al., 2012a). However, that study did not look in detail at the distribution parameters of poor mental health and their relationship with overall levels in the population. In this paper we take advantage of two unique datasets to explore these issues in depth, assessing in particular the question of if and how mental health inequalities have changed in different countries between 2001 and 2010. We also briefly ask whether there is a trade-off between inequalities and average levels of mental health. Indeed, there is a widely held notion, based on...
empirical literature, that health improvements “on average” may be accompanied by increases in health-related socioeconomic inequalities (Wagstaff, 2002; Wagstaff et al., 2014), as those who have the greatest social and educational resources are best placed to take advantage of emerging opportunities to improve their own health while others, less advantaged, are left behind (Mackenbach et al., 2003; Rumble and Pevalin, 2013; Singh, 2003). Therefore, we ask the following question: are those countries that do well in terms of average mental health the ones that do poorly in terms of its socioeconomic distribution? Or do both go hand in hand?

2. Methods

2.1. Data

The data used in this paper come from two nationally representative surveys: the 2001 Living Conditions, Lifestyles and Health (LLH) study; and the 2010–2011 Health in Times of Transition (HITT) study. The LLH survey was conducted in eight countries (Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, and Ukraine) while the HITT survey added Azerbaijan. The two survey instruments were designed to be as similar as possible, although with the HITT instrument drawing on lessons learnt with LLH. Both surveys collected information using standardised questionnaires on a range of health outcomes, health behaviours, and demographic, socio-economic and environmental characteristics. The surveys were cross-sectional in nature, and therefore they can be combined to enable a pooled cross-sectional design.

The overall sample size in the LLH survey was 18,426, with about 2,000 in each country except for the Russian Federation (4,006) and Ukraine (2,400). The subjects were adults (aged 18 years and older) not living in institutions. Samples were selected using multi-stage random sampling with stratification by region and rural/urban settlement type. Response rates varied between 71% and 88% among countries. For more details on the survey, see www.llh.net.

The sample size in the HITT survey was 17,998, again including non-institutionalised adults aged 18 or older. Multi-stage random sampling with stratification by region and rural/urban settlement type was used. Each country had 1,800 respondents, except in Russia (N = 3,000) and Ukraine (N = 2,000) to reflect their larger and more regionally diverse populations, and in Georgia (N = 2,200) where a booster survey of 400 additional interviews was undertaken in November 2010 to ensure a more representative sample. Response rates varied from 47.3% in Kazakhstan to 83% in Moldova. For more details, see www.hitt-cis.net.

The ethical approval for both LLH and HITT datasets was granted by the Ethics Committee of the London School of Hygiene and Tropical Medicine.

2.2. Variables

In this paper, mental health was measured using a 12-item scale developed for use in former Soviet countries. This has been described previously (Cockerham et al., 2006) and used in several previous studies in this region (Goryakin et al., 2014; Roberts et al., 2010, 2012a). Each respondent was asked if he or she had recently experienced a number of symptoms (giving yes/no responses). The 12 symptoms include: (1) feelings of stress, (2) feeling lonely, (3) inability to concentrate, (4) insomnia, (5) feeling constantly under strain, (6) feeling you couldn’t overcome your difficulties, (7) losing confidence in yourself, (8) often shaking or trembling, (9) frightening thoughts coming into your mind, (10) getting spells of exhaustion or fatigue, (11) feeling an impossibility to influence things, and (12) feeling that life is too complicated. The instrument was forward and back translated and piloted in each of the study countries and showed good internal consistency with a Cronbach’s alpha score of 0.84 in the LLH 2001 survey and 0.82 in the HITT 2010 survey.

In the present study, poor mental health was defined as having 6 or more distressing mental health symptoms. This level was selected to make sure that it was meaningful, in a sense that it was neither too general (i.e. it did not include people with only mild deviations from normal mental health), nor too specific (i.e. that it did not exclusively apply to people with very serious mental health problems). Approximately 32% of respondents belonged to this group in 2001, and 22% in 2010. However, in order to avoid relying exclusively on this definition of mental health, we also made use of the whole range of the mental health score, treating it as an ordinal variable, as part of a sensitivity analysis.

Our measure of living standards is the country and year-specific asset score index, estimated by principal component analysis, using the approach suggested in (Filmer and Pritchett, 2001; O’Donnell et al., 2008; Vyas and Kumaranayake, 2006). The items included in the two surveys differed as follows. The items included in 2001 were whether the household had a television, washing machine, phone, personal computer, dishwasher, motorbike, bicycle, video recorder, video camera, or car. In 2010 they were whether the household had a television, washing machine, mobile phone, computer, dishwasher, fridge, car produced before 2005, car made after 2005, automatic washing machine, or home cinema. Households were then ranked on asset scores and divided into country and year specific quartiles, with dummy variables for each of them.

Ideally, the two asset scores would have had identical compositions but this was decided against in view of the considerable changes in household possessions between the two surveys, not least as a result of economic and technological progress between 2001 and 2011. Consequently, only three variables were the same in both surveys. However, this is less of a limitation than it seems as the analyses are based on the ranking within each survey.

2.3. Analyses

2.3.1. Simple and standardized prevalence

We start our analysis by estimating the prevalence of poor mental health for each country, year and asset quartile. This gives us a descriptive snapshot, for each year and country, of how wealth may be related to mental health, although it does not allow us to formally compare the magnitude of inequality, either between countries or between survey years. Next, we account for the possibility that demographic profiles of countries may be quite different, by taking controlling for the age and gender distribution of the respondents in each country. Specifically, we use an indirect standardisation methodology, by calculating age and sex standardised rates of poor mental health in people in each asset class (O’Donnell et al., 2008). This controls for the correlation of both gender and age not only with mental health, but also with socioeconomic status.

More formally, in the first step, we estimate the parameters in the following regression (separately for each survey and country):

\[ Y_{it} = f(b_0 + b_1X_{it} + b_2Z_{it} + e_{it}) \]

where \( Y_{it} \) is the health outcome variable of interest (either binary, as in the case of poor mental health, or count, as in the case of the number of mental health symptoms), \( X_{it} \) is the vector of our standardizing variables (age and gender), and \( Z_{it} \) is the vector of non-confounding variables for which we do not want to standardize, but rather to control for in order to obtain partial correlation coefficients with the confounding variables contained in the \( X_{it} \) vector (O’Donnell et al., 2008). Specifically, we want to partial out the effect of the following variables: education, household size, being
married, living in village or in the capital. We estimate parameters in the above model using either Probit (if the outcome is binary), or negative binominal regression (when the outcome is a count variable). The latter analysis is done as a sensitivity check.

Upon obtaining the parameters, we estimate the “x-predicted” values of the mental health outcome variables:

\[ Y_{it}^X = f(\hat{b}_0 + \hat{b}_1 X_{it} + \hat{b}_2 Z_t) \]  

We then obtain the estimates of the indirectly standardized measure of mental health for each person:

\[ Y_{it}^I = Y_{it}^X - Y_{it}^X + \hat{Y}_it \]  

Finally, for each country and survey year, we estimate the average value of the standardized mental health variable separately for each of the 4 asset categories. This allows us to compare the wealth-related distribution of mental health not only across countries, but also to see how this distribution changes over time (i.e. between 2001 and 2010).

2.3.2. Regression analysis

Next, we formally ascertain whether poor mental health varies by asset score. This is examined using year and country-specific linear regression specification (Jones, 2006):

\[ \text{Health}_{it} = \beta_0 + \beta_1 \text{LSM}_{it} + \beta_2 X_{it} + e_{it} \]  

where LSM is the living standards measure, or asset score (in the form of dummy variables for three of the four quartiles), and \( X_{it} \) contains variables that, unless controlled for, may potentially affect the association between the asset score dummies and the poor mental health variable of interest. Specifically, we control for age, education (including dummies for having secondary or tertiary attainment education), gender, household size, being married, living in the village, as well as living in the capital city. Finally, \( e_{it} \) is an error term.

In order to better understand the mechanism by which wealth might be associated with poor mental health, we also explore how sensitive the estimates are to the inclusion of several variables that proxy for subjective satisfaction with life/financial position, using data pooled for all countries and both years. We do so by controlling for two variables measuring respondents’ perception of their satisfaction with life, as a whole, as well as of the financial situation of their households “today”. In both cases, respondents were asked to indicate their satisfaction on a 10 point scale, ranging from “not at all satisfied” to “extremely satisfied”. In addition, we control for a variable where respondents were asked to locate themselves on a ladder (again, on a 10-point scale), ranging from the poorest people to the richest ones. If any independent association remains after we include these controls, then one may suspect that there is some direct effect of poverty on mental health over and above the subjective satisfaction of people over their lives, as well as their perception over their financial situation.

2.3.3. Concentration index

The third step involves estimating the standardized concentration index for each country and survey year. This enables a more formal comparison of wealth-related inequality of poor mental health (standardized for age and gender, as described above) between countries and over time. The concentration index was defined (here, for convenience, we omit country and time subscripts) as follows (O’Donnell et al., 2008):

\[ C = \frac{2}{N\mu} \sum_{i=1}^{n} \frac{Y_{it}^IS}{f_i} - 1 - \frac{1}{N} \]  

where \( C \) is the concentration index (CI); \( Y_{it}^IS \) is the standardised mental health variable; \( \mu \) is its mean; \( N \) is the number of people; \( f_i \) is the fractional rank of individual \( i \) in the wealth distribution (from \( i = 1 \) being the poorest, to \( i = N \) being the richest).

We estimated \( C \) using the so-called “convenience covariance” formula (O’Donnell et al., 2008):

\[ 2\hat{\sigma}_r^2 \left( \frac{\sqrt{\hat{\gamma}_r^2}}{\mu} \right) = \hat{\alpha}_1 + \hat{\beta}_1 f_1 + \hat{e}_1 \]  

where \( \hat{\sigma}_r^2 \) is the variance of the fractional rank, and \( \hat{\beta} \) is the estimate of the concentration index. The index ranges from \(-1\) to \(+1\). Thus, when there is no wealth-related inequality, it is equal to zero. When it is positive, it indicates greater pro-poor inequality in poor health (the closer to one, the greater the inequality). In other words, when the concentration index is positive, the rich are more likely to have bad health than the poor. Conversely, when it is negative, the greater it is in absolute magnitude, the greater the pro-rich inequality in poor mental health.

In practice, following advice of (O’Donnell et al., 2008), in order to obtain correct standard errors using delta method, we regress untransformed values of the standardized mental health variable on fractional rank, and then use the following formula which allows us to estimate standardized CI, as well as correct standard errors, using Stata’s nlcom command:

\[ \hat{\beta} = \left( \frac{2\hat{\sigma}_r^2}{\hat{\alpha}_1 + \hat{\beta}_1^2} \right) \times \hat{\beta}_1 \]  

where \( \hat{\beta} \) is the estimate of the CI, with the correct standard errors; \( \hat{\alpha}_1 \) and \( \hat{\beta}_1 \) are parameter estimate from equation (6) where the dependent variable is untransformed standardized value of poor mental health; \( \hat{\sigma}_r^2 \) is the variance of the fractional rank. For each country, the concentration index was normalized by dividing it by one minus the mental health variable mean (O’Donnell et al., 2008), to account for the dichotomous nature of the mental health variable.

2.3.4. Relationship between average level of poor mental health and wealth-related mental health inequalities

We also explore how both average levels of poor mental health, as well as health-related inequalities changed between 2001 and 2010. We explore this graphically, by plotting country and year-specific proportions of people with poor mental health against corresponding concentration indices. Specifically, we are interested whether poor mental health is traded-off against declining wealth-related inequalities, or whether both go hand in hand.

3. Results

3.1. Prevalence of poor mental health

In Table 1, we present the estimates for the average proportions of respondents in the HFTT and LHFS samples who reported having 6 or more mental health symptoms (out of 12), by wealth quartile. This table also shows how the proportion of people with poor mental health changed between 2001 and 2010, by country and by asset quartile. In all countries, except Georgia, there was a decrease in this measure in all quartiles, although the changes were not significant in two quartiles in Belarus, Moldova and Kazakhstan,
and in one quartile in Kyrgyzstan. In Georgia, the prevalence of poor mental health increased in all quartiles, although the change was not significant in the top two quartiles. Overall, it appears that in most countries the greatest reduction was observed in the poorest quartile, with Georgia being a notable exception experiencing entirely opposite trends.

From Table 1, it also appears that in 2001 there was a considerable pro-rich gradient in poor mental health in most countries except Georgia. However, in 2010, the pro-rich gradient became much more pronounced in Georgia, but became much weaker in other countries. As Azerbaijan was not included in the 2001 surveys, we cannot assess changes in prevalence there, but it seems that inequality in poor mental health was very low in 2010.

Next, it is of interest to explore how the prevalence of poor mental health changed in these countries, not only by wealth, but also by age and gender. In Table 2, we show estimates of prevalence of poor mental health by four age of birth cohorts: 1) those born before 1940; 2) those born between 1941 and 1960; 3) those born between 1961 and 1980; and 4) those born on 1981 and later. We restricted ourselves to four categories to make sure that we have enough people in each country and birth year cohort.

A priori, the relationship between age and mental health is difficult to predict. A study conducted in the US concluded that the prevalence of poor mental health (depression) had a U-curve relationship with age: it declined from yearly adulthood until about 45 years, before starting to rise until late life (Mirowsky and Ross, 1992). However, in another study conducted in the US among people aged 65+, this finding was not confirmed (Blazer et al., 1991). By looking at Table 2, we can see that in Georgia, the prevalence of poor mental health increased in all birth cohorts, and most strongly so among the most elderly people. On the other hand, the change was not significant in any birth cohort in Moldova and Belarus, and was insignificant in 3 out of 4 cohorts in Kyrgyzstan. Surprisingly, the prevalence of poor mental health decreased significantly in 4 age cohorts in Armenia, and in 3 age cohorts in Kazakhstan, Russia and Ukraine.

Finally, we also consider how the prevalence of poor mental health has changed by gender between 2001 and 2010. For the sake of brevity we are only presenting the results in graphic form. As can be seen in Figure A1 (please see the Annex), the prevalence of poor mental health declined for both genders in all countries except Georgia, although the drop was particularly large in Armenia. Moreover, in 6 out of 8 countries the decline in prevalence was larger among females than among males. In Georgia, where the prevalence increased, there appeared to be little difference in the rate of change between men and women.

3.2. Age- and gender-standardized prevalence of poor mental health

Since the demographic characteristics vary substantially between countries (for example, averaged over 2 surveys, the proportion of female respondents varies from 64% in Georgia to 52% in Kyrgyzstan, as does the average age, from 46.18 in Georgia to 38.54 in Kyrgyzstan), it is essential to standardize our results for age and gender to facilitate inter-country comparisons. We present the estimates of age- and gender-standardized prevalence in Table 3, as well as the differences between years.

By comparing Tables 1 and 3, we find that standardization makes relatively little difference in 5 out of the 9 countries. By contrast, the differences were relatively substantial (i.e., of at least 3 percentage points in at least one category) in the remaining 4 countries, i.e. Belarus, Moldova, Russia and Ukraine. Interestingly, standardization tended to lead to lower estimates of poor mental health prevalence in the poorest quartile, and to larger estimates in the wealthiest quartiles. Also, across all countries the effect of standardization was strongest for the wealthiest and poorest quartiles, and relatively small for the middle two quartiles. Nevertheless, the changes in prevalence between 2001 and 2010 were of similar magnitude in both tables, and almost always had the same sign.

Finally, we found very similar relationships when the outcome was the continuous mental health score, ranging from 0 to 12, using indirect standardization methodology with negative binomial regression (see results in the Annex). However, we did find that the extent of wealth-related inequality appeared to be greater in Ukraine in 2010, using the continuous measure, compared to what is shown in Table 3.

3.3. SES-related inequality in poor mental health: regression results

In Table 4, we show the country- and year-specific differences in poor mental health by asset group, controlling for a range of socio-demographic characteristics. It turns out that these results are in line with what was shown earlier: in most countries there is
evidence of pro-rich inequality in poor mental health. Table 4, however, also formally shows that the degree of inequality increased in some countries, while it decreased in others. It is particularly striking how pro-rich inequality has increased in Georgia: while there was hardly any association between wealth quartiles and poor mental health in Georgia in 2001, the relationship became the strongest of all the countries in 2010. Inequalities also increased markedly in Armenia. On the other hand, the inequalities declined considerably in Kazakhstan, Ukraine and Russia. In Belarus, inequality appears to have been rather low in both years.

It should be noted that there is no consensus view on whether to control for education when estimating wealth-related inequality in health, especially in studies that are purely descriptive in nature. While it is not possible with our data to determine the causal impact of wealth on poor mental health, we nevertheless believe it is essential to try to isolate the effect of wealth from that of education, and hence to control for the latter variable. However, not controlling for education makes little difference to the sign and size of the parameter estimates in Table 4. The only exception is Kazakhstan: not controlling for education in 2010 leads to parameters on wealth (for 3rd and 4th quartiles) being marginally significantly related to poor mental health. Yet, the parameters are very similar in size to those reported in Table 4 below, meaning that the strength of association falls greatly compared to 2001 in both cases.

In an attempt to explore the possible pathways between wealth and poor mental health in the pooled sample further, we present results in Table 5 (only using the 2010 data, as variables on the potential pathways were only available then). The results indicate that controlling for self-perceived rank on the poor-rich ladder reduces the association between wealth and poor mental health more than when controlling for satisfaction with life or with financial position. When controlling for the 3 potential channels combined, the association diminishes even further (column 5). This could be because poorer people may be more likely to have poor mental health mostly because of their lower subjective life satisfaction, as well as because of their perception of their financial situation, rather than due to any direct effect of poverty. However, there may also be reverse causality if, for example, someone with poor mental health is more likely to perceive low control over his or her life. Consequently, these results should be interpreted with caution.

3.4. Concentration indices by country

In Table 6, we present a more formal test of wealth-related inequality in mental health by country. Consistent with findings reported in Table 3 and in the Annex, it appears that in 2010 inequality was the greatest in Georgia and the smallest in Kazakhstan, but the values were not significant in Belarus, Russia and Ukraine either. In 2010, it appears there was considerable pro-poor inequality in poor mental health in Azerbaijan (meaning that the richer people are more likely to have poor mental health, not the other way around). There was a considerable increase in inequality between 2001 and 2010 in Georgia, and a large decrease in Kazakhstan as well as in Russia and Ukraine. Figure A2 in the Annex illustrates the variation in the concentration index among countries and between years.

For comparison, we also estimated concentration indices for another health outcome, i.e. poor general health. On a 5-point scale ranging from very poor to very good, bad health was defined as people reporting either poor or very poor health. Note that this can only be estimated for 2010. Georgia again had the highest value of wealth-related general health inequality, although Kazakhstan now occupied the second place. The lowest degree of wealth-related inequality in this general measure of poor health was recorded in Azerbaijan.

3.5. The relationship between average level of poor mental health and wealth-related inequality

A pertinent question to consider is whether there is any trade-off between the average level of and wealth-related inequality in poor mental health (Fig. 1). First of all, an interesting observation is that between 2001 and 2010 most countries have moved in the “south-eastern” direction: both the proportion of people with poor mental health and the pro-rich inequality in poor mental health have been on the decline. A notable - indeed extreme - exception is Georgia: the proportion of people with poor mental health doubled there during this period, while the inequality pattern changed from being strongly pro-poor to being strongly pro-rich. In Armenia, although the pro-rich inequality also increased during this period, there was a large reduction in the proportion of people with poor mental health.
Table 3
Age and gender-standardized probability of poor mental health by wealth and by country.

<table>
<thead>
<tr>
<th>Wealth quartile</th>
<th>Armenia</th>
<th>Azerbaijan</th>
<th>Belarus</th>
<th>Georgia</th>
<th>Kazakhstan</th>
<th>Kyrgyzstan</th>
<th>Moldova</th>
<th>Russia</th>
<th>Ukraine</th>
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<tr>
<td>2001</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>1 0.599</td>
<td>–</td>
<td>0.338</td>
<td>0.101</td>
<td>0.310</td>
<td>0.408</td>
<td>0.441</td>
<td>0.412</td>
<td>0.470</td>
<td></td>
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<tr>
<td>2 0.559</td>
<td>–</td>
<td>0.247</td>
<td>0.121</td>
<td>0.263</td>
<td>0.305</td>
<td>0.416</td>
<td>0.322</td>
<td>0.396</td>
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<tr>
<td>3 0.484</td>
<td>–</td>
<td>0.282</td>
<td>0.160</td>
<td>0.180</td>
<td>0.312</td>
<td>0.352</td>
<td>0.268</td>
<td>0.343</td>
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<tr>
<td>4 0.478</td>
<td>–</td>
<td>0.266</td>
<td>0.138</td>
<td>0.172</td>
<td>0.253</td>
<td>0.247</td>
<td>0.260</td>
<td>0.319</td>
<td></td>
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<tr>
<td>2010</td>
<td></td>
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<tr>
<td>1 0.280</td>
<td>0.136</td>
<td>0.257</td>
<td>0.359</td>
<td>0.168</td>
<td>0.308</td>
<td>0.372</td>
<td>0.223</td>
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<tr>
<td>2 0.225</td>
<td>0.188</td>
<td>0.215</td>
<td>0.222</td>
<td>0.133</td>
<td>0.323</td>
<td>0.337</td>
<td>0.188</td>
<td>0.254</td>
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<tr>
<td>3 0.182</td>
<td>0.163</td>
<td>0.227</td>
<td>0.204</td>
<td>0.126</td>
<td>0.220</td>
<td>0.246</td>
<td>0.149</td>
<td>0.217</td>
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<tr>
<td>4 0.136</td>
<td>0.137</td>
<td>0.179</td>
<td>0.157</td>
<td>0.118</td>
<td>0.194</td>
<td>0.240</td>
<td>0.148</td>
<td>0.204</td>
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Change between 2001 and 2010

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<tr>
<td></td>
<td>0.319***</td>
<td>–</td>
<td>–0.081*</td>
<td>0.258***</td>
<td>–0.142***</td>
<td>–0.100**</td>
<td>–0.068</td>
<td>–0.188***</td>
<td>–0.196***</td>
<td>0.342***</td>
<td>–0.136***</td>
<td>–0.172**</td>
<td>0.266</td>
<td>0.138</td>
<td>–0.172**</td>
<td>0.319***</td>
<td>–0.142***</td>
<td>–0.100**</td>
<td>–0.068</td>
<td>–0.188***</td>
<td>–0.196***</td>
<td>0.342***</td>
<td>–0.136***</td>
<td>–0.172**</td>
<td>0.266</td>
<td>0.138</td>
<td>–0.172**</td>
</tr>
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Note: X-variables: age, female; Z-variables: tertiary education, household size, married, village, capital. Poor mental health equals 1 if number of symptoms is 6 or more; and zero otherwise. Predicted value of poor mental health estimated with Probit.

Fig. 1 also shows that both these variables appear to go hand in hand: Georgia, for example, had the third highest average proportion of people with poor mental health in 2010, while also the highest level of inequality. On the other hand, in that year Azerbaijan had the second lowest proportion of people with poor mental health, coupled with significant pro-poor inequality.

4. Discussion

Our analyses describe substantial wealth-related inequalities in both survey years 2001 and 2010, even after controlling for a range of covariates. Nevertheless, we also found that these inequalities decreased in almost all countries. It also appears that the association between wealth and poor mental health may be mediated by the subjective perception of respondents' financial situation,

Table 6
Concentration indices by country (standardized for age and gender).

<table>
<thead>
<tr>
<th></th>
<th>2001 CI</th>
<th>2010 CI</th>
<th>2001 SE</th>
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<td>Poor mental health</td>
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Note: X-variables: age, female; Z-variables: tertiary education, household size, married, village, capital.
rather than by any direct pathway from poverty, a finding that is aetiologicaly coherent.

We also found that there was a substantial reduction in the proportion of people with poor mental health between 2001 and 2010, especially among the poorest quartile, in all countries except Georgia. Taken together with our finding that pro-rich mental health inequalities have also reduced in most countries, this suggests that - both in terms overall distribution and in terms of population average - mental health has substantially improved in most SU countries during the 2000 decade. Therefore, it does not appear, in this specific case at least, that there is a trade-off according to which improvements in population-level mental health must necessarily be accompanied by increases in mental health inequalities. This is an encouraging and surprising result, as it shows that policymakers are not always and everywhere bound to make a choice between neither seeking to improve the average or reducing inequalities (Wagstaff, 2002). While the finding is encouraging, the formidable challenge of course remains to find out exactly what has brought about the improvement on both counts.

While it is outside of the scope of this paper to explain the causes of these changes, we tentatively consider two potential drivers. One possibility is that changes in income inequality may have played a role. In Fig. 2 we have plotted the changes in concentration indices, from our survey data, against changes in Gini coefficients from the World Development Indicators. There appears to be some association in the expected direction. Thus, Kazakhstan, which experienced the greatest reduction in income inequality, also experienced the greatest pro-poor change in the concentration index. In contrast, Georgia had the second highest increase in Gini coefficient but also had by far the largest increase in pro-rich wealth-related mental health inequality between 2001 and 2010.

Another potential driver is differential rates of growth in national income. For example, it could be that the increases in wealth-related inequality in poor mental health were the greatest in countries which experienced the slowest increases in living standards. This is explored further in Fig. 3, which shows how larger increases in GDP per capita between 2001 and 2010 were apparently positively associated with increases in the concentration index. Thus, the top 3 countries in terms of growth of GDP per capita were also among the top 4 countries in terms of positive changes in the concentration index (implying smaller pro-rich inequality). In contrast, Georgia was among the bottom 3 countries in terms of increases in GDP per capita, and also had the greatest negative change in wealth-related inequality in poor mental health.

Nevertheless, two caveats relevant to this exploratory analysis do remain. First, the magnitude of these associations appears modest, given the spread of dots in both scatter plots. Second, Georgia is a marked outlier in both cases, implying that some other factors must also have been important drivers of change. One can speculate whether the rapid social and economic reforms implemented by Michael Saakashvili’s government played any role in this. Alternatively, the war between Georgia and Russia in 2008, when Georgia lost a substantial part of its territory, may also have contributed to these negative changes.

An alternative way to look at this is whether to focus on the 2001 or 2010 data for Georgia. For example, Table 6 shows that, in 2001, Georgia was very unusual in that it was the only country with pro-poor mental health inequality. On the other hand, by 2010, it became much more like most other countries, with significant pro-rich inequality. From that point of view, one may wonder why Georgia was so different in 2001, and what factors made it more similar to other countries in 2010. Some previous research has shown (McKee et al., 2013b; Roberts et al., 2012b, 2012c) that Georgia was not markedly out of line with the other countries in the 2001 survey, with one exception: levels of trust in institutions were extremely low at that time in Georgia, recovering substantially by 2010 (McKee et al., 2013a). However, while this suggests a useful line of enquiry, it is not possible to explore this in more depth with the data available.

One potential drawback of our analysis is the limited nature of the living standards measure. Thus, one may ideally prefer to use expenditure based indicators. While we do not have an alternative indicator available for both years, we did find that in 2010, when we based our wealth measure on people ranking themselves on a 10-point ladder ranging from “very poor” to “very rich” (and defining 4 dummies based on the distribution of this variable), there was little difference in regression results between these two models for Georgia (available upon request). This suggests that our proxy for wealth is a good indicator of how people perceive their living standards.
Our study is also primarily descriptive in nature. Thus, we cannot rule out the possibility that poor mental health may be causing wealth-related inequalities, rather than the other way around. Likewise, we cannot exclude that some other factors may be driving the observed association between poor mental health and wealth, although our inclusion of a number of control variables does counter this problem to some extent.

Another potential limitation is that the cut-off values that we chose for defining poor mental health are arbitrary. On the other hand, as we argued earlier in the paper, we chose the cut-off to ensure that the measure was neither too broad nor too specific. In addition, the alternative indirect standardization approach with negative binomial regression that we applied to a 12 point mental health score outcome variable (see Annex) also suggested similar conclusions. Likewise, another study also found, using the same dataset as we did, but a different cut-off value for defining high psychological distress level (i.e., having between 10 and 12 symptoms), that the proportion of people suffering from such distress declined in all countries between 2001 and 2010. Hence, we would not expect sensitivity of our results to a different cut-off to be a major concern.

Finally, although there were few missing data among survey participants, and the response rate was quite high in almost all countries – and indeed comparable or even higher than response rates in some other surveys in this, or neighbouring regions (e.g. the RLMS survey in Russia, European Social Survey (Stoop et al., 2010); ISSP survey conducted in Russia in 2007 (Scholz and Heller, 2009)), it was rather low in Kazakhstan in the HITT survey, at 47.3%. This may raise a question about the representativeness of results for this country, as people who agree to take part in the survey may be different from those who refuse to do so. Unfortunately, there is little that can be done to rectify this problem, as there is no information on socioeconomic or demographic characteristics of survey non-participants. Fortunately, where the impact of non-response on representativeness has been studied, it appears that it is rather low (Keeter et al., 2006; Vägerö et al., 2008).

Although the relationship between poverty and mental health has been studied for a number of years in high income countries (Bobak et al., 2000; Kakwani et al., 1997; Kunst et al., 2005, 1995; Mackenbach et al., 1997; Mackenbach et al., 2008; Roberts et al., 2010; Van Doorslaer et al., 1997; Vandenheede et al., 2013), this field is still in its infancy in low and middle income countries (Lund, 2014), and in post-communist countries in particular. For example, Bobak et al. (2000) found that in seven post-communist countries (only one of them – Russia – was also represented in our study), material deprivation was strongly related to self-rated health. Vandenheede et al. (2013) studied socioeconomic inequalities in all-cause mortality in four post-communist countries. Using a similar approach to ours (e.g. by estimating age and gender standardized mortality rates by asset categories), they found that wealth-related inequalities were large and significant in all countries, with the absolute inequalities being the highest among Russian men, and the relative inequalities being highest among Czech and Lithuanian men. Nevertheless, the authors stressed that this high degree of inequality in these two countries was counterbalanced by the relatively low burden of mortality.

Overall, it appears that the research on the relationship between economic inequality and mental health is sparse, with the country-level studies finding little if any association (Rai et al., 2013). Our study usefully contributes to this debate. Our main finding that, overall, inequalities in poor mental health seemed to be decreasing during the 2000–2010 decade gives ground for optimism that at least on this measure, the most difficult times associated with the transition to a market economy may be over, although doubts still remain about how the recent economic crisis has affected countries in this region.

**Ethics approval**

We confirm that the ethical approval for both LLH and HITT datasets was granted by the Ethics Committee of the London School of Hygiene and Tropical Medicine.

**Acknowledgements**

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**Annex**

![Fig. A.1. Change in prevalence of poor mental health, by gender and country. Source: HITT and LLH datasets](image-url)
Table A1
Age and gender-standardized average value of mental health score by wealth and by country

<table>
<thead>
<tr>
<th>Wealth quartile</th>
<th>Armenia</th>
<th>Azerbaijan</th>
<th>Belarus</th>
<th>Georgia</th>
<th>Kazakhstan</th>
<th>Kyrgyzstan</th>
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<td>1</td>
<td>4.552</td>
<td>–</td>
<td>4.158</td>
<td>2.167</td>
<td>4.111</td>
<td>5.006</td>
<td>5.067</td>
<td>4.844</td>
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<td>3</td>
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<tr>
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<td>4.333</td>
<td>4.375</td>
<td>2.993</td>
<td>3.392</td>
</tr>
</tbody>
</table>

Note: X-variables: age, female; Z-variables: tertiary household size, married, village, capital.

Mental health score part estimated with negative binomial regression.

Fig. A2. Concentration index for poor mental health inequality by country and by year. Source: HITT and LLH datasets

References
Vandenbende, H., Khikheva, O., Pikhart, H., Kubinova, R., Malyutina, S., Pakaj, A., et al., 2013. Socioeconomic inequalities in all-cause mortality in the Czech


