June 11, 2018

Reply to editors

We thank the editorial board for the opportunity to revise our manuscript. Our responses to the editors' comments are outlined below in regular font with editor's comments in bold font.

Briefly, there are three issues. (a) The authors are asked to take care of the list of issues raised by R2. (b) Please also make sure that the manuscript comes in around the appropriate length for manuscripts (8,000 words). (c) Also please be advised that color printing will incur additional costs. Many of the figures will be difficult to design effectively in black and white.

We have taken care of the three issues:

1) We have addressed every comment from R2 and explained the changes made to the manuscript.
2) The word count of the manuscript (including abstract and notes) without references is 7928, and it includes 8 figures and tables.
3) We agree with color figures and will pay accordingly.

As you prepare the conditional draft, please ensure that the manuscript has no more than 8,000 words (including the abstract and notes, but excluding references) and no more than 10 total tables and figures). Appendix material will appear as an online supplement (and would be easily accessible).

Please include the following manuscript files:
- The manuscript in Word or LaTeX format. Figures and tables can be embedded in the file, or in an Excel file, or as a .pdf file.
- The entire manuscript, including figures, in a single .pdf file.

We have included the files accordingly.

Thank you again for considering our manuscript.

José Manuel Aburto
Alyson van Raalte

Reply to reviewers
We appreciate the reviewer' minor comments that helped improved the article. Below, we describe the final changes to the manuscript regarding R2.

This paper analyzes trends in lifespan dispersion in Central and Eastern Europe since 1960, deepening our understanding of lifespan dispersion and also providing an overview of mortality trends in the region since 1960. The analysis is appropriate, comprehensive and powerful. The manuscript has been significantly improved. I just have several minor comments.

I felt that this paper could be made shorter. The results section is quite detailed, and the discussion section is a little repetitive and redundant. Some descriptions do not seem very important. This is not a serious problem, but some editorial revisions for condensing the paper a little more would make it easier to read the paper thoroughly.

P4. 'We decomposed mortality …' -> We decomposed changes in e0 and e† …
Thanks, for the suggestion. It now reads as : "We decomposed changes in life expectancy and lifespan variation by single age, period and cause of death."

P5. 'Keyfitz's life table entropy'
Should credits be given to Demetrius as well?

The Keyfitz measure is related to but not the same as the entropy used in physics and information science (Colchero et al. 2016). Although Demetrius has made several contributions to demographic research with his entropy measure, the concept is different from Keyftiz'. For example, Keyfitz' entropy is a measure of lifespan inequality, and can also be interpreted as the elasticity of life expectancy to small changes in mortality (Keyfitz 1977, Vaupel and Canudas-Romo 2003). While Demetrius'entropy *"measures the variability in the contribution of different age classes to the stationary age distribution and the reproductive potential measures the mean of the contribution of the different age classes to the Malthusian parameter.*". Therefore, we do not believe that, in this particular case, Demetrius' reference would be consistent.

Colchero, F., Rau, R., Jones, O. R., Barthold, J. A., Conde, D. A., Lenart, A., ... & Zarulli, V. (2016). The emergence of longevous populations. *Proceedings of the National Academy of Sciences*, *113*(48), E7681-E7690.

Keyfitz, N. (1977). What difference would it make if cancer were eradicated? An examination of the Taeuber paradox. *Demography*, *14*(4), 411-418.

Vaupel, J. W., & Romo, V. C. (2003). Decomposing change in life expectancy: A bouquet of formulas in honor of Nathan Keyfitz's 90th birthday. *Demography*, *40*(2), 201-216.

Demetrius, L. (1974). Demographic parameters and natural selection. *Proceedings of the National Academy of Sciences*, *71*(12), 4645-4647.

P15, L3. 'even direction with changes …'

It is not fully clear to me whether an increase or a decrease in e† corresponds to an increase in e0.
This line refers particularly to figure 3 where we show that for the periods 1960-1980, 1980-1988 at least 45% of the time life expectancy and lifespan variation moved in the same direction. We rephrased the line to:

"with the result that changes in lifespan variation did not correspond in intensity or in the desirable direction with changes in life expectancy. i.e. an increase in life expectancy with a decrease in lifespan variation."

P15, paragraph 2.
Is this paragraph really necessary?

Thanks for the suggestion, to condense the paper and avoid redundancy we merged the previous paragraph only with:

"For example, it was apparent that between-country differences in lifespan variation have and continue to be larger (in relative terms) than between-country differences in life expectancy (coefficients of variation for e_0 and $e^\dagger in 2014 are 0.06 and 0.11, respectively)."

And left out of the paper the rest.

P16. 'younger age lifespan variability'
The meaning of this concept is unclear. It meant "contributions of mortality change at younger
ages to life span variability"?

Thanks for this observation, to make clearer this sentence we rephrased it as:
"van Raalte et al. (2014) discovered that although life expectancy increased across Finnish occupational classes, lifespan variation diverged between occupational classes. These differences were caused by early-adult mortality, while older-age mortality declined for all the classes."

P16, paragraph 2.
Is the second sentence really necessary?
Thanks for this suggestion, we have merged the first sentence regarding progress in under-5 mortality with the following paragraph, and left out the second sentence.

P17. 'early-adult mortality compression'
The meaning of this concept is not clear, either. It meant "mortality compression due to reduction
of death rates at early adult ages"?

Thanks. We changed the sentence accordingly:

"They found that mortality compression due to reduction of death rates at early-adult ages during this period was attributed to a decrease in alcohol-related mortality as a consequence of Gorbachev's anti-alcohol campaign."

Page 17, paragraph 1.
Is the last sentence really necessary?

No, we have deleted since it was not adding substance to that paragraph. In addition, it was repetitive from the introduction.

P18, paragraph 2. 'differences in lifespan variability'
By what? Or should it be just 'lifespan variability'?

Thanks for this observation. External mortality has been highlighted as factor to reduce lifespan variation, but also differences in lifespan disparity between populations (e.g. Firebaugh et al. 2014). We rephrased that sentence to:
"Preventing external mortality at young ages has been previously highlighted as an immediate factor to reduce lifespan variability, and differences in life disparity between populations."

P18, paragraph 2. 'cancers and cardiovascular diseases helped …'
➔ **'reduction in mortality from cancers and cardiovascular diseases helped …'**

Thanks, we changed it accordingly:
"…reduction in mortality from cancers and cardiovascular diseases helped to increase life expectancy…"

P18., paragraph 4. 'predictability of life' -> 'predictability of lifespan'

We changed it as suggested.

Figure 1, 4-6.
CEE is used to represent Central Europe. But CEE is for Cental and Eastern Europe. CEE should be changed to CE.
Thanks, we have replaced CEE with CE throughout the manuscript and figures when referring only to CE.

Figure 1.
Vertical ticks for 1970, 1980, 1990, 2000 and 2010 would be very helpful.

We have included vertical ticks as suggested.