The Impact of Covid19 on the Urban-Rural Happiness

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abstract:

In the developed world urbanites tend to be less happy than ruralites: "urban-rural happiness gradient." The recent covid19 pandemic offers an opportunity to explore one of the disadvantages of large/dense cities: the greater spread of infectious diseases. We examine how covid19 affected happiness in cities compared to smaller areas using the World Values Survey. We find a large differential or effect size pre-during pandemic for cities versus smaller areas. Cities became two times less happy during pandemic versus pre-pandemic compared to smaller areas. In absolute terms, while .2 to .5 difference on a 1-10 SWB scale is not large, given the massive scale of urbanization, the practical effect in population is large. As in any non-experimental research, causality may not be present. Results from Great Britain, the Netherlands, and Uruguay studied here may not generalize to other countries, especially ones with much different covid19 rates, policy responses, and urbanization patters.

URBAN, RURAL, URBAN-RURAL HAPPINESS GRADIENT, HAPPINESS, LIFE SATISFACTION, SUBJECTIVE WELLBEING, COVID19, WORLD VALUES SURVEY (WVS)

Here is the great city: here have you nothing to seek and everything to lose. (Nietzsche)

1 Introduction

Covid19 has changed our way of life (Olasov et al. 2022). Pre-pandemic there was city renewal, rebirth, and urban triumphalism. Just a few years back, Ed Glaeser wrote a bestselling book "Triumph of the city" (Peck 2016). During pandemic, there is urban scepticism, scare, and, in some cases, urban collapse. Many cities were hollowed out in important ways by the covid19—commercially (offices, restaurants, etc) and residentially (many urbanites moved to less dense areas) (Nixey 2020).

The pandemic has exposed urban-rural differnces. A person's chance of getting the virus and surviving it was closely associated to their zipcode (Chen and Krieger 2021). Urban areas were the epicenters of the virus outbreak: the dense population and inevitable close proximity to others, a defining feature of cities, resulted in rapid transmission and a fertile ground for infection. One of the disadvantages of city life is the increased spread of infectious disease[1] (Bettencourt et al. 2010, 2007). The transmission of infectious disease is a social contact process. Urbanization increases the conditions and statistical likelihood that microbes are being spread, which has resulted in a tripling of the total number of disease outbreaks per decade since the 1980s (Ali and Keil 2011, Haggett 1994, Connolly et al. 2021). Although the scale of covid19 was unparalleled, major infectious disease outbreaks in the past, e.g., SARS and Ebola, occurred in urbanising hinterlands and quickly spread to metropolitan areas (Keil and Ali 2007). Rural areas, in contrast, given their low population density and geographic isolation, provide a natural social distancing environment that slows the spread of infectious viruses. As such, covid19 affected cities more than smaller areas (Stier et al. 2021).

[1] See for example, "SIR Models for Spread of Disease" (Newman 2002, Cooper et al. 2020).

In the present study, we take a development perspective using a measure of human development, progress, or flourishing: subjective wellbeing (SWB). Our hypothesis is that since cities suffer disproportionately from infectious diseases, city happiness decreased disproportionately during the covid19 pandemic.

We start with a brief urban-rural happiness gradient/gap theory overview and how covid19 impacted different aspects of life in urban v rural areas. Our empirical analysis follows and we conclude with a discussion of the results and limitations/directions for future research.

2 Urban-Rural Happiness

The urban-rural happiness gradient means that happiness raises from its lowest in largest cities to highest in smallest places, little towns, villages, and open country. Often the gradient is simplifed as a gap between the extremes, i.e., large cities v rural areas. Urban unhappiness is common (Okulicz-Kozaryn and Valente 2021, Senior 2006, Lenzi and Perucca 2016, Morrison 2015, Morrison and Weckroth 2017, Sorensen 2020, Sørensen 2014). Recent studies added nuance: Lenzi and Perucca (2020), Morrison (2021), Okulicz-Kozaryn and Valente (2018), Carlsen and Leknes (2022, 2019), Lenzi and Perucca (2022). As a corollary, exposure to nature, the opposite of urbanicity, is related to happiness (Pretty 2012, Frumkin 2001, Tesson 2013, Maller et al. 2006, Berman et al. 2012).

Easterlin and O'Connor (2023) points out that only a few studies examine the effect of covid19 on SWB. Easterlin and O'Connor (2023) does an overal analysis for Europe, but misses the urban-rural differential. Thus, this is the first study on this topic.

Health is one of the strongest predictors of SWB, if not the very strongest–decent health is clearly necessary for SWB (e.g., Campbell et al. 1976)–health is expected to be strongly linked with SWB. And cities suffer disproportionately during pandemics in terms of health. Again, cities are hotbeds of infectious disease–infections are promoted by proximity and close contact between humans–by definition cities offer the most fertile ground for infectious disease spread.

There are detailed data for the geography of the covid19 pandemic in the US, and other countries likely followed a similar pattern—large central metropolitan areas were the most affected compared to fringe metros and medium cities (Curtin and Heron 2022). The covid19 urban disadvantage at the beginning of the pandemic translated to almost 2x more incidences of the disease and almost 3x more mortality in urban areas compared to rural areas. Then, the rates converged and towards the end of the pandemic, cities recovered while rural areas had higher rates (Cuadros et al. 2021). Still, the urban (not rural) scare remains[2] as cities are hit first by pandemics, and proximity to others and chance of infection is astronomically greater in the cities. It is important to underscore that the infection rates are reported per capita, for example, per 100,000 population. If it was reported per area, say sq km, i.e., how much disease incidence is recorded in a particular area, the urban disadvantage would have been astronomical during covid19. For instance in New York City, the population density is about 11k/sq km, whereas in Montana it is about 3/sq km, about a 3600x difference.

The urban density not only increases infection risk and spread of infectious diseases (Bettencourt and West 2010), but also increases need for social distancing, and social distancing in itself (regardless of infection) has a negative effect on psychological distress (Khan et al. 2021).

3 Data

We use the World Values Survey (WVS) 7-wave 1981-2022 cumulative file freely available at: `worldvaluessurvey.org`. WVS is representative of countries, typically with country-wave samples of over 1k. The key variables are urbanicity and happiness—variable descriptions and distributions, including control variables, are in online appendix **for peer review appended at the end**.

Covid19 infection increased later in 2020, peaked in 2021 and again in 2022 (see online appendix for covid19 data from `coronavirus.jhu.edu/region`). Hence, the covid19 period sample is 2021 and 2022 .

[2]This is a speculation for future research to find out.

The WVS data in 2021 are only available for: Armenia, Kenya, Maldives, Morocco, and Venezuela. We drop Armenia, Kenya, and Maldives. Armenia's prepandemic sample for large city is only 4 respondents. Kenya was only observed in one time period in WVS, 2021. Maledives is a small island without urban-rural gradient.

Morocco and Venezuela are postponed to online appendix. Morocco of 37m seem to have been largely spared from the pandemic: only 1.2m cases (3%) and 16k deaths. Venezuela is a dictatorship largely cut off from the world, which might have protected it from covid19 (or perhaps the statistics are tampered with)—despite about 30m population, there were only .5m cases (2%) and 5k deaths, while in neighboring Colombia of 50m there were more than 10x cases, 6.3m, and 142k deaths. All cases and deaths data are from `coronavirus.jhu.edu/region`.

In 2022 WVS sampled: Czechia, Libya, Netherlands, Northern Ireland, Slovakia, United Kingdom, and Uruguay. We dropped: Czechia—no city $>$ 500k before 2022 sampled; Libya—only 7 respondents in cities $>$ 500k before 2022; Northern Ireland—data for one wave only; and Slovakia—only 61 respondents in cities $>$ 500k pre-2022. Which leaves us with: the United Kingdom (GBR) 25m cases out 67m population (37%) and 221k deaths, the Netherlands (NLD) 8.7m cases out of 18m population (48%) and 24k deaths, and Uruguay (URY) 1m cases out of 3.4m population (30%) and 7k deaths.

4 Results

The results are displayed in figure 1. Each panel shows results for a separate country: United Kingdom (GBR), the Netherlands (NLD), and Uruguay (URY). The Y axis is life satisfaction, and the X axis is the rural-urban gradient, degrees of urbanicity. Blue bars show pre-pandemic averages (year varies by country; the latest available), and green bars show pandemic averages (2022).

The focus here is on differential from the bar graphs for cities ($>$.5m) before and during the pandemic (last two bars in each country panel). The baseline for urbanicity is smaller areas (all other bars, $<$.5m).

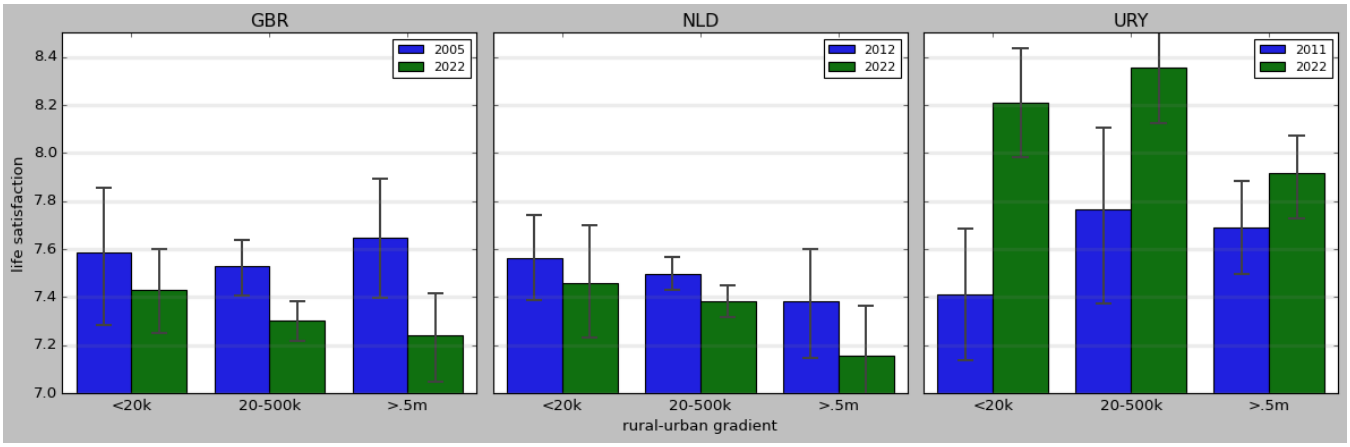

Figure 1: Life satisfaction ($1 = unhappy$ to $10 = happy$) means with 95% CI against rural urban gradient categories. $GBR =$ United Kingdom, $NLD =$ Netherlands, $URY =$ Uruguay.

In both, United Kingdom (GBR) and the Netherlands (NLD) the biggest difference pre-during pandemic (blue v green bar) is for the largest places ($> .5m$). Uruguay (URY), on the other hand, experienced an increase pre-during pandemic in SWB across different urbanicity levels, but the largest places ($> .5m$) increased the least. Thus, across the three countries, we find support for our hypothesis that large cities' happiness suffered disproportionately during the pandemic. Next, we repeat the bar graphs, but with more detailed urban-rural classification to explore nuances in figure 2.

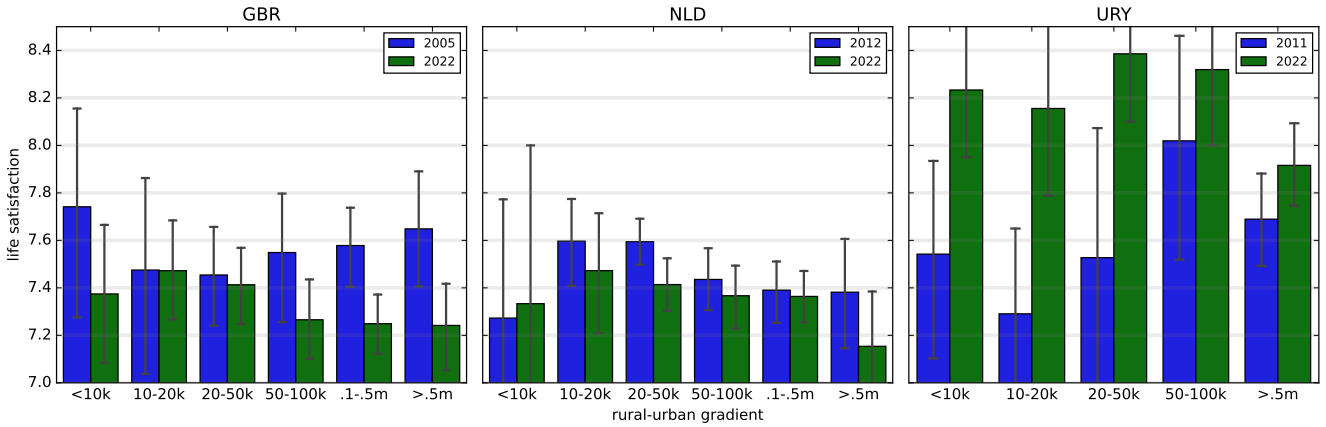

Figure 2: Life satisfaction ($1 = unhappy$ to $10 = happy$) means with 95% CI against rural urban gradient categories. $GBR =$ United Kingdom, $NLD =$ Netherlands, $URY =$ Uruguay. Note: URY is missing .1-.5m category due to small cell sizes.

In the United Kingdom, pre-pandemic, the happiest places were the smallest ($< 10k$), while during the pandemic, both the smallest and largest places were most affected and saw significant reduction in SWB. It is unexpected to see this reduction in the smallest places, and the result could be due to some country specific factors.

In the Netherlands, there's not much change in SWB in the smaller places pre-during pandemic, except for the largest cities where there's a larger drop in SWB as expected. There was also a smaller drop in places with 10-20k, and especially in the 20-50k categories.

Uruguay, a developing country, shows a different story: SWB increased across urbanicity, including the largest areas (>.5m), but that's also where the smallest increase occurred, as expected. Many of the CI are wide, and so even large mean differences may not be statistically significant.

Next, we test the differences with OLS regression.[3] First, since the focus is on cities versus smaller areas (rural and towns), for simplicity, we collapsed categories <.5m into one as rural and towns, and contrast it with cities (>.5m).

There are also two technical reasons for such a binary gap approach v original gradient in bar charts. It is a simpler exposition to have an urban dichotomy as opposed to a gradient, given that we also have two other breakdowns: pre-during COVID and by country. And, critically, the cell sizes run small with too many breakdowns for this relatively small dataset. When more data becomes available, future research should test the full urban-rural gradient.

Our hypothesis is that while the pandemic decreased SWB in general, we expect to see an even greater SWB decrease in cities. We are focused on the pre-during pandemic differences in SWB levels in city ($> .5m$) v smaller areas ($< .5m$).

The bivariate regression results are in table 1. We first separate our analyses by country and then within each country by rural and towns ($< .5m$) v cities ($> .5m$). We regress life satisfaction on a year dummy for 2022 with the base case being the latest pre-pandemic wave as shown in figures 1 and 2.

	GBR		NLD		URY	
	$< .5m$	$> .5m$	$< .5m$	$> .5m$	$< .5m$	$> .5m$
2022	-0.21**	-0.41**	-0.12**	-0.23	0.75***	0.23+
constant	7.54***	7.65***	7.50***	7.38***	7.54***	7.69***
N	3111	521	3572	373	1154	836
adj R2	0.003	0.008	0.002	0.002	0.036	0.002

+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err

Table 1: OLS regressions of life satisfaction. WVS country samples split by rural and towns ($< .5m$) v cities ($> .5m$)

The effect sizes on the year 2022 dummy are the bar length differences from fig 1 or 2 for cities ($> .5m$) and average bar lengths for smaller areas now collapsed as ($< .5m$). For GBR the difference pre-during pandemic is about .2 for rural areas and towns ($< .5m$), and the difference for cities ($> .5m$) is about .4, and so forth for the NLD and URY. A remarkable finding in our analysis is the

[3] A usual argument in favor of OLS over categorical models is repeated in online appendix. And a set of control variables is also motivated.

roughly 2 times difference for GBR (.2 v .4) and NLD (.1 v .2) , and 3 times difference for URY (.7 v .2)—this is a strong differential. When comparing cities ($> .5m$) versus smaller areas ($< .5m$), cities became 2 to 3 times less happy during-pandemic compared to pre-pandemic.

Still, one of the coefficients for the NLD is not significant, and only weakly significant for URY, and there is left out variable bias. Differences in SWB levels should be even bigger when controlling for SWB predictors as the urban rural happiness gradient often emerges only after controlling for SWB predictors (Okulicz-Kozaryn and Valente 2021). Hence, we elaborate our models with SWB predictors in table 2.

	GBR		NLD		URY	
	$< .5m$	$> .5m$	$< .5m$	$> .5m$	$< .5m$	$> .5m$
2022	-0.18*	-0.39+	-0.20***	-0.45**	0.42***	0.21
income	0.09***	0.01	0.06***	0.14***	0.07*	0.13***
age	-0.03*	-0.08**	-0.02+	-0.06+	0.00	-0.06**
age2	0.00**	0.00**	0.00**	0.00*	-0.00	0.00**
male	-0.18**	-0.13	-0.11*	-0.27+	0.06	0.19
married or living together as married	0.53***	0.74***	0.44***	0.23	0.46**	0.06
divorced/separated/widowed	0.07	0.15	-0.11	-0.14	-0.37+	-0.19
autonomy	-0.11*	-0.07	-0.11**	-0.01	-0.06	0.06
freedom	0.44***	0.42***	0.35***	0.43***	0.43***	0.36***
trust	0.12+	0.42**	0.43***	0.28+	-0.05	0.10
postmaterialist	-0.05	-0.18	-0.11*	0.14	-0.02	0.15
god important	0.01	0.05*	0.02*	-0.01	0.05**	0.06**
constant	4.08***	5.95***	4.59***	4.80***	3.47***	4.58***
N	1985	309	2283	237	736	579
adj R2	0.321	0.313	0.279	0.398	0.276	0.201
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err						

Table 2: OLS regressions of life satisfaction. WVS country samples split by rural and towns ($< .5m$) v cities ($> .5m$).

The elaborated models in table 2 mostly confirm our earlier results. We find that there's again roughly a 2 times difference for GBR and the NLD, while for URY the differential is reduced from about 3 times to roughly 2 times as well.

As a robustness check we add "health" as a control variable in table 3. It is important to underscore that there's a confounding effect between pre-during covid19 and health by definition. And there will also be confounding effects between urbanicity and health since covid19 is more prevalent (at least in initial phase) in cities as previously discussed. Hence, these regressions are less useful in determining pre-during difference, and coefficients are smaller and less significant, as expected. Remarkably though, we find still that the urbanicity differentials even though less statistically significant, are still about 2 times larger for GBR and URY and even stronger for the NLD.

	GBR		NLD		URY	
	$< .5m$	$> .5m$	$< .5m$	$> .5m$	$< .5m$	$> .5m$
2022	-0.12	-0.26	-0.06	-0.24+	0.44***	0.23
health	0.48***	0.67***	0.62***	0.77***	0.56***	0.32**
income	0.05**	-0.01	0.04***	0.08**	0.05	0.12***
age	-0.02*	-0.07*	-0.01	-0.03	0.01	-0.05*
age2	0.00**	0.00**	0.00**	0.00+	-0.00	0.00*
male	-0.16*	-0.15	-0.09+	-0.23+	-0.01	0.14
married or living together as married	0.49***	0.60**	0.38***	0.21	0.41**	0.04
divorced/separated/widowed	0.05	0.20	-0.15	-0.27	-0.36+	-0.16
autonomy	-0.12**	-0.09	-0.10**	0.07	-0.09	0.04
freedom	0.38***	0.29***	0.29***	0.31***	0.40***	0.35***
trust	0.07	0.28*	0.34***	0.21	-0.07	0.01
postmaterialist	-0.05	-0.26+	-0.09*	0.06	0.01	0.12
god important	0.01	0.02	0.02+	0.00	0.05**	0.06**
constant	2.72***	4.29***	2.46***	2.01*	1.31+	3.31***
N	1985	309	2279	236	736	578
adj R2	0.379	0.416	0.371	0.527	0.320	0.216
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err						

Table 3: OLS regressions of life satisfaction. WVS country samples split by rural and towns ($< .5m$) v cities ($> .5m$).

In online appendix we do not split by urban/rural but instead add urban/rural dummy and interaction with pandemic dummy—the interaction is statistically insignificant, i.e., the pandemic differential urban v rural effect is not statistcially significant if split by country. However, if urban-rural gradient is not collapsed into binary urban-rural, but several categories, the differences for the Great Britain and Uruguay are statistically significant. Finally, we pool data for the three countries together in table 4.

	a1	a2	a3	a4	a5
pandemic	-0.20**	-0.13+	-0.10	-0.02	-0.18*
city lg500k	0.05	0.19*	0.20*	0.11	0.07
pandemic × city lg500k	-0.26*	-0.26*	-0.26*	-0.21+	-0.15
United Kingdom	-0.04	0.03	0.08	-0.01	-0.04
Uruguay	0.82***	0.92***	0.95***	0.68***	0.43***
2011	-0.82***	-0.72***	-0.54***	-0.47***	-0.44***
2012	-0.10	0.15+	0.11	0.02	0.05
income		0.14***	0.13***	0.08***	0.08***
age		-0.05***	-0.04***	-0.03***	-0.03***
age2		0.00***	0.00***	0.00***	0.00***
male		-0.16***	-0.17***	-0.16***	-0.11**
married or living together as married		0.46***	0.46***	0.39***	0.44***
divorced/separated/widowed		0.01	0.01	-0.03	-0.07
god important			0.03***	0.03***	0.02***
trust			0.38***	0.25***	0.26***
postmaterialist			-0.04	-0.05+	-0.04
autonomy			-0.10***	-0.10***	-0.09***
health				0.71***	
freedom					0.40***
constant	7.58***	7.42***	7.14***	4.40***	4.47***
N	9196	7746	6038	6032	5970
adj R2	0.020	0.094	0.113	0.230	0.291

+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err

Table 4: OLS regressions of life satisfaction. Country-wave pooled models.

We start with a basic model where we regress life satisfaction on a dummy for the largest cities, and during-pandemic wave dummy where "pandemic" $= 1$ if $year = 2022$. We also include country dummies, as we now pull all the data together. We also include year dummies in addition to pandemic dummy since data were collected in different countries in different years.

In column a1, as expected, during pandemic SWB went down by -.2, and especially so for cities by an additional -.26. When adding basic controls in model a2, "pandemic∗city lg 500k" stays about the same at -.26. We include an extended list of controls in model a3, and again the coefficient stays at -.26. It is only after adding "health" in model a4 that the coefficient slightly drops to -.21.

The addition of freedom in model a5 cuts the effect most substantially to -.15 and kills statistical significance. The freedom variable is: "Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means 'none at all' and 10 means 'a great deal' to indicate how much freedom of choice and control you feel you have over the way your life turns out." A rationale to look at freedom is that it confounds with city; i.e., city has more freedom than rural at least in some senses. The idea goes back at least to Ferdinand Toennies' "Gemeinschaft und Gesellschaft" (Tönnies [1887] 2002)–city air is free–e.g., nonstandard/nonconformist types such as LGBTQ are more free in a city.

WVS freedom variable also measures control over one's life. Clearly, during the pandemic, city residents, all things equal, would feel a greater loss of control over their lives since they are more exposed to being infected. This explains why it removes the effect of the interaction variable "pandemic x city lg500k".[4]

5 Conclusion and Discussion

The present study argues that the covid19 pandemic has lowered SWB in large cities. In the US, before the pandemic, city happiness was on the rise relative to rural areas (Okulicz-Kozaryn and Valente 2019). As rural areas have been left behind (Hanson 2015), the rural happiness advantage has decreased. A rural Californian explains (Fuller 2017, p. 2):

> "In the rural parts of the state we drive more miles, we drive older cars, our economy is an agriculture- and resource-based economy that relies on tractors. You can't move an 80,000-pound load in an electric truck. They've devastated ag [agricultural] jobs, timber jobs, mining jobs with their environmental regulations, so, yes, we have a harder time sustaining the economy, and therefore there's more people that are in a poorer situation."

[4]We thank anonymous reviewer for providing this explanation. Likewise, anonymous reviewer also points to institutional trust (the more you trust the institution the more you are confident that the COVID-19 situation is handled well by the authorities). Maybe rural residents have higher institutional trust and if so, maybe this could explain their lower loss of happiness. For discussion see Sørensen and Christiansen (2022). Future research could further explore freedom, control, and institutional trust.

The situation may be similar in many other countries—as urbanization had been favored over rurality in world development in general (Lipton et al. 1977).

Ironically, the covid19 pandemic made the economic advantage and prosperity of cities quickly wither away. The pandemic created significant economic turmoil particularly in large urban centers: as businesses and industries shut down, millions lost their jobs, and thousands fled to the suburbs or smaller places, hoping to avoid human interaction and protect themselves against the virus. Places like New York City, that were vibrant and full of life, became dull and empty. Still, as of 2023, much of commercial real estate in urban cores is empty.

Urban and rural areas experienced and coped with the pandemic very differently. Urban areas became the center of coronavirus outbreaks around the world, and many cities saw their healthcare systems become quickly overwhelmed given the magnitude of the virus–makeshift hospitals and makeshift morgues were set up in cities like New York City.

There's always a strong correlation between subjective well being and health. Health is the key predictor of happiness–almost no one considers health unimportant (e.g., Campbell et al. 1976). The virus not only made people severely ill, but it prevented people who had any other health emergencies or issues from being properly taken care of (e.g., cancer, heart disease, diabetes). Thus, the number of people who's health was directly or indirectly affected by covid19 is significantly larger then the reported statistics of covid19 infection. This was particularly an issue in large metropolitan areas. Covid19 impact on wellbeing is arguably larger than that simply measured by its incidence, hospitalization, and death counts–e.g, social distancing in itself (regardless of infection) has a negative effect on psychological distress (Khan et al. 2021). Thus, it is no surprise that our findings show such a significant and relatively large drop in happiness levels in cities as compared to smaller places.

Understanding the urban-rural discrepancies is important because policymakers can implement policies targeted to create a more healthy and livable environment for urban and rural residents based on the different challenges they experience to foster happiness. The spread of infectious disease in cities is unavoidable and will likely happen again in the near future. Learning from the challenges brought by covid19 might result in lifesaving, health and happiness promoting measures.

It is important to highlight that only the initial phase of infection per capita is greater in cities, then urban versus rural rates converge, and in last stage infections are higher in rural as cities got hit first and recovered first (Cuadros et al. 2021)—at least in the US—and we assume that elsewhere the mechanism is similar.

But there is arguably a strong psychological effect, urban scare, that will also last well after the pandemic for the foreseeable future—future research can test it. Likewise, urban quality of life versus rural quality of life even given similar[5] per capita infection is very different—one can easily go about daily life and even enjoy most rural activities in rural areas, while the opposite is true in cities—city way of life during a pandemic is unbearable.

The massive difference in population density of urban versus rural needs to be underscored. The disproportionate population density signifies that even if the infection rate were similar across urban-rural areas, the difference in infection rate per sq km would be massive. And this is one key factor behind the urban scare from covid19—the sheer number of infections in one's proximity was astronomical.

In many ways, cities cannot be fixed–there is inherent conflict, dysfunction and even misanthropy in metropolis Wirth (1938), Fischer (1972), Okulicz-Kozaryn and Valente (2022), Thrift (2005), Amin (2006), Okulicz-Kozaryn (2015), Peck (2016). Others would argue that a city can be fixed and made happier (for a review see Ballas 2013). Olasov et al. (2022) offers many ideas by 10 philosophers. For instance, to re-imagine cities as places that offer convivial and sensual shared space for shared pleasure, "a mesh of small, safe, intimate places, rather than a series of grand urban projects."

[5]Assuming similar per capita rates is not illogical, again, cities experience increased infection rate only initially, but then infectin rates in smaller areas rise as cities recover and disease spreads to smaller areas.

6 Limitations and Future Research

Population size and density–the two correlate. Still they are not the same—future research could use density. WVS only has population size. Covid spread and subjective "scare" are not only about population size but also about density.

There may be time effects—covid19 developed differently in differnt places over time—see trajectories in online appendix. We only used 2 periods for each country—before and during—another dataset that has more time points would be useful.

Results from Great Britain, the Netherlands, and Uruguay studied here may not generalize to other countries, especially ones with much different covid19 rates, policy responses and urbanization patters.

As more data becomes available, it will be instructive to closely examine countries that were most affected by covid19. Italy and the U.S., for example, will probably show much greater negative effects on SWB than what we found in the UK (GBR), the Netherlands (NLD) and Urguguay (URY). Although covid19 infection rates are significantly lower now (in 2023), and another massive pandemic could be decades ahead, we'll likely experience covid19 lingering effects for many years to come. This could arguably include urban scare, prevalence of misanthropolis (a metropolis full of distrust and dislike of humankind) (Okulicz-Kozaryn and Valente 2022), and possibly an urban crisis. It would be useful to study the long term effect on urban-rural happiness gradient/gap and whether covid19 has widened more permanently the urban-rural happiness gap that had been closing prior to the pandemic (Okulicz-Kozaryn and Valente 2018).

This is only the first study on the topic and more research is needed to examine the impact of covid19 on the urban-rural gradient/gap. We are interested in the general and overall patterns we observed here and believe it provides a good starting point for a much needed debate on this topic. Future research can focus on a more direct link between infections, hospitalizations, and deaths and SWB by linking public health data with SWB data for specific locations. Likewise there is a huge difference in infection rates across countries (e.g., Italy, the US, China), and across places within countries. Such differences could be perhaps explored in a natural experiment framework where massively infected area can be matched with a similar area but with low infection rate.

References

Ali, S. H. and R. Keil (2011): *Networked disease: emerging infections in the global city*, John Wiley & Sons.

Amin, A. (2006): "The good city," *Urban studies*, 43, 1009–1023.

Ballas, D. (2013): "What makes a 'happy city'?" *Cities*, 32, S39–S50.

Berman, M. G., E. Kross, K. M. Krpan, M. K. Askren, A. Burson, P. J. Deldin, S. Kaplan, L. Sherdell, I. H. Gotlib, and J. Jonides (2012): "Interacting with nature improves cognition and affect for individuals with depression," *Journal of affective disorders*, 140, 300–305.

Bettencourt, L. and G. West (2010): "A unified theory of urban living," *Nature*, 467, 912–913.

Bettencourt, L. M., J. Lobo, D. Helbing, C. Kühnert, and G. B. West (2007): "Growth, innovation, scaling, and the pace of life in cities," *Proceedings of the National Academy of Sciences*, 104, 7301–7306.

Bettencourt, L. M., J. Lobo, D. Strumsky, and G. B. West (2010): "Urban scaling and its deviations: Revealing the structure of wealth, innovation and crime across cities," *PloS one*, 5, e13541.

Blanchflower, D. G. and A. J. Oswald (2011): "International happiness: A new view on the measure of performance," *The Academy of Management Perspectives*, 25, 6–22.

Campbell, A., P. E. Converse, and W. L. Rodgers (1976): *The quality of American life: perceptions, evaluations, and satisfactions*, Russell Sage Foundation, New York NY.

Carlsen, F. and S. Leknes (2019): "The paradox of the unhappy, growing city: reconciling evidence?" *Unpublished*.

——— (2022): "For whom are cities good places to live? Evidence from Norway." *Regional Studies*.

Chen, J. T. and N. Krieger (2021): "Revealing the unequal burden of COVID-19 by income, race/ethnicity, and household crowding: US county versus zip code analyses," *Journal of Public Health Management and Practice*, 27, S43–S56.

Connolly, C., R. Keil, and S. H. Ali (2021): "Extended urbanisation and the spatialities of infectious disease: Demographic change, infrastructure and governance," *Urban studies*, 58, 245–263.

Cooper, I., A. Mondal, and C. G. Antonopoulos (2020): "A SIR model assumption for the spread of COVID-19 in different communities," *Chaos, Solitons & Fractals*, 139, 110057.

Cuadros, D. F., A. J. Branscum, Z. Mukandavire, F. D. Miller, and N. MacKinnon (2021): "Dynamics of the COVID-19 epidemic in urban and rural areas in the United States," *Annals of epidemiology*, 59, 16–20.

Curtin, S. C. and M. P. Heron (2022): *COVID-19 death rates in urban and rural areas: United States, 2020*, US Deparment of Health and Human Services, Centers for Disease Control and Prevention.

Easterlin, R. A. and K. J. O'Connor (2023): "Three years of COVID-19 and life satisfaction in Europe: A macro view," *Proceedings of the National Academy of Sciences*, 120, e2300717120.

Ferrer-i-Carbonell, A. and P. Frijters (2004): "How Important is Methodology for the Estimates of the Determinants of Happiness?" *Economic Journal*, 114, 641–659.

Fischer, C. S. (1972): "Urbanism as a Way of Life (A Review and an Agenda)," *Sociological Methods and Research*, 1, 187–242.

Frumkin, H. (2001): "Beyond toxicity: human health and the natural environment," *American journal of preventive medicine*, 20, 234–240.

Fuller, T. (2017): "California's Far North Deplores Tyranny of the Urban Majority," *The New York Times*.

Haggett, P. (1994): "Geographical aspects of the emergence of infectious diseases," *Geografiska Annaler: Series B, Human Geography*, 76, 91–104.

Hanson, V. D. (2015): "The Oldest Divide. With roots dating back to our Founding, America's urban-rural split is wider than ever." *City Journal*, Autumn 2015.

Harvey, D. (2012): *Rebel cities: From the right to the city to the urban revolution*, Verso Books.

Keil, R. and H. Ali (2007): "Governing the sick city: urban governance in the age of emerging infectious disease," *Antipode*, 39, 846–873.

Khan, A. G., M. Kamruzzaman, M. N. Rahman, M. Mahmood, and M. A. Uddin (2021): "Quality of life in the COVID-19 outbreak: influence of psychological distress, government strategies, social distancing, and emotional recovery," *Heliyon*, 7.

Lenzi, C. and G. Perucca (2016): "The Easterlin paradox and the urban-rural divide in life satisfaction: Evidence from Romania," *Unpublished; http://www.grupposervizioambiente.it*.

——— (2020): "Not too close, not too far: Urbanisation and life satisfaction along the urban hierarchy," *Urban Studies*, 0042098020962397.

——— (2022): "No Place for Poor Men: On the Asymmetric Effect of Urbanization on Life Satisfaction," *Social Indicators Research*, 1–23.

Lipton, M. et al. (1977): *Why poor people stay poor: a study of urban bias in world development*, London: Canberra: Temple Smith; Australian National University Press.

Maller, C., M. Townsend, A. Pryor, P. Brown, and L. St Leger (2006): "Healthy nature healthy people:'contact with nature'as an upstream health promotion intervention for populations," *Health promotion international*, 21, 45–54.

Morrison, P. (2015): "Capturing effects of cities on subjective wellbeing," *European Regional Science Association Conference, Lisbon*.

Morrison, P. S. (2021): "Whose Happiness in Which Cities? A Quantile Approach," *Sustainability*, 13, 11290.

Morrison, P. S. and M. Weckroth (2017): "Human values, subjective well-being and the metropolitan region," *Regional Studies*, 1–13.

Newman, M. E. (2002): "Spread of epidemic disease on networks," *Physical review E*, 66, 016128.

Ng, Y.-K. (1996): "Happiness surveys: Some comparability issues and an exploratory survey based on just perceivable increments," *Social Indicators Research*, 38, 1–27.

——— (1997): "A case for happiness, cardinalism, and interpersonal comparability," *The Economic Journal*, 107, 1848–1858.

Nixey, C. (2020): "Death of the office. As the pandemic leaves offices around the world empty, Catherine Nixey asks what was the point of them anyway?" *The Economist*.

Okulicz-Kozaryn, A. (2015): *Happiness and Place. Why Life is Better Outside of the City.*, Palgrave Macmillan, New York NY.

Okulicz-Kozaryn, A. and R. R. Valente (2018): "No Urban Malaise for Millennials," *Regional Studies*.

——— (2019): "No urban malaise for Millennials," *Regional Studies*, 53, 195–205.

——— (2021): "Urban unhappiness is common," *Cities*, 103368.

——— (2022): "Misanthropolis: Do cities promote misanthropy?" *Cities*, 131, 103945.

Olasov, I., M. Menser, J. Gammage, E. S. dos Santos, J. R. Short, K. Easwaran, R. R. Sundstrom, I. Khawaja, Q. R. Kukla, and K. Melcher (2022): "Cities After COVID: Ten philosophers consider how COVID has impacted the life of the city." .

Park, R. E., E. W. Burgess, and R. D. Mac Kenzie ([1925] 1984): *The city*, University of Chicago Press, Chicago IL.

Peck, J. (2016): "Economic Rationality Meets Celebrity Urbanology: Exploring Edward Glaeser's City," *International Journal of Urban and Regional Research*, 40, 1–30.

Pretty, J. (2012): *The earth only endures: On reconnecting with nature and our place in it*, Routledge, New York NY.

Senior, J. (2006): "Some Dark Thoughts on Happiness," *New York Magazine*.

Sorensen, J. (2020): "The rural happiness paradox in developed countries," *social science research*.

Sørensen, J. F. (2014): "Rural–urban differences in life satisfaction: Evidence from the European Union," *Regional Studies*, 48, 1451–1466.

Sørensen, J. F. L. and M. Christiansen (2022): "The role of economic stress, health concerns, and institutional trust in supporting public protests against COVID-19 lockdown measures in Denmark," *International Journal of Environmental Research and Public Health*, 20, 148.

Stier, A. J., M. G. Berman, and L. M. Bettencourt (2021): "Early pandemic COVID-19 case growth rates increase with city size," *npj Urban Sustainability*, 1, 31.

Subramanian, S., M. A. Subramanyam, S. Selvaraj, and I. Kawachi (2009): "Are self-reports of health and morbidities in developing countries misleading? Evidence from India," *Social science & medicine*, 68, 260–265.

Tesson, S. (2013): *Consolations of the Forest: Alone in a Cabin in the Middle Taiga*, Penguin, London UK.

Thrift, N. (2005): "But malice aforethought: cities and the natural history of hatred," *Transactions of the institute of British Geographers*, 30, 133–150.

Tönnies, F. ([1887] 2002): *Community and society*, DoverPublications.com, Mineola NY.

Wirth, L. (1938): "Urbanism as a Way of Life," *American Journal of Sociology*, 44, 1–24.

7 Online Appendix

7.1 Variable Definitions and Distributions

Table 5: Variable definitions.

name	description
happiness	"All things considered, how satisfied are you with your life as a whole these days?" 1="dissatisfied" to 10="satisfied"; WVS
place size	"OBSERVATIONS BY THE INTERVIEWER; Code size of town where interview was conducted"
income	"Scale of incomes"
age	age
male	male
married or living together as married	"Are you currently ....(READ OUT AND CODE ONE ONLY) 1 'Married' 2 'Living together as married' 3 'Divorced' 4 'Separated' 5 'Widowed' 6 'Single/Never married' 7 'Divorced, Separated or Widow' 8 'Living apart but steady relation (married,cohabitation)'"
divorced/separated/widowed	"Are you currently ....(READ OUT AND CODE ONE ONLY) 1 'Married' 2 'Living together as married' 3 'Divorced' 4 'Separated' 5 'Widowed' 6 'Single/Never married' 7 'Divorced, Separated or Widow' 8 'Living apart but steady relation (married,cohabitation)'"
autonomy	"Autonomy index"
freedom	"Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means 'none at all' and 10 means 'a great deal' to indicate how much freedom of choice and control you feel you have over the way your life turns out."
health	"State of health (subjective)"
trust	"Most people can be trusted"
postmaterialist	"Post materialist index "
god important	"How important is God in your life? Please use this scale to indicate- 10 means very important and 1 means not at all important."

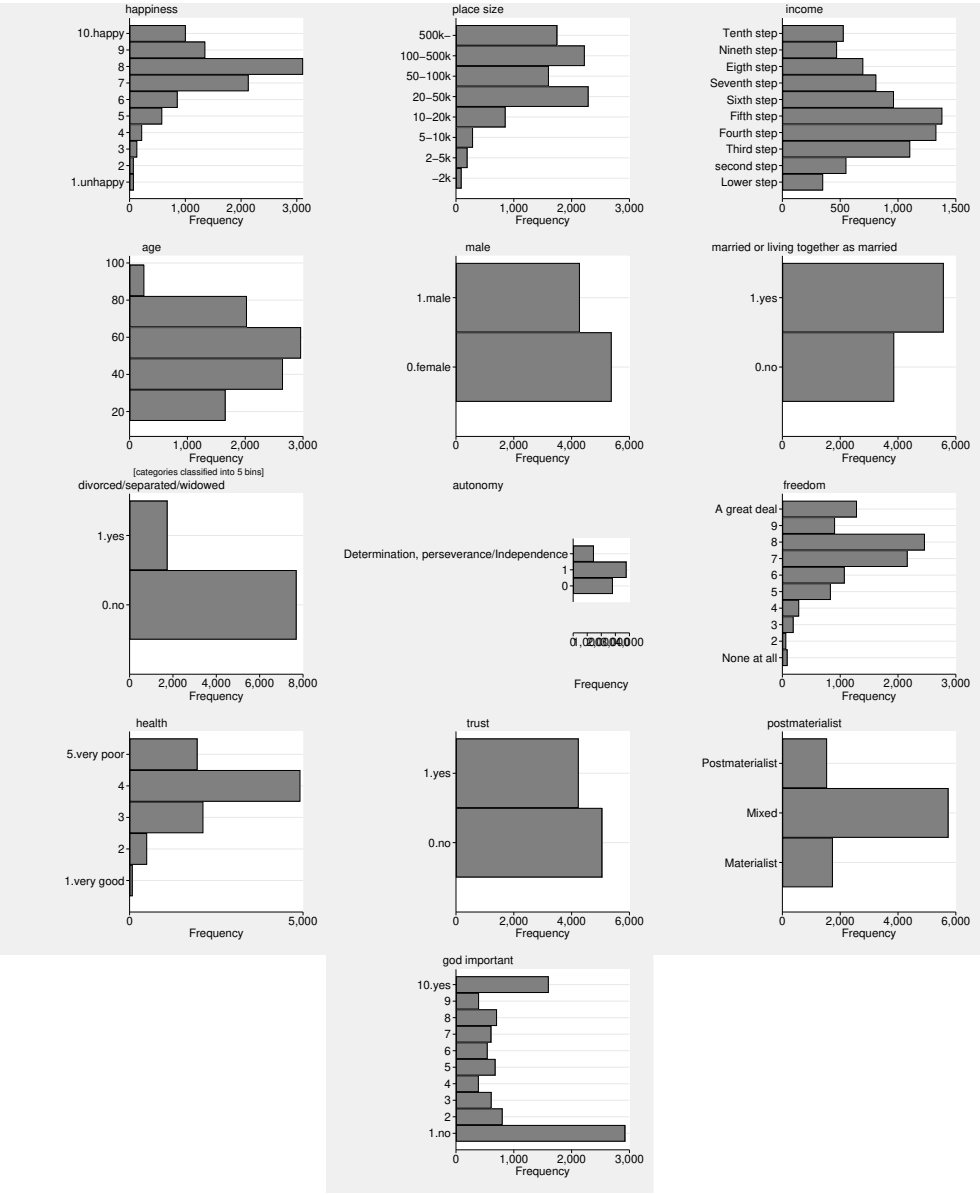

Figure 3: Variables' distribution.

7.2 Model and Controls

We use a standard OLS regression with robust standard errors. We treat the 10-step happiness variable as continuous. Ordinal happiness can be treated as a continuous variable (Ferrer-i-Carbonell and Frijters 2004). OLS has become the default method in happiness research (Blanchflower and Oswald 2011). Theoretically, while there is still debate about the cardinality of SWB, there are strong arguments to treat it as a cardinal variable (Ng 1996, 1997).

In choice of controls we generally follow (Okulicz-Kozaryn and Valente 2021). There are specific controls worth discussing. One great advantage of city living that is often forgotten is freedom "City air makes men free (Stadt Luft macht frei)" Park et al. ([1925] 1984, p. 12)[6], hence we control for freedom. Health is a key predictor of SWB, and also note that subjective health measure used here is a reasonable measure of actual health (Subramanian et al. 2009).

More discussion of freedom is in the paper at the end of results section.

[6]It originated in the Middle Ages, and it meant freedom from feudalism, non-feudal islands in a sea of feudalism (Harvey 2012).

7.3 Morocco (MAR) and Venezuela (VEN)

Morocco (MAR), like Uruguay (URY) in the body of the paper, increased SWB everywhere, but least in largest cities (>500k), but also in 100-500k category. 20-50k category should not be interpretetd as there are only 22 obs in 2001, (and 0 obs in 50–10k category).

In case of Venezuela (VEN), most places had SWB drop, and while larger had little more drop than smaller ones, there are no clear patters unlike in other countries. And this is not surprising. Venezuela like Morocco had very little of its population affected by covid, about 2-3 percent. But unlike Morocco, it is a non-free autocracy with unstable/turbulent economy–we did not expect to see much of an effect of covid in Venezuela.

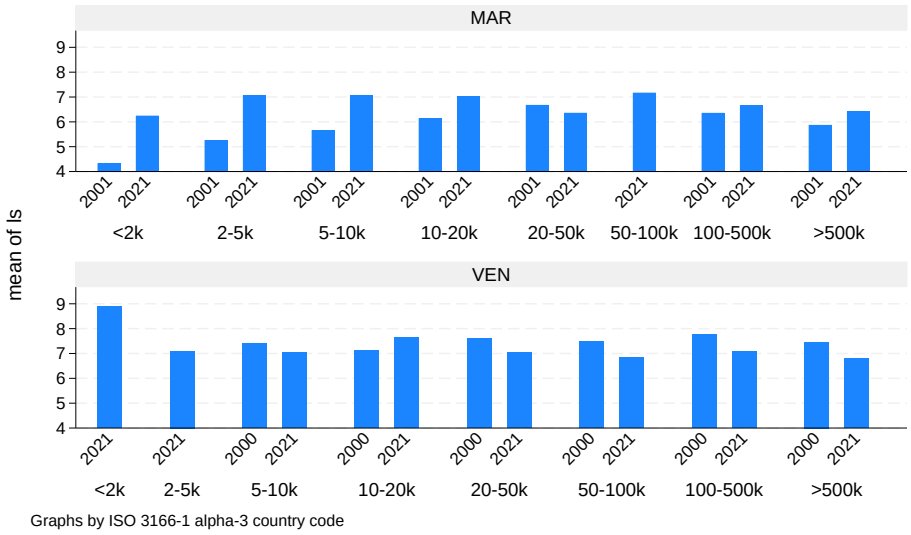

Figure 4: Urban-rural happiness gradeint in Morocco and Venezuela pre and during the pandemic.

7.4 Covid Trends in GBR, NLD, URY

Ideally we would like these by settlement size, but these are best and most cross-country consistent data we have found—data from `https://coronavirus.jhu.edu/region`.

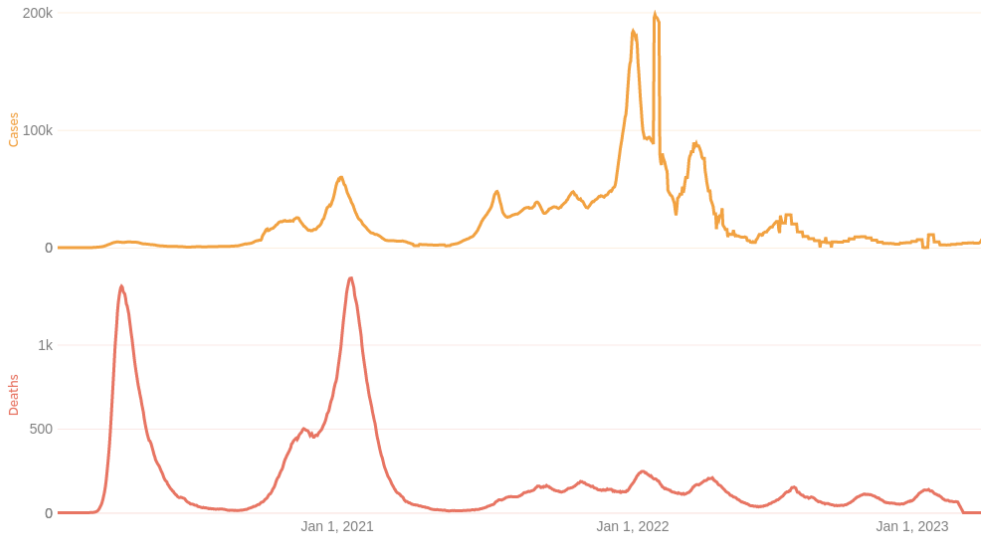

Figure 5: GBR

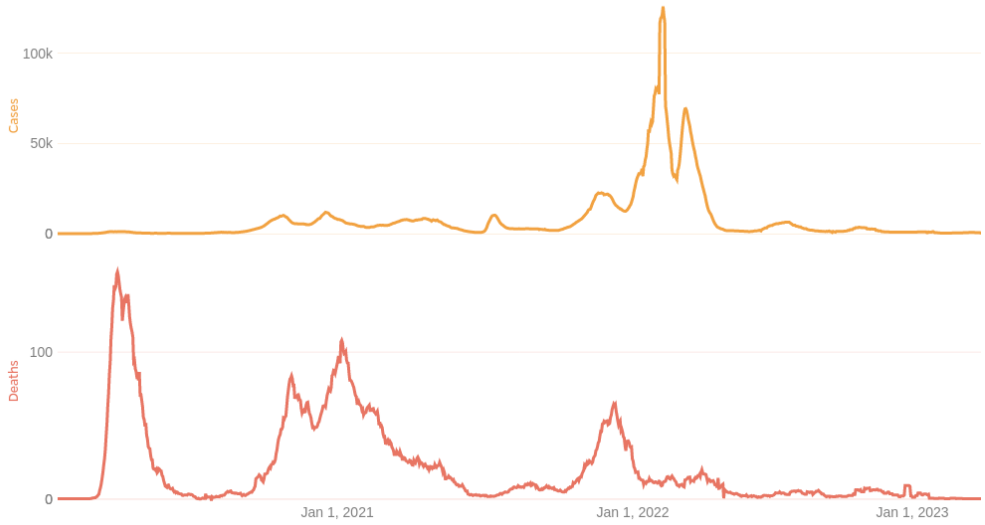

Figure 6: NLD

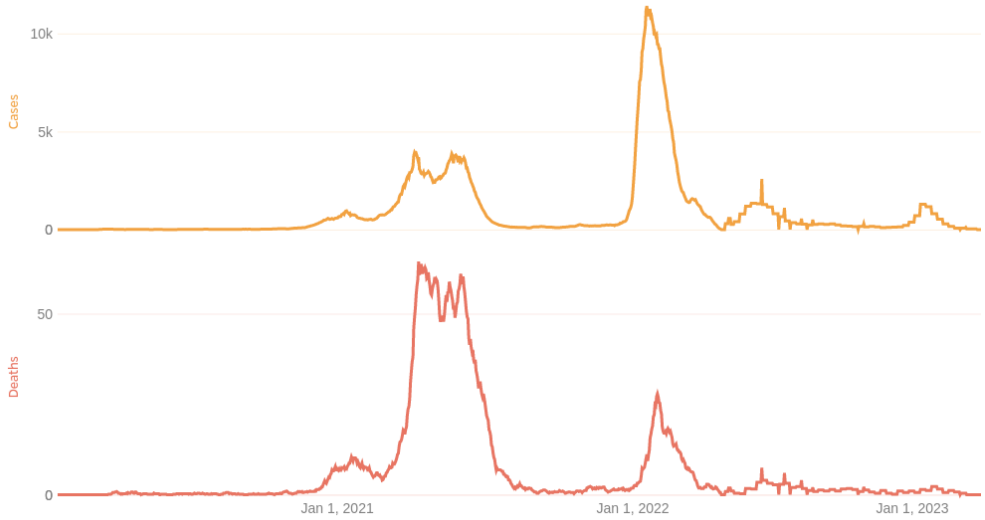

Figure 7: URY

7.5 Interaction or Pandemic Dummy with Urban/Rural Dummy Separately for Each Country

In table 1 we repeat previous 3 sets of models, but instead of splitting by urban rural, we add an interaction to test if pandemic urban rural difference is statistically significant, and it is not. The sign and effect sizes are as expected.

	GBR1	NLD1	URY1	GBR2	NLD2	URY2	GBR3	NLD3	URY3
pandemic	-0.21**	-0.12*	0.75***	-0.18*	-0.22***	0.29+	-0.13+	-0.07	0.29*
city lg500k	0.11	-0.12	0.16	0.25	0.16	-0.07	0.16	0.11	-0.12
pandemic × city lg500k	-0.20	-0.11	-0.53**	-0.24	-0.12	-0.11	-0.17	-0.12	-0.08
income				0.08***	0.07***	0.10***	0.04**	0.04***	0.08**
age				-0.04***	-0.02*	-0.03	-0.03**	-0.01	-0.02
age2				0.00***	0.00***	0.00	0.00***	0.00***	0.00
male				-0.18**	-0.12*	0.08	-0.16**	-0.10*	0.03
married or living together as married				0.56***	0.43***	0.28*	0.51***	0.37***	0.25*
divorced/separated/widowed				0.07	-0.10	-0.21	0.06	-0.15+	-0.19
autonomy				-0.10*	-0.10**	-0.04	-0.11**	-0.08**	-0.06
freedom				0.44***	0.36***	0.39***	0.37***	0.29***	0.37***
trust				0.16**	0.43***	0.11	0.11+	0.32***	0.01
postmaterialist				-0.06	-0.09*	0.06	-0.07	-0.08*	0.04
god important				0.02*	0.01	0.05**	0.01	0.01	0.05**
health							0.51***	0.64***	0.46***
constant	7.54***	7.50***	7.53***	4.30***	4.58***	4.20***	2.89***	2.37***	2.45***
N	3628	3872	1696	2290	2520	1160	2290	2515	1159
adj R2	0.003	0.003	0.020	0.319	0.287	0.215	0.383	0.386	0.248
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err									

Table 6: OLS regressions of life satisfaction.

However, having more gradation in urbanicity, produces more statistical significance in table 7. Rationale is to use more/fuller information on urbanicity. And with regressions, rationale is also to have a large stable base case, here $< 50k$, and compare against it 3 larger places $50 - 100$, $100 - 500$, $gt500$

	town3				
Settlement size	1	2	3	4	Total
under 2000	95	0	0	0	95
2-5000	197	0	0	0	197
5-10000	293	0	0	0	293
10-20000	856	0	0	0	856
20-50000	2,291	0	0	0	2,291
50-100000	0	1,605	0	0	1,605
100-500000	0	0	2,195	0	2,195
500000 and more	0	0	0	1,749	1,749
Total	3,732	1,605	2,195	1,749	9,281

	x1GBR	x2NLD	x3URY	x4GBR	x5NLD	x6URY
2005	0.00			0.00		
2022	-0.08	-0.17*	0.83***	-0.02	-0.31***	0.76***
town3=1	0.00	0.00	0.00	0.00	0.00	0.00
town3=2	0.05	-0.15+	0.59*	0.13	-0.08	0.70**
town3=3	0.08	-0.20*		0.17	-0.08	
town3=4	0.15	-0.21	0.26	0.48**	0.23*	0.15
2005 × town3=1	0.00			0.00		
2005 × town3=2	0.00			0.00		
2005 × town3=3	0.00			0.00		
2005 × town3=4	0.00			0.00		
2022 × town3=1	0.00	0.00	0.00	0.00	0.00	0.00
2022 × town3=2	-0.21	0.10	-0.53	-0.32	0.04	-0.54+
2022 × town3=3	-0.25+	0.14		-0.25	0.08	
2022 × town3=4	-0.33+	-0.06	-0.61**	-0.38+	-0.14	-0.54**
2012		0.00			0.00	
2012 × town3=1		0.00			0.00	
2012 × town3=2		0.00			0.00	
2012 × town3=3		0.00			0.00	
2012 × town3=4		0.00			0.00	
2011			0.00			0.00
2011 × town3=1			0.00			0.00
2011 × town3=2			0.00			0.00
2011 × town3=4			0.00			0.00
income				0.14***	0.13***	0.16***
age				-0.05***	-0.05***	-0.05**
age2				0.00***	0.00***	0.00**
male				-0.28***	-0.09*	-0.08
married or living together as married				0.54***	0.46***	0.41***
divorced/separated/widowed				0.04	0.07	-0.08
constant	7.50***	7.59***	7.43***	7.28***	7.57***	7.51***
N	3628	3872	1696	2846	3250	1650
adj R2	0.003	0.004	0.021	0.085	0.108	0.067
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err						

Table 7: OLS regressions of life satisfaction.

7.6 Anecdotal Evidence: An Author Got Covid

Many people think that covid19 is largely gone and cities are safe to return to. One of the authors of this study was reckless enough to go to a large city, New York City, and surely enough just got infected with covid19 this summer (2023) when we were revising this paper. We advise the readers to keep away from large cities–you will be safer from infectious disease and happier.

But then again, this is anecdotal. An anonymous reviewer also got covid19, but outside of a large city.