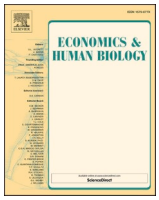
Economics and Human Biology 55 (2024) 101427

Contents lists available at ScienceDirect

Economics and Human Biology

journal homepage: www.elsevier.com/locate/ehb



Loneliness during the COVID-19 pandemic: Evidence from five European countries

Alessio Rebechi [a,*], Anthony Lepintuer [a], Andrew E. Clark [b], Nicholas Rohde [c], Claus Vögele [a], Conchita D'Ambrosio [a]

[a] University of Luxembourg, Luxembourg
[b] PARIS School of Economics – CNRS and University of Luxembourg, Luxembourg
[c] Griffith University, Australia

ARTICLE INFO

JEL Classification:
H51
I18
I31

Keywords:
Loneliness
COVID-19
COME-HERE
Age
Pandemic policies

ABSTRACT

We use quarterly panel data from the COME-HERE survey covering five European countries to analyse three facets of the experience of loneliness during the COVID-19 pandemic. First, in terms of prevalence, loneliness peaked in April 2020, followed by a U-shape pattern in the rest of 2020, and then remained relatively stable throughout 2021 and 2022. We then establish the individual determinants of loneliness and compare them to those found in the literature predating the COVID-19 pandemic. As in previous work, women are lonelier, and partnership, education, income, and employment protect against loneliness. However, the pandemic substantially shifted the age profile: it is now the youngest who are the loneliest. We last show that pandemic policies affected loneliness, which rose with containment policies but fell with government economic support. Conversely, the intensity of the pandemic itself, via the number of recent COVID-19 deaths, had only a minor impact. The experience of the pandemic has thus shown that public policy can influence societal loneliness trends.

1. Introduction

Loneliness has recently been identified as the next public-health crisis after smoking and obesity (Jaffe, 2023). It has become increasingly common over the last few years (Hysing et al., 2020) and may have risen with the advent of the COVID-19 pandemic (Lepinteur et al., 2022).

Defined as the gap between what individuals want or expect from social relationships and what they experience (Cacioppo and Patrick, 2008), loneliness is correlated with a number of adverse health outcomes. These include mental health problems, such as depression, anxiety, and sleeping disorders (Cacioppo et al., 2010), and physical problems such as heart conditions, dementia, cognitive impairment (Hawkley et al., 2022) and altered endocrine-immune functioning (Hawkley and Cacioppo, 2003; Venero et al., 2022). By reducing the ability to self-regulate, loneliness negatively affects cognitive functioning (Hawkley and Cacioppo, 2010), and is a risk factor for unhealthy behaviours such as alcohol and drug abuse (Åkerlind and Hörnquist, 1992; Lauder et al., 2006). It is also thought to significantly increase the odds of early mortality (Case and Deaton, 2020; Holt-Lunstad et al., 2015; Steptoe et al., 2013; Cacioppo and Cacioppo, 2018).

In addition to its public-health implications, loneliness is associated with more-general social and economic costs. Lonely individuals tend to place more emphasis on negative information, have more negative social expectations, and are more pessimistic and hostile towards others (Hawkley and Cacioppo, 2010). This loop of negativity, anxiety, depression, and low self-esteem contributes to their sense of isolation and detachment (Cacioppo et al., 2016), reducing their social and political engagement (Langenkamp, 2021) and leading to worse economic outcomes (Burlina and Rodríguez-Pose, 2023).

The COVID-19 pandemic brought unprecedented changes to social structures and personal relationships worldwide. Lockdowns, social-distancing measures and the pervasive fear of contagion have drastically altered the ways in which individuals interact with each other, leading to significant social isolation. Given these developments, the analysis of loneliness over this period is important for the understanding

* Correspondence to: Maison des Sciences Humaines 11, Porte des Sciences, Esch-sur-Alzette L-4366, Luxembourg.
E-mail addresses: alessio.rebechi@uni.lu (A. Rebechi), anthony.lepinteur@uni.lu (A. Lepintuer), andrew.clark@ens.fr (A.E. Clark), n.rohde@griffth.edu.au (N. Rohde), claus.voegele@uni.lu (C. Vögele), conchita.dambrosio@uni.lu (C. D'Ambrosio).

https://doi.org/10.1016/j.ehb.2024.101427
Received 15 April 2024; Received in revised form 14 August 2024; Accepted 14 August 2024

of the broader psychosocial impacts of the pandemic. We here study the dynamic patterns of loneliness, as measured by the UCLA loneliness scale, together with its risk and protective factors during the COVID-19 pandemic using quarterly panel data from April 2020 to December 2022 from five European countries (France, Germany, Italy, Spain and Sweden). As the pandemic involved a rapid and radical restructuring of personal relationships, it is plausible that the fundamental nature of loneliness and its determinants changed during this challenging time. By investigating these changes, we aim to shed light on the unique challenges posed by the pandemic and help to inform strategies to mitigate adverse effects on mental health.

We have three main findings. First, loneliness peaked in early 2020 and then followed a U-shaped pattern for the rest of that year. It subsequently remained remarkably stable in 2021 and 2022 – a pattern that also holds across demographic groups. Second, while the trends are similar, there are substantial differences across groups in terms of loneliness prevalence. Women report being lonelier than men, and partnership, education, employment, and income are protective, as was the case in the pre-pandemic literature. However, other pre-existing loneliness patterns changed with the pandemic. Notably, the age-relationship shifted substantially, with the younger now being lonelier than the older. We also find that reduced social interactions predict greater loneliness, with the influence of face-to-face interactions looming larger than that of remote interactions. Last, we analyse the role of the pandemic itself and the resulting policy responses. Lockdown-style policies led to greater loneliness, while greater government economic support played an offsetting role. The pandemic itself, measured in terms of COVID-19 death rates, had only a limited effect. The time profile of pandemic policies largely explains the loneliness U-shape and its subsequent stability over time. Accounting for selective attrition in our sample does not change these conclusions.

Our research contributes to the broad literature on the impact of COVID-19 on mental health and life satisfaction (Aknin et al., 2022a, 2022b; Brodeur et al., 2021; Bu et al., 2023; Cameron-Blake et al., 2023; Clark and Lepinteur, 2022; Fancourt et al., 2021; Jabakhanji et al., 2022; Lee et al., 2020; Lee et al., 2021; Lorenzo et al., 2023; Hamermesh, 2020; Salanti et al., 2022; Voss et al., 2021), and more specifically to that on loneliness during COVID-19. Many articles have explored the socio-demographic determinants of loneliness (Bu et al., 2020a, 2020b; Buecker and Horstmann, 2022; Ernst et al., 2022; Groarke et al., 2020; Killgore et al., 2020; Hu and Gutman, 2021; Lampraki et al., 2022; Losada-Baltar et al., 2021; Rumas et al., 2021; Okruszek et al., 2020; Wickens et al., 2021) and documented the evolution of loneliness during the pandemic (Baarck et al., 2022; Babin et al., 2021; Caro et al., 2022; Lee et al., 2021; Lucchetti et al., 2020; Prati and Mancini, 2021). However, none of these contributions used longitudinal samples covering a period as long as ours or have explicitly modelled the separate effects of COVID-19 policies and the pandemic itself. We are able here to use ten waves of longitudinal data from 2020 to 2022, harmonised across five different European countries. This allows us to control for unobserved heterogeneity and provides sufficient variation to identify the correlation between loneliness, on the one hand, and a variety of pandemic variables, on the other. The sample is also large-enough (over 50,000 observations) for analyses to be carried out by sub-groups with reasonable statistical power.

Amongst the contributions cited above, Caro et al. (2022) also analysed loneliness using COME-HERE data, as we do. One of their main objectives was to identify latent classes of loneliness, with the probability of class membership depending on age, gender, education and partnership. Their balanced sample from the first five COME-HERE waves includes around 3000 observations, and they identify four classes (within each of which the relationship between loneliness and a number of explanatory variables may differ). Contrary to the approach we take here, they do not introduce individual fixed effects in the latent-class analysis or address attrition, and while they analyse lockdowns, they do not consider government economic support. Last, with the shorter 11-month time period covered by the first five waves, they do not address the time profile of loneliness during the pandemic. On the contrary, our longer time period allows us to show that the combination of pandemic variables mostly explains the evolution of loneliness over the first two and a half years of COVID-19.

The remainder of the paper is organised as follows. Section 2 reviews the pre-COVID-19 literature on the determinants of loneliness. Section 3 describes the estimation sample. Our empirical approach and main findings then appear in Section 4. Last, Section 5 concludes.

2. Research on the pre-pandemic determinants of loneliness

A variety of validated single- or multi-item scales have been developed in which individuals either directly report their loneliness or it is inferred indirectly from other emotions (Manera et al., 2022). In this paper, we analyse data from the University of California Los Angeles (UCLA) Loneliness Scale (ULS), first developed by Russell et al. (1978), which assesses loneliness by focusing on its determinants and correlated constructs, such as anxiety, depression and life satisfaction (see MacEvoy et al., 2011).

An extensive pre-pandemic literature identified the main determinants of loneliness as measured by the ULS. Gender is usually found to be an important predictor (Beutel et al., 2017; Lepinteur et al., 2022), but there is no consensus on the relationship with age. Some contributions suggest a U-shape relationship, with greater loneliness among the youngest and oldest (Beutel et al., 2017; Luhmann and Hawkley, 2016; Hawkley, 2022), but others instead that loneliness rises with age (Yang and Victor, 2011). Most agree, however, that age does play a major direct role, as well as being a significant moderator of other factors (Franssen et al., 2020; Luhmann and Hawkley, 2016; Qualter et al., 2015; Shovestul et al., 2020), with the exception of Mund et al., (2020) who conclude from their meta-analysis of longitudinal analyses that loneliness is stable across adulthood.

Other socio-demographic characteristics, such as relationship status and living arrangements, are also important. Prior to COVID-19, those living alone or without a partner consistently experienced greater loneliness than those in a relationship or in a couple living together (Beutel et al., 2017; Hutten et al., 2022; Pinquart, 2003; Smith and Victor, 2019; Sundström et al., 2009). A significant role was also found for having children, with the latter being an important protective factor, especially for older couples (Valora Long and Martin, 2000).

Loneliness is negatively correlated with socio-economic status, income, and education, and is lower for the employed (Hutten et al., 2022; Menec et al., 2019). The effect of income and education is mostly mediated by work and social opportunities, which in turn affect the extent and quality of social interactions (Hawkley et al., 2005; Hawkley et al., 2008). In particular, the frequency of social interactions and the quality of social relationships are important elements, with fewer contacts with family and friends being associated with more loneliness (Holt-Lunstad, 2021; Luhmann and Hawkley, 2016). Group membership, diverse social networks, and positive social and marital relationships protect against loneliness by providing stability, friendship, feelings of being connected and supported, as well as a sense of belonging (Hawkley et al., 2008).

Last, the place of residence (urban versus rural) and population density are contextual factors that are associated with loneliness. These can directly affect the frequency and proximity of social contact, although it is not uncommon to find that individuals in densely-populated urban areas are lonelier than those in rural and/or low population-density areas (Cacioppo and Cacioppo, 2018; Shovestul et al., 2020). While urban living likely provides more opportunities to meet others, the quality of social relationships (rather than only their quantity) is thought to play a key role (Hawkley et al., 2008; Pinquart and Sörensen, 2003). Arin et al. (2022) find that lockdowns had a larger effect on loneliness in rural than in urban areas at the very beginning of the pandemic in four European countries.

3. Data and estimation sample

The data come from the first ten waves of the COME-HERE (COVID-19, MEntal HEalth, REsilience and SElf-regulation) longitudinal survey designed by the University of Luxembourg. COME-HERE is an ongoing panel study that started in April 2020. The data are collected in collaboration with Qualtrics to produce a sample of adults (aged 18 or over) from five European countries: France, Germany, Italy, Spain and Sweden. The first survey wave was collected in April 2020, and the sample in each country was nationally representative with respect to age, gender and region of residence. The same respondents were then contacted again in nine subsequent survey waves, collected approximately every three months, with the last wave that we use for our empirical analysis taking place in late November 2022. The COME-HERE panel is ongoing, but the key policy variables of lockdown intensity and government economic support that we will introduce in our regressions as correlates of loneliness have not been updated since the end of 2022.

The high frequency of the data collection (quarterly as opposed to the typical annual frequency) allows for the analysis of rapid changes in health, well-being, and pandemic policy that are not normally possible in panel surveys. The initial sample in April 2020 included more than 8000 participants, and 1472 individuals responded to all 10 survey waves. Younger, less-educated, poorer, and male respondents were more likely to leave the sample. We use this information to adjust our analysis for attrition via Inverse Probability Weighting (IPW). We show throughout the rest of the paper that accounting for attrition does not alter our conclusions. An additional refresher sample of roughly 3000 respondents was introduced in November 2021 (Wave 7) to compensate for the attrition in the original sample, and has been reinterviewed ever since.

The survey contains information on many different aspects of respondents' lives, at both the individual and household levels, with a special focus on mental health and living conditions during the pandemic, as well as standard socio-demographic characteristics. COME-HERE is unique due to its harmonised cross-country questionnaires and frequent sampling. This allows us to first investigate the dynamics of loneliness, and to relate these to the substantial changes in public policy and the intensity of the pandemic itself that took place over the data-collection period.

Loneliness in each wave is measured using the eight-item UCLA Loneliness Scale (ULS-8) developed by Hays and DiMatteo (1987), with each item answered on a four-point scale. The total score ranges from 8 to 32 points, with higher scores corresponding to more loneliness. This scale has been consistently validated across studies, performing better in terms of reliability and validity than the other well-known short-version, ULS-4 (Wilson et al., 1992). Cronbach's α (with 0.7 usually being considered as an acceptable value for internal consistency and 0.9 as the maximum expected value) for the ULS-8 was higher than for the ULS-4 (0.84 vs 0.63) as well as the correlation with the ULS-20 original version (0.91 vs 0.88). Appendix Table A1 lists the eight ULS-8 questions.

There is also information on changes (either an increase, a decrease, or no change with respect to the previous wave) in the frequency of remote and face-to-face contacts with seven different groups: close relatives living in the same household, close relatives living 'elsewhere', other relatives, close friends, acquaintances, co-workers/fellow students, and housemates. We construct two summary variables for reduced social interactions, one for face-to-face and the other for remote contacts, as the number of groups out of seven for which the respondent says that social contacts have become less frequent.

Our sample consists of individuals with non-missing information on loneliness and the control variables. This produces an estimation sample of 52,987 observations on 11,059 respondents. Half of the sample observations come from women, 70 % from respondents aged 40+, and 42 % from those with tertiary education. Around 60 % of the observations come from respondents who live with a partner, with the same figure applying to employment and living in an urban area. 30 % of observations come from respondents living with children. The average number of groups (out of seven) for which respondents reported less-frequent face-to-face interactions is 1.71, with an analogous figure of 0.91 for remote interactions.[1]

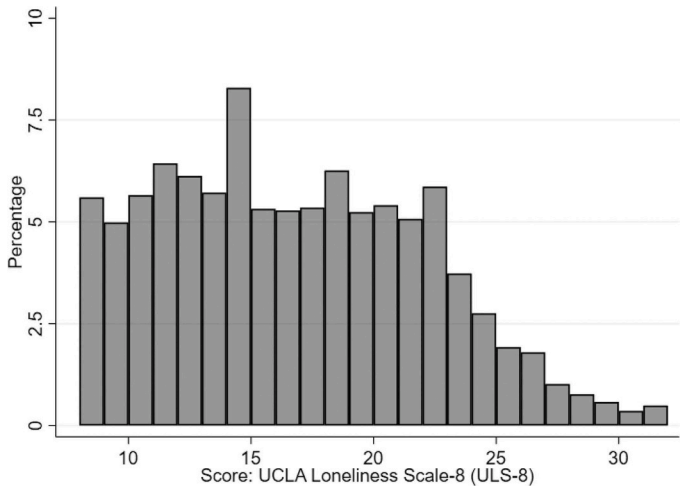


Fig. 1. Histogram of the ULS-8 Score, Notes: This graph plots the distribution of the ULS-8 loneliness score in the estimation sample from the COME-HERE survey data. The mean value is 16.3, and the standard deviation is 5.35.

Fig. 1 displays the distribution of ULS-8 scores in the estimation sample, and Table 1 lists the descriptive statistics for all of the variables of interest. A visual inspection of the distribution of loneliness scores suggests right-skewness, which is confirmed by the Jarque-Bera and Shapiro-Wilk tests. The mean score on the 8–32 loneliness scale is 16.30, with a mode of 14 and a median of 16. Appendix Figure A1 plots the loneliness score in three different periods (April 2020, June 2021 and November 2022). There is a shift in the distributions to the left over-time, suggesting that loneliness decreased after April 2020. In the following section, we will report loneliness trends, and investigate both the individual correlates of loneliness and how the evolution of loneliness over time is related to both the spread of the pandemic and the different policies that governments introduced to tackle it.

4. Empirical analysis

4.1. Graphical evidence: loneliness trends during the pandemic

We begin by plotting the average ULS-8 score over the course of the pandemic in Fig. 2. The separate loneliness scores over time by country appear in Appendix Figure A2. Loneliness peaked in our sample in April 2020 at a value of 16.75 and then dropped by almost one point just two months later (a fall of approximately 0.2 standard deviations: see Table 1). Loneliness subsequently rose gradually and then stabilised from 2021 onwards at a level of around 16.3. Appendix Figure A3 plots the same time series adjusted for attrition using IPW: adjusting for attrition produces average loneliness scores that are systematically higher (so that it was the lonelier who dropped out), but the pattern of the change in loneliness over time remains the same as that in Fig. 2.

Fig. 2 refers to the whole sample. The time trends for various demographic strata are plotted in Appendix Figures A4 and A5. The trends

[1] Given that some of our regression models include individual fixed effects, it could be argued that our sample be restricted to individuals who participated in COME-HERE at least twice. Applying this criterion excludes 1530 respondents, thereby reducing our sample size from 52,987 to 51,457 observations. Our pooled OLS regression results are unchanged in this smaller sample (results available upon request).

Table 1
Descriptive statistics – estimation sample.

	Mean	SD	Min	Max
UCLA Loneliness Scale−8 (ULS−8)	16.30	5.35	8	32
OxCGRT Measures:				
Stringency Index	46.89	10.46	26.85	75.19
Economic Support Index	57.44	29.22	0	100
Average Daily Deaths (4 weeks average)	134.93	96.86	5.40	370.43
Pre-determined Characteristics (measured in April 20020):				
Female	0.50		0	1
Age (18−39)	0.30		0	1
Age (40−64)	0.45		0	1
Age (65+)	0.25		0	1
Primary Education	0.19		0	1
Secondary Education	0.39		0	1
Tertiary Education	0.42		0	1
Time-varying characteristics:				
Living with Children	0.30		0	1
Living with a Partner	0.60		0	1
Log Equivalent Household Income (in PPP)	7.24	0.68	4.17	9.42
Employed	0.58		0	1
Living in an Urban Area	0.59		0	1
Social interactions:				
Decrease in Face-to-Face Social Interactions	1.71	2.29	0	7
Decrease in Remote Social Interactions	0.91	1.86	0	7
Observations	52,987			
Individuals	11,059			

Notes: This table presents the estimation-sample means, standard deviations, minima, and maxima for all the variables used in the empirical analysis. There are 52,987 observations on 11,059 COME-HERE respondents who appeared in at least one of the 10 survey waves.

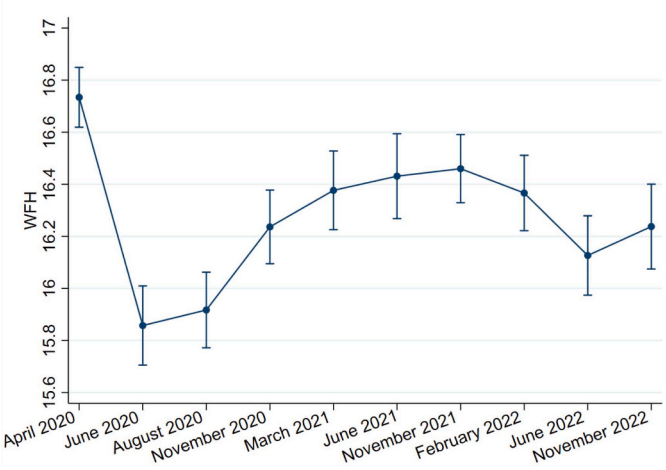


Fig. 2. The Trend in Loneliness During the Covid-19 Pandemic, Notes: These figures are the average ULS-8 loneliness scores over the ten waves of the COME-HERE survey. The vertical lines correspond to 95 % confidence intervals. The results refer to the estimation sample.

are strikingly similar across subgroups, although the levels are different. Some of these gaps in levels correspond to the findings in the pre-pandemic literature. For example, women and individuals not living with a partner have consistently higher scores. In Appendix Figure A5, there is no discernible difference between respondents residing in rural and urban areas.

One pertinent question is why loneliness was U-shaped in 2020 and then remained mostly stable throughout 2021 and 2022, as shown in Fig. 2. The initial peak in April 2020 coincided with the introduction of the first COVID-19 restrictions, with most European countries imposing lockdowns between March and April 2020. The severity and unexpected nature of these lockdowns, with their concomitant abrupt disruption to social interactions, mobility and working conditions, likely lie behind this first peak. The subsequent sharp decline and stabilisation could reflect changing pandemic policies over time. We will formally assess the influence of pandemic policies and the spread of the pandemic itself in the last part of this section.

4.2. The determinants of loneliness during the COVID-19 pandemic

4.2.1. Individual characteristics

The scores in Appendix Figures A4 and A5 provide useful information on the average differences between groups. They do not, however, address potential confounding (city dwellers may be younger, the employed have higher education and income, the partnered are more likely to have children, etc.). To establish the independent contribution of these various factors, we estimate the following linear regressions using Ordinary Least Squares (OLS):

$$Loneliness_{ijt} = \boldsymbol{\beta}_1 \boldsymbol{P_i} + \boldsymbol{\beta}_2 \boldsymbol{X_{it}} + \boldsymbol{\beta}_3 \boldsymbol{F_{it}} + \lambda_t + \delta_j + \epsilon_{ijt} \quad (1)$$

$$Loneliness_{ijt} = \boldsymbol{\beta}_2 \boldsymbol{X_{it}} + \boldsymbol{\beta}_3 \boldsymbol{F_{it}} + \lambda_t + \delta_j + \mu_i + \epsilon_{ijt}. \quad (2)$$

Here $Loneliness_{ijt}$ is the standardised (Mean=0, Standard Deviation=1) ULS-8 score of individual i in country j in year t. $\boldsymbol{P_i}$ is a set of pre-determined individual covariates measured in April 2020: age in January 2020 (split into the following categories: 18–39, 40–64 and 65+), gender, and level of education. The vector $\boldsymbol{X_{it}}$ captures the time-varying individual characteristics of the log of equivalised (via the square-root scale) net monthly household income expressed in PPP, dummies for living with a partner, having children in the household, employment, and living in an urban area. The vector $\boldsymbol{F_{it}}$ contains the two social-interaction measures: the two counts (one for face-to-face and one for remote) of the fall in the frequency of social interactions with seven groups: relatives living in the same household, close relatives living 'elsewhere', other relatives, close friends, acquaintances, coworkers/fellow students, and housemates. Last, λ_t and δ_j are respectively survey wave and country of residence dummies. Standard errors are clustered at the individual level.

The difference between Eqs. (1) and (2) is that the latter includes individual fixed effects μ_i in order to tackle the influence of unobserved time-invariant confounders. As such, the estimates from the fixed-effects model are likely to be more reflective of causal flows than those from Eq. (1). As the predetermined variables $\boldsymbol{P_i}$ are time-invariant, they are captured by the μ_i and do not appear in Eq. (2).

The regression results are listed in Table 2. Column (1) refers to a simplified version of Eq. (1), controlling only for the pre-determined individual characteristics. We then add the time-variant characteristics in $\boldsymbol{X_{it}}$ in column (2) and $\boldsymbol{F_{it}}$ in column (3). Last, Column (4) adds the individual fixed effects.

Women consistently report higher loneliness scores, as in our raw data in Figure A4, with a gender gap ranging from 7 to 11 percent of the standard deviation in the loneliness score. The pandemic likely hit women harder, as they were more likely to be essential workers with less flexibility in their working arrangements (Costi et al., 2023). They also took on a disproportionate share of the childcare during the pandemic. Lepinteur et al. (2022) analysed SOEP data and found that loneliness rose more for women between 2017 and 2020 than for men. Education protects against loneliness in the regression results, as opposed to the finding of no effect in Figure A5. This likely reflects the confounding effect of age, as older respondents are both less lonely (in our data) and less educated. Loneliness falls with age in all of columns (1) to (3). In column (3), respondents aged 18–39 report a loneliness score that is, on average, 23.4 % and 44.8 % of a standard deviation lower than those aged 40–64 and those aged 65 and above, respectively.

The estimated coefficients on the time-varying characteristics are mostly similar in columns (2) and (3) of Table 2 in terms of both size and

Table 2
Determinants of Loneliness – Pooled and Fixed-Effects Results.

	Loneliness Scale (std)			
	(1)	(2)	(3)	(4)
Female	0.113***	0.072***	0.083***	
	(0.009)	(0.009)	(0.009)	
Age: 40–64	−0.360***	−0.281***	−0.234***	
	(0.012)	(0.013)	(0.012)	
Age: 65 +	−0.638***	−0.500***	−0.448***	
	(0.013)	(0.016)	(0.015)	
Secondary Education	−0.078***	−0.058***	−0.044***	
	(0.013)	(0.013)	(0.012)	
Tertiary Education	−0.117***	−0.048***	−0.035***	
	(0.013)	(0.013)	(0.013)	
Living with a Partner		−0.302***	−0.279***	−0.050***
		(0.010)	(0.009)	(0.017)
Living with Children		0.069***	0.040***	−0.012
		(0.011)	(0.010)	(0.033)
Log Equivalent Household Income (in PPP)		−0.104***	−0.093***	−0.013*
		(0.005)	(0.005)	(0.007)
Employed		0.028**	−0.018	−0.054***
		(0.012)	(0.012)	(0.019)
Living in an Urban Area		0.020**	0.018**	0.027**
		(0.008)	(0.008)	(0.011)
Decrease in Face-to-Face Social Interactions			0.086***	0.035***
			(0.007)	(0.004)
Decrease in Remote Social Interactions			0.098***	0.011***
			(0.005)	(0.003)
Observations	52,987	52,987	52,987	52,987
Individuals	10,316	10,316	10,316	10,316
Adjusted R^2	0.083	0.117	0.152	-
Within R^2	-	-	-	0.013
Country and Wave FE	Yes	Yes	Yes	Yes
Individual FE	No	No	No	Yes

Notes: These are linear regression estimates. The sample here is respondents from the ten waves of the COME-HERE survey; there are 52,987 observations in each column. Standard errors in parentheses are clustered at the individual level. Time-invariant controls are dropped in the panel regression.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

statistical significance (column (3) includes the two reductions in social-interaction variables). As in our raw data in Figures A4 and A5, the partnered are less lonely, and income consistently attracts a negative estimated coefficient. Urban living is associated with greater loneliness, although the effect sizes are only small. During the pandemic, those in urban areas may have been more concerned about the increased risk of infection (due to higher population density) and so more careful to comply with restrictions, increasing their loneliness. It is also possible that the larger number of potential social relationships in urban settings does not necessarily translate into higher-quality relationships, as suggested by Hawkley et al. (2008) and Pinquart and Sörensen (2003). Employment is associated with greater loneliness in column (2), but this correlation is reversed in column (3) when we control for measures of face-to-face and remote social interactions. This is consistent with the employed suffering more from the loss of interaction with others during the pandemic period. Equally, the (positive) coefficient on children is smaller in column (3): the presence of children was associated with higher loneliness scores during COVID-19 partly because they were associated with greater drops in social interactions.

A number of these results are consistent with those in the existing literature. However, those for children and age are notably different from those in the majority of the existing research. As noted above, children no longer protected against loneliness due to their correlation with social interactions during the pandemic. Our finding of a negative age gradient could well reflect the particular nature of daily life during the pandemic. Older people may have been less affected by some everyday life disruptions, being more often retired, and may, in addition, value the quality of social interactions over the quantity. On the other hand, the interruption of education and the transition to online learning, combined with the fall in the number of social interactions, had a major impact among the youngest (Wickens et al., 2021).

The above results come from cross-section analysis and may well be confounded by unobserved individual traits. We, therefore, now turn to the fixed-effect estimates in column (4). As is often the case, the estimated panel coefficients are smaller in absolute size than those from the cross-section regressions, with some no longer being statistically significant (such as the living with children dummy). Despite this attenuation, living with a partner and having a higher income continue to be associated with less loneliness. Equally, as in the pooled model, urban living significantly increases loneliness, while employment now protects against it. The fall in social-interaction variables continues to predict greater loneliness, with the coefficient on face-to-face interactions being larger than that on remote interactions. Overall, the time-varying factors with the largest point estimates are the dummy variables for living with a partner, having a job, and changes in face-to-face interactions. Living with a partner and having a job are associated with reductions of five percent of a standard deviation, while a decrease in face-to-face interactions is associated with a rise in loneliness of 3.5 percent of a standard deviation.

These conclusions may vary across different groups of respondents. Appendix Table A2 reports the results from the re-estimation Model (2) for different gender, age and education groups. A number of conclusions continue to apply: living with a partner and having social connections are associated with lower loneliness scores for nearly everyone. However, there are some differences: the protective effect of income is found only for men and the oldest respondents, while the protective effect of employment only appears for women. Additionally, the association between face-to-face interaction and loneliness is 70 % larger for women.

4.2.2. The Role of the Pandemic and Pandemic Policies

We now explicitly introduce the role of the pandemic itself and estimate the following regressions:

$$Loneliness_{ijt} = \boldsymbol{\beta_1 P_i} + \boldsymbol{\beta_2 X_{it}} + \boldsymbol{\beta_3 F_{it}} + \beta_4 SI_{jt} + \beta_5 ESI_{jt} + \beta_6 Pandemic_{jt} + \lambda_t + \delta_j + \epsilon_{ijt} \quad (3)$$

$$Loneliness_{ijt} = \boldsymbol{\beta_2 X_{it}} + \boldsymbol{\beta_3 F_{it}} + \beta_4 SI_{jt} + \beta_5 ESI_{jt} + \beta_6 Pandemic_{jt} + \lambda_t + \delta_j + \mu_i + \epsilon_{ijt}. \quad (4)$$

These add three variables to Eqs. (1) and (2): SI_{jt}, ESI_{jt} and $Pandemic_{jt}$. These capture the trajectory of the pandemic and the strength and intensity of governmental policy responses. SI_{jt} and ESI_{jt} are respectively the values of a Stringency Index and an Economic Support Index in country j on the day t that the respondent responded to the survey. These indices were developed by the Blavatnik School of Government at the University of Oxford (Hale, 2021). Both indices are calculated from sub-indicators. The Stringency Index includes nine indicators of containment policies (school closing, workplace closing, cancellation of public events, restriction on gathering, public transport closing, stay-at-home requirements, restriction on internal movement, restriction on international travel, and public information campaigns). The Economic Support Index includes only two sub-indicators: income support and debt relief. Both indices have been re-scaled and range from 0 to 100, with higher values of the Stringency Index corresponding to more severe lockdown policies, and of the Economic Support Index to greater government transfers to attenuate the negative impacts of COVID-19 on individuals' incomes. These indices cannot be interpreted

Table 3
Pandemic Policies and Loneliness – Pooled and Fixed-Effects Results.

	Loneliness Scale (std)		
	(1)	(2)	(3)
Stringency Index	0.036*	0.032*	0.037***
	(0.019)	(0.018)	(0.010)
Economic Support Index	−0.028***	−0.029***	−0.027***
	(0.006)	(0.006)	(0.004)
Average Daily COVID−19 Deaths	0.026**	0.005	0.001
(4 weeks average)	(0.013)	(0.012)	(0.007)
Observations	52,987	52,987	52,987
Individuals	10,316	10,316	10,316
Adjusted R^2	0.083	0.153	-
Within R^2	-	-	0.015
Country and Wave FE	Yes	Yes	Yes
Controls: Pre-determined characteristics	Yes	Yes	No
Controls: Time-varying characteristics	No	Yes	Yes
Individual FE	No	No	Yes

Notes: These are linear regression estimates. The sample here is respondents from the ten waves of the COME-HERE survey; there are 52,987 observations in each column. The Stringency Index, Economic Support Index and Average Daily Deaths variables are all standardised over the estimation sample. Standard errors in parentheses are clustered at the Stringency Index*Economic Support Index*Average Daily COVID-19 Deaths level. In the panel regressions, we only retain the variables reflecting employment, relationship status, having children, place of residence, and change in social interactions.
* $p < 0.10$,
** $p < 0.05$,
*** $p < 0.01$.

as exact measures of the effectiveness of the policy interventions implemented by each government during the pandemic, but rather as synthetic measures of the intensity of those policies, allowing for cross-country and over-time comparisons (Hale, 2021). Both the SI_{jt} and ESI_{jt} variables are standardised. We also control for the evolution of the pandemic, $Pandemic_{jt}$. Following Clark and Lepinteur (2022), we use the daily number of COVID-19 deaths (averaged over the previous four weeks) to measure the evolution of the COVID-19 pandemic. We do so as, even though pandemic policies are arguably independent of loneliness and other individual characteristics, they are an endogenous response to the pandemic. The parameters β_4 and β_5 can thus be read as capturing the effects of the pandemic policies net of the spread of COVID-19 itself. Standard errors are clustered at the $SI_{jt} * ESI_{jt} * Pandemic_{jt}$ level.[2]

The results appear in Table 3 (and the full results in Appendix Table A3). In column (1), a one-standard-deviation rise in the Stringency Index is associated with greater loneliness of four percent of a standard deviation. The analogous figure for the Economic Support Index is a fall of three percent of a standard deviation. These figures remain similar in magnitude even after the introduction of potential mediating variables, such as income and the frequency of social interactions in column (2) and individual fixed effects in column (3).[3] This first underlines the orthogonality of pandemic policies to individual characteristics, supporting the argument that these public policies can be viewed as quasi-exogenous from the perspective of individuals. Second, if we assume that the control variables accurately capture all the objective mediators, the coefficients on the pandemic-policy variables then may well reflect psychological factors or processes. In this case, lockdown measures may increase loneliness independently of whether individuals do, in fact, substitute virtual for face-to-face social interactions. Similarly, greater economic support may reduce feelings of loneliness as individuals know that the government is actively intervening on their behalf. Importantly, the changes in loneliness associated with the changes in pandemic policies are comparable in magnitude with those caused by one of the most important individual factors we identified in Table 2, namely, that of reduced face-to-face interactions.

The picture is different regarding the evolution of the pandemic. In column (1), a one-standard-deviation rise in average daily COVID-19 deaths is associated with a rise in loneliness of 2.6 percent of a standard deviation. Introducing controls in column (2) drives this estimated coefficient to zero. Investigation reveals that this is due to social interactions: higher death rates lead individuals to interact less (even holding the formal restrictions from the Stringency Index constant), which in turn makes them lonelier.[4] Appendix Table A4 mirrors Appendix Table A3 but accounts for attrition using IPW. The results there confirm our main conclusions: women and the youngest are lonelier, while partnership, education, income and employment all offer protection. Pandemic policies also correlate significantly with loneliness, with somewhat larger coefficients for the intensity of the pandemic itself.

The results in Table 3 refer to the whole sample; however, the estimates attracted by both policies and COVID-19 deaths may differ across demographic groups. Appendix Table A5 presents heterogeneity analyses by waves (Waves 1–5 versus 6–10), gender, age and education. The only significant differences between these sub-samples refer to the coefficient of economic support in earlier and later waves and between age groups.

Do these pandemic-spread and pandemic-policy variables help to explain the loneliness time profile in Fig. 2? The estimated wave coefficients from three regression specifications are plotted in Fig. 3 and listed in Appendix Table A6. These coefficients are all relative to April 2020. The first specification only includes wave dummies and is thus equivalent to Fig. 2, expressed as deviations from April 2020. The second regression includes the pre-determined characteristics and country dummies: these somewhat flatten the time trend. Introducing the pandemic-spread and pandemic-policy variables halves the size of most estimates (in particular at the beginning and the end of the sample period). The pattern of loneliness over time, therefore, largely reflects the changing nature of the government's response to the COVID-19 pandemic.

5. Conclusion

Our analysis of 10 waves of panel data from April 2020 to November 2022 in five European countries has shown that many of the individual characteristics that were found to be correlated with loneliness in pre-pandemic research continued to be so in COVID-19 times. Women were lonelier, while income, education, employment, and partnership continued to act as a buffer against loneliness. On the other hand, contrary to pre-pandemic findings, younger individuals were more likely to feel lonely during the pandemic. This greater loneliness of the young is partly explained by changes in the quantity of social interactions. Whether this pattern will continue remains an open question and a promising avenue for future research. While the return to normal interactions may have helped reduce loneliness, the changes induced by the pandemic in working-from-home arrangements may conversely

[2] In Equations (1) and (2), we clustered standard errors at the individual level due to potential correlation in the error terms within individuals. Here, individuals with the same values of the Stringency Index, the Economic Support Index, and COVID-19 deaths are equally treated: this is why we introduce clustering at that level (as suggested by Cameron and Miller, 2015).

[3] While the figures of 3 or 4 % of a standard deviation look small, it is worth underlining that these are found in panel regressions (where the amount of variation conditional on individual fixed effects is much lower). When we decompose the variance of loneliness into its between and within components, we find that the former is twice as large as the latter. In particular, expressing the estimated policy coefficients in column (3) of Table 3 as a percentage of the within standard deviation produces larger figures of 5.5 and 8 % of a standard deviation.

[4] Both remote and face-to-face interactions play a role here, but it is the decline in the latter that is the most important.

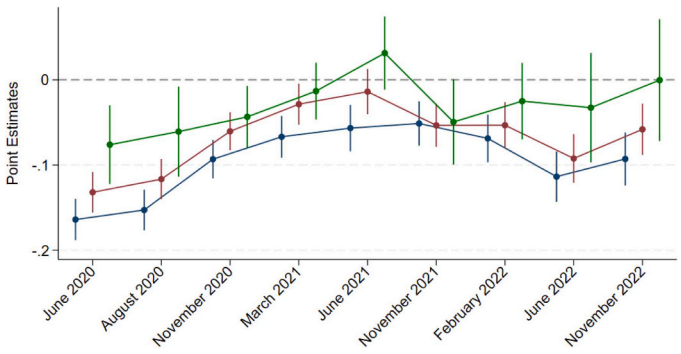


Fig. 3. Explaining Loneliness over Time by the Pandemic Variables, Notes: These figures are the point estimates from the standardised loneliness regressions for the nine wave dummies using COME-HERE survey data. The omitted category is the first wave in April 2020. These estimates are obtained from three separate linear regressions with i) no other controls, ii) pre-determined characteristics and country dummies, and iii) pre-determined characteristics, country dummies, and the pandemic variables. The results here refer to the estimation sample.

produce greater isolation.

Loneliness changed substantially over the pandemic, following a U-shape in 2020 and then stabilising between 2021 and 2022. Pandemic policies help explain this pattern, with lockdown policies increasing loneliness but government economic support reducing it. The negative consequences of lockdowns on loneliness, with their potentially long-run health implications, were then largely offset by the programs of economic support that were provided over the pandemic. This novel result suggests that public policies can have material effects on loneliness. Future research should focus on identifying the types of governmental support, in non-pandemic situations, that are the most effective in mitigating loneliness.

CRediT authorship contribution statement

Anthony Lepinteur: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Andrew Clark:** Writing – review & editing, Writing – original draft, Conceptualization. **Claus Vogel:** Conceptualization. **Nicholas Rohde:** Writing – review & editing. **Conchita D'Ambrosio:** Writing – review & editing, Writing – original draft, Formal analysis. **Alessio Rebechi:** Writing – review & editing, Writing – original draft, Conceptualization, Methodology, Formal analysis.

Funding

Financial support from the French Agence Nationale de la Recherche (ANR-21-CO16-0002), André Losch Fondation, Art2Cure, Cargolux, CINVEN Fondation and COVID-19 Foundation, under the aegis of the Fondation de Luxembourg, and the Fonds National de la Recherche Luxembourg (Grant 14840950 – COME-HERE) is gratefully acknowledged. Andrew Clark acknowledges financial support from the EUR grant ANR-17-EURE-0001.

Declaration of Competing Interest

None of the authors have any competing interest to disclose.

Data availability

The data that has been used is confidential.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ehb.2024.101427.

References

Åkerlind, I., Hörnquist, J.O., 1992. Loneliness and alcohol abuse: a review of evidences of an interplay. Soc. Sci. Med. 34, 405–414.
Aknin, L.B., Andretti, B., Goldszmidt, R., Helliwell, J.F., Petherick, A., De Neve, J.-E., Dunn, E.W., Fancourt, D., Goldberg, E., et al., 2022a. Policy stringency and mental health during the COVID-19 pandemic: a longitudinal analysis of data from 15 countries. Lancet Public Health 7, e417–e426.
Aknin, L.B., De Neve, J.-E., Dunn, E.W., Fancourt, D., Goldberg, E., Helliwell, J.F., Jones, S.P., Karam, E., Layard, R., Lyubomirsky, S., et al., 2022b. Mental health during the first year of the COVID-19 pandemic: A review and recommendations for moving forward. Perspect. Psychol. Sci. 17, 915–936.
Arin, K.P., Lacomba, J.A., Lagos, F., Moro-Egido, A.I., Thum, M., 2022. Exploring the hidden impact of the COVID-19 pandemic: the role of urbanization. Econ. Hum. Biol. 46, 101119.
Baarck, J., d'Hombres, B., Tintori, G., 2022. Loneliness in Europe before and during the COVID-19 pandemic. Health Policy *126*, 1124–1129.
Babin, J.J., Foray, M., Hussey, A., 2021. Shelter-in-place orders, loneliness, and collaborative behavior. Econ. Hum. Biol. *43*, 101056.
Beutel, M.E., Klein, E.M., Brähler, E., Reiner, I., Jünger, C., Michal, M., Wiltink, J., Wild, P.S., Münzel, T., Lackner, K.J., Tibubos, A.N., 2017. Loneliness in the general population: prevalence, determinants and relations to mental health. BMC Psychiatry 17, 1–7.
Brodeur, A., Clark, A.E., Flèche, S., Powdthavee, N., 2021. COVID-19, lockdowns and well-being: Evidence from Google Trends. J. Public Econ. 193, 104346.
Bu, F., Steptoe, A., Fancourt, D., 2020b. Who is lonely in lockdown? Cross-cohort analyses of predictors of loneliness before and during the COVID-19 pandemic. Public Health 186, 31–34.
Bu, F., Steptoe, A., Fancourt, D., 2020a. Loneliness during a strict lockdown: Trajectories and predictors during the COVID-19 pandemic in 38,217 United Kingdom adults. Soc. Sci. Med. 265, 113521.
Bu, F., Steptoe, A., Fancourt, D., 2023. Longitudinal changes in home confinement and mental health implications: a 17-month follow-up study in England during the COVID-19 pandemic. Psychol. Med. *53*, 3943–3951.
Buecker, S., Horstmann, K.T., 2022. Loneliness and social isolation during the COVID-19 pandemic. Eur. Psychol. 26, 272–284.
Burlina, C., & Rodríguez-Pose, A. (2023). Alone and lonely. The economic cost of solitude for regions in Europe. *Environment and Planning A: Economy and Space* , 0308518X2311692.
Cacioppo, S., Bangee, M., Balogh, S., Cardenas-Iniguez, C., Qualter, P., Cacioppo, J.T., 2016. Loneliness and implicit attention to social threat: a high-performance electrical neuroimaging study. Cogn. Neurosci. 7, 138–159.
Cacioppo, J.T., Cacioppo, S., 2018. The growing problem of loneliness. Lancet 391, 426.
Cacioppo, J.T., Hawkley, L.C., Thisted, R.A., 2010. Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study. Psychol. Aging 25, 453.
Cacioppo, J.T. & Patrick, W. (2008). Loneliness: Human nature and the need for social connection. WW Norton & Company.
Cameron, A.C., Miller, D.L., 2015. A practitioner's guide to cluster-robust inference. J. Hum. Resour. 50 (2), 317–372.
Cameron-Blake, E., Annan, H., Marro, L., Michaud, D., Sawatzky, J., Tatlow, H., 2023. Variation in the stringency of COVID-19 public health measures on self-reported health, stress, and overall wellbeing in Canada. Sci. Rep. 13, 13094.
Caro, J.C., Clark, A.E., D'Ambrosio, C., Vögele, C., 2022. The impact of covid-19 lockdown stringency on loneliness in five European countries. *Social.* Sci. Med. 314, 115492.
Case, A., Deaton, A., 2020. Deaths of Despair and the Future of Capitalism. Princeton University Press, Princeton.
Clark, A.E., Lepinteur, A., 2022. Pandemic policy and life satisfaction in Europe. Rev. Income Wealth 68, 393–408.
Costi, C., Clark, A.E., Lepinteur, A., & D'Ambrosio, C. (2023). Healthcare Workers and Life Satisfaction during the Pandemic. IZA Discussion Paper No. 16680.
Ernst, M., Niederer, D., Werner, A.M., Czaja, S.J., Mikton, C., Ong, A.D., Beutel, M.E., 2022. Loneliness before and during the COVID-19 pandemic: A systematic review with meta-analysis. Am. Psychol. 77, 660–677.
Fancourt, D., Steptoe, A., Bu, F., 2021. Trajectories of anxiety and depressive symptoms during enforced isolation due to COVID-19 in England: A longitudinal observational study. Lancet Psychiatry 8, 141–149.
Franssen, T., Stijnen, M., Hamers, F., Schneider, F., 2020. Age differences in demographic, social and health-related factors associated with loneliness across the adult life span (19–65 years): a cross-sectional study in the Netherlands. BMC Public Health 20, 1–12.
Groarke, J.M., Berry, E., Graham-Wisener, L., McKenna-Plumley, P.E., McGlinchey, E., Armour, C., 2020. Loneliness in the UK during the COVID-19 pandemic: Cross-sectional results from the COVID-19 Psychological Wellbeing Study. PloS One *15*, e0239698.
Hale, T., Angrist, N., Goldszmidt, R., Kira, B., Petherick, A., Phillips, T., Webster, S., Cameron-Blake, E., Hallas, L., Majumdar, S., et al., 2021. A global panel database of

pandemic policies (Oxford COVID-19 government response tracker). Nat. Hum. Behav. 5, 529–538.
Hamermesh, D.S., 2020. Life satisfaction, loneliness and togetherness, with an application to Covid-19 lock-downs. Rev. Econ. Househ. 18, 983–1000.
Hawkley, L.C., 2022. Loneliness and health. Nat. Rev. Dis. Prim. 8, 22 (Article).
Hawkley, L.C., Browne, M.W., Cacioppo, J.T., 2005. How can I connect with thee? Let me count the ways. Psychol. Sci. 16, 798–804.
Hawkley, L.C., Buecker, S., Kaiser, T., Luhmann, M., 2022. Loneliness from young adulthood to old age: Explaining age differences in loneliness. Int. J. Behav. Dev. 46, 39–49.
Hawkley, L.C., Cacioppo, J.T., 2003. Loneliness and pathways to disease. Brain Behav. Immun. 17 (1), 98–105.
Hawkley, L.C., Cacioppo, J.T., 2010. Loneliness matters: a theoretical and empirical review of consequences and mechanisms. Ann. Behav. Med. 40, 218–227.
Hawkley, L.C., Hughes, M.E., Waite, L.J., Masi, C.M., Thisted, R.A., Cacioppo, J.T., 2008. From social structural factors to perceptions of relationship quality and loneliness: the Chicago health, aging, and social relations study. J Gerontol. Ser. B 63, S375–S384.
Hays, R.D., DiMatteo, M.R., 1987. A Short Form Measure of Loneliness. J. Personal. Assess. 51, 69–81.
Holt-Lunstad, J., 2021. Loneliness and Social Isolation as Risk Factors: The Power of Social Connection in Prevention. Am. J. Lifestyle Med. 15, 567–573.
Holt-Lunstad, J., Smith, T.B., Baker, M., Harris, T., Stephenson, D., 2015. Loneliness and social isolation as risk factors for mortality: a meta-analytic review. Perspect. Psychol. Sci. 10, 227–237.
Hu, Y., Gutman, L.M., 2021. The trajectory of loneliness in UK young adults during the summer to winter months of COVID-19. Psychiatry Res. 303, 114064.
Hutten, E., Jongen, E.M.M., Hajema, K., Ruiter, R.A.C., Hamers, F., Bos, A.E.R., 2022. Risk factors of loneliness across the life span. J. Soc. Pers. Relatsh. 39, 1482–1507.
Hysing, M., Petrie, K.J., Bøe, T., Lønning, K.J., Sivertsen, B., 2020. Only the lonely: A study of loneliness among university students in Norway. Clin. Psychol. Eur. 2, e2781.
Jabakhanji, S.B., Lepinteur, A., Menta, G., Piper, A., Vögele, C., 2022. Sleep quality and the evolution of the COVID-19 pandemic in five European countries. PLoS One 17, e0278971.
Jaffe, S., 2023. US Surgeon General: loneliness is a public health crisis. Lancet 401, 1560.
Killgore, W.D., Cloonan, S.A., Taylor, E.C., Miller, M.A., Dailey, N.S., 2020. Three months of loneliness during the COVID-19 lockdown. Psychiatry Res. 293, 113392.
Lampraki, C., Hoffman, A., Roquet, A., Jopp, D.S., 2022. Loneliness during COVID-19: Development and influencing factors. PLoS One 17, e0265900.
Langenkamp, A., 2021. Lonely Hearts, Empty Booths? The relationship between loneliness, reported voting behavior and voting as civic duty. Soc. Sci. Q. 102, 1239–1254.
Lauder, W., Mummery, K., Jones, M., Caperchione, C., 2006. A comparison of health behaviours in lonely and non-lonely populations. Psychol. Health Med. 11, 233–245.
Lee, C.M., Cadigan, J.M., Rhew, I.C., 2020. Increases in loneliness among young adults during the COVID-19 pandemic and association with increases in mental health problems. J. Adolesc. Health 67, 714–717.
Lee, Y., Lui, L.M., Chen-Li, D., Liao, Y., Mansur, R.B., Brietzke, E., McIntyre, R.S., 2021. Government response moderates the mental health impact of COVID-19: a systematic review and meta-analysis of depression outcomes across countries. J. Affect. Disord. 290, 364–377.
Lepinteur, A., Clark, A.E., Ferrer-i-Carbonell, A., Piper, A., Schröder, C., D'Ambrosio, C., 2022. Gender, loneliness and happiness during COVID-19. J. Behav. Exp. Econ. 101, 101952.
Lorenzo, A., Kthupi, A., Liu, W., Hamza, C., Todorova, A.A., Kuburi, S., Gagnon, F., 2023. The mental health impact of the COVID-19 pandemic on post-secondary students: a longitudinal study. Psychiatry Res. 327, 115401.
Losada-Baltar, A., Martínez-Huertas, J.Á., Jiménez-Gonzalo, L., Pedroso-Chaparro, M.D. S., Gallego-Alberto, L., Fernandes-Pires, J., Márquez-González, M., 2022. Longitudinal correlates of loneliness and psychological distress during the lockdown situation due to COVID-19. Effects of age and self-perceptions of aging. J. Gerontol.: Ser. B 77, 652–660.
Luchetti, M., Lee, J.H., Aschwanden, D., Sesker, A., Strickhouser, J.E., Terracciano, A., Sutin, A.R., 2020. The trajectory of loneliness in response to COVID-19. Am. Psychol. 75, 897–908.
Luhmann, M., Hawkley, L.C., 2016. Age differences in loneliness from late adolescence to oldest old age. Dev. Psychol. 52, 943–959.
MacEvoy, J.P., Weeks, M.S., Asher, S.R., 2011. Loneliness. In: Bradford, B.B., Prinstein, M.J. (Eds.), Encyclopedia of Adolescence, *Vol. 2*. Elsevier/Academic Press, Boston MA, pp. 178–187.
Manera, K.E., Smith, B.J., Owen, K.B., Phongsavan, P., Lim, M.H., 2022. Psychometric assessment of scales for measuring loneliness and social isolation: an analysis of the household, income and labour dynamics in Australia (HILDA) survey. Health Qual. Life Outcomes 20, 1–11.
Menec, V.H., Newall, N.E., Mackenzie, C.S., Shooshtari, S., Nowicki, S., 2019. Examining individual and geographic factors associated with social isolation and loneliness using Canadian Longitudinal Study on Aging (CLSA) data. PLoS One 14, e0211143.
Mund, M., Freuding, M.M., Möbius, K., Horn, N., Neyer, F.J., 2020. The stability and change of loneliness across the life span: A meta-analysis of longitudinal studies. Personal. Soc. Psychol. Rev. *24*, 24–52.
Okruszek, Ł., Aniszewska-Stańczuk, A., Piejka, A., Wiśniewska, M., Żurek, K., 2020. Safe but lonely? Loneliness, anxiety, and depression symptoms and COVID-19. Front. Psychol. 11, 579181.
Pinquart, M., 2003. Loneliness in married, widowed, divorced, and never-married older adults. J. Soc. Pers. Relatsh. 20, 31–53.
Pinquart, M., Sörensen, S., 2003. Risk Factors for Loneliness in Adulthood and Old Age - A Meta-analysis. Nova Science Publishers.
Prati, G., Mancini, A., 2021. The psychological impact of COVID-19 pandemic lockdowns: A review and meta-analysis of longitudinal studies and natural experiments. Psychol. Med. 51, 201–211.
Qualter, P., Vanhalst, J., Harris, R., Van Roekel, E., Lodder, G., Bangee, M., Maes, M., Verhagen, M., 2015. Loneliness across the life span. Perspect. Psychol. Sci. 10, 250–264.
Rumas, R., Shamblaw, A.L., Jagtap, S., Best, M.W., 2021. Predictors and consequences of loneliness during the COVID-19 pandemic. Psychiatry Res. 300, 113934.
Russell, D., Peplau, L.A., Ferguson, M.L., 1978. Developing a measure of loneliness. J. Personal. Assess. 42, 290–294.
Salanti, G., Peter, N., Tonia, T., Holloway, A., White, I.R., Darwish, L., Crowd Investigators, M.H.C.O.V.I.D., 2022. The impact of the COVID-19 pandemic and associated control measures on the mental health of the general population: a systematic review and dose–response meta-analysis. Ann. Intern. Med. *175*, 1560–1571.
Shovestul, B., Han, J., Germine, L., Dodell-Feder, D., 2020. Risk factors for loneliness: The high relative importance of age versus other factors. PLoS One 15, e0229087.
Smith, K., Victor, C., 2019. Typologies of loneliness, living alone and social isolation, and their associations with physical and mental health. Ageing Soc. 39, 1709–1730.
Steptoe, A., Shankar, A., Demakakos, P., Wardle, J., 2013. Social isolation, loneliness, and all-cause mortality in older men and women. Proc. Natl. Acad. Sci. USA 110, 5797–5801.
Sundström, G., Fransson, E., Malmberg, B., Davey, A., 2009. Loneliness among older Europeans. Eur. J. Ageing 6, 267–275.
Valora Long, M., Martin, P., 2000. Personality, relationship closeness, and loneliness of oldest old adults and their children. J. Gerontol. Ser. B 55, P311–P319.
Venero, C., Grippo, A.J., Lai, J.C., 2022. Endocrinology of loneliness and social isolation. Front. Behav. Neurosci. 16, 978386.
Voss, G., Paiva, A.F., Delerue Matos, A., 2021. A study of the association between the stringency of covid-19 government measures and depression in older adults across Europe and Israel. Int. J. Environ. Res. Public Health 18, 8017.
Wickens, C.M., McDonald, A.J., Elton-Marshall, T., Wells, S., Nigatu, Y.T., Jankowicz, D., Hamilton, H.A., 2021. Loneliness in the COVID-19 pandemic: Associations with age, gender and their interaction. J. Psychiatr. Res. 136, 103–108.
Wilson, D., Cutts, J., Lees, I., Mapungwana, S., Maunganidze, L., 1992. Psychometric properties of the revised UCLA Loneliness Scale and two short-form measures of loneliness in Zimbabwe. J. Personal. Assess. 59 (1), 72–81.
Yang, K., Victor, C., 2011. Age and loneliness in 25 European nations. Ageing Soc. 31, 1368–1388.