



The effects of COVID-19-era unemployment and business closures upon the physical and mental health of older Europeans: Mediation through financial circumstances and social activity

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ARTICLE INFO

Keywords:

Health
COVID-19
Lost work
Social activity
Financial circumstances
Aging

ABSTRACT

COVID-19-era lockdown policies resulted in many older persons entering unemployment, facing financial difficulties and social restrictions, and experiencing declining health. Employing the Survey of Health, Ageing and Retirement in Europe's first COVID-19 module (summer 2020) (N = 11,231) and the Karlson-Holm-Breen method for decomposition of effects within non-linear probability models (logistic regression modelling), we examined associations of pandemic-era lost work with older Europeans' (50–80 years of age) self-assessed health, depressive symptoms, and anxiety symptoms, and mediation through households' difficulties making ends meet, loneliness, and curtailed face-to-face contact with non-relatives. We find that lost work was associated with detriments in all three health outcomes. Total mediation was 23% for worsened self-assessed health, 42% for depressive symptoms, and 23% for anxiety symptoms. In all cases, combined mediation through the two social activity variables was approximately twice the magnitude of mediation through household financial difficulties. This evidence highlights the extent of employment's value for friendship formation and sustenance, and social activity, during the pandemic-era social restrictions. This might be accentuated among older persons because of the social constrictions often concomitant to advancing age. These results emphasize that the social correlates of lost employment, beyond the financial concomitants, should receive thorough research and policy attention, perhaps especially for older adults during public health crises.

1. Introduction

The COVID-19 pandemic is a worldwide medical dilemma declared to be a Public Health Emergency of International Concern in January 2020 by the World Health Organization (WHO) (Metelmann & Busemann, 2020). In concert with WHO propositions, many national governments enacted lockdown proceedings (Dubey & Tripathi, 2020) that constrained working from one's regular site for many employees within putative non-essential occupations (examples of essential occupations include those entailing food provision, law enforcement, and health-care) (Russo et al., 2021). While helping to contain COVID-19 infections (Long et al., 2021; Russo et al., 2021), these proceedings deeply affected national economies, including raising unemployment rates, especially within occupations not easily adjusted for remote work (Béland et al.,

2020). Economies and jobs were further negatively affected by diminished spending on more superfluous items such as clothing, restaurant meals, and vacations (Bank of England, 2021).

Pandemic-era lost work created financial stressors (Jiang et al., 2022). Moreover, self-imposed social restrictions and government-instituted social distancing measures produced social stressors (Slavich, 2022; Zajacova et al., 2020). The two intersect since employment is an important circumstance for the development and maintenance of friendships (McBain & Parkinson, 2017; Rumens, 2017). Both financial (Jiang et al., 2022) and social (Werner et al., 2021) stress during the pandemic harmed health and well-being. More generally, unemployment damages health (Böckerman & Ilmakunnas, 2009; Kroymdas et al., 2021).

This highlights how beyond the more purposely intended economic

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<https://doi.org/10.1016/j.ssmph.2023.101419>

Received 14 February 2023; Received in revised form 5 April 2023; Accepted 29 April 2023

Available online 18 May 2023

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functions of paid work, employment serves less purposely intended psychological and social functions (see below) (Jahoda, 1981; Nordenmark & Strandh, 1999; Paul & Batinic, 2010). The latter were likely of accentuated importance during the social restrictions and psychological turmoil of the pandemic. Moreover, loss of employment depletes diverse resources valuable for coping with unemployment-linked stressors, and stressful conditions more broadly (McKee-Ryan et al., 2005; Warr, 1987), including those during the pandemic.

There are many important reasons to study these topics among older individuals. Throughout the world, including Europe, populations are aging (Kaplan & Inguanzo, 2017). Furthermore, contemporary Europeans are remaining employed until more advanced ages than in past times (Eurofound, 2022). In fact, high later life employment rates are a central policy goal in many developed countries, including in Europe (Zaidi et al., 2013). However, declining health is a common precursor to retirement (Oksanen & Virtanen, 2012). Relatedly, considerably because of more frequent underlying health concerns, older persons are more susceptible to death or severe morbidity from COVID-19 infection (Wolf et al., 2020). The concomitant anxiety symptoms (Wolf et al., 2020) likely compound other COVID-19-era stressors. Moreover, older workers are more commonly employed within occupations not easily translated to remote work, contributing to their risk of pandemic-era unemployment (Li & Mutchler, 2020).

Additionally, older adults confront challenges in building and maintaining social networks. Because of close contacts' deaths, residential changes, and retirement, older adults commonly lose social connections (Rook, 2009). Furthermore, entry into widowhood and/or retirement (Cornwell et al., 2008), functional and activity limitations (Lawton & Nahemow, 1973), and fewer social ties serving as "bridges" to new potential friends (Rook, 2009) hinder the acquisition of new social connections. These factors contribute to the social isolation more common among older adults (Toepoel, 2013). Social connections providing support and physically- and cognitively-stimulating interactions are especially beneficial for the health and well-being of older adults undergoing waning health (Cornwell et al., 2008; Rook, 2009). Notably, the aging process often involves the shedding of weaker social ties (e.g., with colleagues) in favor of establishing deeper connections with closer social ties (see the socioemotional selectivity theory of aging, Löckenhoff & Carstensen, 2004). This deprives many older persons of benefits including breadth of received information, advice, and support, affirmation of personal value, opportunities for participation in diverse social groups and activities, and stocks of weaker social connections that can be strengthened should previous close ties be lost (Farrell et al., 2022).

Using an older European sample, we ask 1) how was early COVID-19-era lost work associated with general health, depressive symptoms, and anxiety symptoms? and 2) to what extents did financial difficulties and restrained social lives mediate these relationships? We thereby contribute to the literature in six ways: 1) We study these processes using high-quality data covering older individuals in Europe. 2) Our findings specific to the COVID-19 era hold implications for understanding and addressing future widescale epidemics. 3) Mediation through restrained social lives is particularly important among older individuals during the pandemic as both aging and the pandemic-era restrictions have curtailing effects upon social connectedness; each might thus magnify the other's impact. 4) We holistically study the health correlates of these mediation processes through examining self-assessed overall health, depressive symptoms, and anxiety symptoms. 5) Through simultaneously examining mediation through economic difficulties and restrained social activity, our study allows an assessment of their relative importance. 6) We thus highlight the social functions, among numerous other functions, of employment.

1.1. Background on COVID-19-era challenges

The pandemic caused widespread employment and economic

challenges. Official statistics show that between 2019 and 2020 within all 27 nations of the European Union (EU), total proportion employed decreased by 1.4% (Eurostat, 2022), and unemployment increased by 0.3% (Ando et al., 2022). Furthermore, a March 2020 survey based on the G7 nations (which encompass the EU) included 31% of households stating that the pandemic had thus far negatively affected their incomes (Statista, 2022).

The pandemic also caused social and health challenges. A study of 101 countries, encompassing many European nations, included 21% of respondents categorized as isolated based on their regular social activity, and 13% of interviewees having undergone considerable rises in isolation due to the pandemic (O'Sullivan et al., 2021). Studies have shown how the pandemic negatively affected general health (Felix-Cardoso et al., 2020), and increased depressive (Paccagnella & Pongiglione, 2022) and anxiety (Hajek et al., 2022) symptoms.

This scholarship motivates our analyses of the extents to which financial and social stressors mediated the associations of pandemic-era lost work with general health, depressive symptoms, and anxiety symptoms. We thus integrate within a coherent framework these topics of importance during the COVID-19 era.

However, the pandemic era also provides causes for optimism. Some European countries fared much better than others through the pandemic. In the Netherlands, for example, employment rates effectively recovered (Jongen et al., 2021). In fact, by December 2021, the amount of employed individuals surpassed that in February 2020, immediately preceding the Netherlands' pandemic period (Jongen et al., 2021). In contrast, Spain's unemployment rate was 14.12% in 2019 (already high) and rose to 15.52% in 2020 (Su et al., 2022). Additionally, the lowering of demanding and rushed obligations and the collective effervescence resulting from the pandemic-era challenges might have reduced depressive symptoms (Van Winkle et al., 2021). Telecommuting might have had some positive outcomes for workers, including improved productivity, autonomy, job satisfaction, schedule flexibility, and balance between work and life (Grace, 2021). Furthermore, income losses might have been compensated by reduced consumption and escalated saving behavior (see Immordino et al., 2022).

1.2. Theoretical framework

1.2.1. The stress process model

We employ the stress process model as an orienting theoretical framework for our empirical analysis. This model proposes that life events, such as lost work, often produce stressors with physical and mental health concomitants (Pearlin et al., 1981). It further highlights mediators and moderators of these effects, including psychological traits and features of one's social life (Pearlin et al., 1981), and thus the proliferation of stressors across intersecting life domains (Pearlin et al., 1997).

Related scholarship has shown unemployment to be a stressor negatively affecting health and well-being (Savage et al., 2013). Accordingly, we expect that COVID-19-era lost work will be associated with reduced health and increased depressive and anxiety symptoms (Hypothesis 1). However, of relevance to the COVID-19 era, the stressful effects of personal unemployment might be mitigated in circumstances of high unemployment rates as social stigma and self-blame are reduced (Böckerman & Ilmakunnas, 2009). Of relevance to this study, stress process scholarship has further shown that financial troubles (Drentea & Reynolds, 2015), loneliness, and lack of social engagement (Lepore, 1997) constitute health-damaging stressors.

1.2.2. The manifest and latent functions of employment

The stress process model connects with the functionalist approach to employment's roles within society. The latter emphasizes the manifest (more purposely intended) and latent (less purposely intended) functions served by paid work, the losses of both of which are health-damaging stressors (Jahoda, 1981; Nordenmark & Strandh, 1999; Paul

& Batinic, 2010). Employment's most manifest function is earning financial resources for oneself and one's family (Jahoda, 1981; Nordenmark & Strandh, 1999; Paul & Batinic, 2010). We thus expect that COVID-19-era lost work's associations with worsened health, depressive symptoms, and anxiety symptoms will be substantially mediated through households' financial difficulties (Hypothesis 2).

However, employment also serves latent psychological and social functions (Jahoda, 1981; Nordenmark & Strandh, 1999; Paul & Batinic, 2010). These include:

First, employment imposes a time structure on the waking day; second, employment implies regularly shared experiences and contacts with people outside the nuclear family; third, employment links individuals to goals and purposes that transcend their own; fourth, employment defines aspects of personal status and identity; and finally, employment enforces activity (Jahoda, 1981, p. 188).

The social functions of employment highlighted in the above second latent purpose likely rose in importance during the pandemic's social restrictions.

1.2.3. Agency, identity, and coping resources

In consonance with the latent psychological functions of employment, Ezzy (1993) and Nordenmark and Strandh (1999) addressed issues of agency and identity within job loss' consequences. Importantly, work cultivates health-enhancing sentiments of control over one's own life. The mood alterations experienced by the unemployed further decrease this sense of personal control. Those whose previous employment characteristics and other societal involvements fostered a sustained sense of personal control are to some extent protected from unemployment's mental health consequences (Ezzy, 1993; Nordenmark & Strandh, 1999). Given the importance of sense of personal control for older adults' well-being during the pandemic (Verhage et al., 2021), these topics are of heightened importance during the COVID-19 era. Additionally, unemployment's mental health consequences are likely intensified if one's previous work role was a central component of one's identity (Ezzy, 1993; Nordenmark & Strandh, 1999), which might aggravate pandemic-linked stressors.

These manifest and latent functions of employment also concord with McKee-Ryan et al.'s (2005) account of various coping resources, including economic, social, personal, and time organization, which buffer the effects of unemployment-linked stressors, while themselves being depleted by loss of work. These resources safeguard health from stressful circumstances more generally (McKee-Ryan et al., 2005; Warr, 1987). The pandemic's financial, social, and psychological stressors might have intensified these protective functions.

1.2.4. The complementarity hypothesis

Informed by the latent social functions of employment, we engage the complementarity hypothesis, according to which workforce involvement and social connectedness are positively associated (Lancee & Radl, 2012; Mutchler et al., 2003). Beyond furnishing social opportunities with coworkers (McBain & Parkinson, 2017; Rumens, 2017), employment is associated with general activity levels that influence motivation for social engagement (Lancee & Radl, 2012).

This hypothesis' antithesis is the theory of activity-substitution, which proposes that employment and social involvement counterpoise each other (Lancee & Radl, 2012; Mutchler et al., 2003; van den Bogaard et al., 2014). This substitution sustains life purpose and meaning, and is facilitated by the free time resulting from the decline of one set of activities (Lancee & Radl, 2012; Mutchler et al., 2003; van den Bogaard et al., 2014). While some studies have revealed activity-substitution (Mutchler et al., 2003; van den Bogaard et al., 2014), others have provided evidence for complementarity (Klumb & Baltes, 1999; Lancee & Radl, 2012).

Plausibly, complementarity predominates in the COVID-19 era as

employment is a circumstance within which social activity continues to be encouraged, even while discretionary social interactions are generally discouraged (see Slavich, 2022). This discouragement potentially prevents processes of activity-substitution that might have otherwise occurred. Research showing how positive social relationships between coworkers improve employees' performance (Anitha, 2014) supports this postulated complementarity. These pandemic-era accentuated social functions of employment might be especially pertinent to older adults facing more general social constrictions (Cornwell et al., 2008; Lawton & Nahemow, 1973; Rook, 2009).

These discussions of the latent social functions of employment and the complementarity hypothesis led us to expect that under the socially-restrictive circumstances of the COVID-19 era, lost work's associations with health, depressive symptoms, and anxiety symptoms will be substantially mediated through reduced social activity (Hypothesis 3).

2. Materials and methods

2.1. Dataset and sample

We centrally employed the Survey of Health, Ageing and Retirement in Europe's (SHARE) first COVID-19 module (Börsch-Supan, 2022a). While this module's interviews from June to August 2020 (at the apex of the COVID-19-era restrictions) included Israel, we included only the 27 European nations surveyed. The exclusion of Israel ensured analyses of the relatively uniform economic and social circumstances in Europe. The SHARE investigates community-residing older Europeans' (50+ years) workforce and economic circumstances, health, and social engagement. The first wave, in 2004, spanned 11 European nations. Subsequent waves were approximately biennial and regularly added refreshment samples. Later waves incorporated 27 European nations and Israel. The first COVID-19 module fit our goals since it traced respondents' health and finances, and social and working lives through the peak of the crisis and lockdown. Its total response rate across all countries was 78% (Bergmann & Börsch-Supan, 2021). See Börsch-Supan et al. (2013) for additional information pertaining to the SHARE.

We did not employ the SHARE's second COVID-19 module, based on interviews from June to August 2021 (Börsch-Supan, 2022b), for three main reasons. First, it permits less certainty that the pandemic caused the lost work. Second, because older persons might have undergone multiple transitions into and out of employment between the pandemic's start and the summer of 2021, it presents challenges in tracing how particular exits from paid work were associated with respondents' finances, social lives, and health. Third, by the summer of 2021, many older persons might have adjusted to the pandemic-caused changes, dampening their associations with health. Our primary interest was in how more recently experienced pandemic-caused "shocks" were associated with respondents' health.

To ensure the study of older adults, we excluded respondents younger than 50 years. Since they were not "at risk" of losing their work, we excluded those not employed immediately before the pandemic. We also excluded those older than 80 years because workers of this age likely have very unique characteristics. Moreover, among those interviewed in 2019 and 2020 as part of wave eight, while 67% of those from 50 to 80 years of age were retired, this amount was 90% among those over 80 years of age. These exclusions brought the sample to 11,231 respondents.

Due to its non-availability within the first COVID-19 module, the time-constant variable of education (described further below) was obtained from wave eight (2019–2020) of the *easySHARE* dataset (Börsch-Supan & Gruber, 2022). This is a streamlined derived dataset that merges within one file a set of important variables across all interviewees and waves (see Gruber et al., 2014). If missing from the *easySHARE*'s wave eight, education was obtained from its wave seven (2017), and if still missing it was garnered from its wave six (2015) (if available and non-missing). See Bergmann et al. (2019) for the SHARE's

retention and response rates from waves one through seven.

2.2. Variables

2.2.1. Dependent variables. The first dependent variable was based on the question, “If you compare your health with that before the outbreak of Corona, would you say your health has improved, worsened, or stayed about the same?” Given our interest in how pandemic-era lost work was negatively associated with health, “improved or stayed about the same” formed the reference category (ref.), thus accorded a score of “0,” while worsened health was accorded a score of “1.” The second and third dependent variables were composed of “yes” (1) or “no” (0; ref.) answers to the questions, “In the last month, have you been sad or depressed?” and “In the last month, have you felt nervous, anxious, or on edge?”

2.2.2. Independent variable. This study’s central predictor was based on “yes” (1) or “no” (0; ref.) answers to the question, “Due to the Corona crisis have you become unemployed, were laid off or had to close your business?” Notably, additional analyses revealed no significant differences between working completely from one’s usual place, working only from home, and working both from one’s usual place and from home in their associations with the three dependent variables (results not shown). Because the crucial factor for the three outcomes is whether one lost one’s work, this was our focus.

2.2.3. Mediating variables. The first mediating variable was based on the question, “Thinking of your household’s total monthly income since the outbreak of Corona, would you say that your household is able to make ends meet with great difficulty, with some difficulty, fairly easily, or easily?” Answers were coded in the direction of worse economic circumstances: easily (0; ref.), fairly easily (1), with some difficulty (2), and with great difficulty (3).

The second and third mediating variables denoted social activity. One was based on answers to, “How much of the time do you feel lonely? Often, some of the time, or hardly ever or never?” Answers were coded in the direction of greater loneliness: hardly ever or never (0; ref.), some of the time (1), and often (2). The other was based on the following question with reference to non-relatives, such as neighbors, friends, or colleagues, “Since the outbreak of Corona, how often did you have personal contact, that is, face to face, with the following people from outside your home? Was it daily, several times a week, about once a week, less often, or never?” Answers were coded in the direction of fewer face-to-face contacts: daily (0; ref.), several times a week (1), about once a week (2), less often (3), and never (4). Concerning the latter, research has found that face-to-face interactions yield benefits beyond those of virtual communications for older persons’ pandemic-era mental health (Skatacka & Pajestka, 2021).

2.2.4. Control variables. Because they were potential confounders, key demographic variables were controlled, including gender (= men) and age in 2020 (in years, divided by ten to produce more easily interpretable odds ratios (ORs)). Education was based on the International Standard Classification of Education (ISCED) levels:

- Level 0–Pre-primary education
- Level 1–Primary education or first stage of basic education
- Level 2–Lower secondary or second stage of basic education
- Level 3–(Upper) secondary education
- Level 4–Post-secondary non-tertiary education
- Level 5–First stage of tertiary education
- Level 6–Second stage of tertiary education

(United Nations Educational, Scientific and Cultural Organization, 2006). Those reporting “other” or missing data in this variable comprised an additional category (see analysis below). To allow the statistical models to converge, ISCED levels 0 and 1 were combined (ref.).

Because the associations may be dependent on the initial level of health, a further control variable was based on the question, “Before the

outbreak of Corona, would you say your health was excellent, very good, good, fair, or poor?” “Excellent” was the reference category.

Further controlled was country of residence during the first COVID-19 module, which included Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and Switzerland. These country fixed effects account for all permanent (structural) differences in the outcomes of interest based on national characteristics. To allow the statistical models to converge despite some nations including relatively few respondents, some nations were combined with others (informed by scholarship suggesting national similarities). Italy and Malta are both Mediterranean welfare states with many similarities and were thus integrated into one category (see Gal, 2010; Romano, 2022). Hungary, Slovenia, and Slovakia are all Eastern European welfare states sharing many commonalities and were therefore combined into one category (see Borgulya & Hahn, 2013; Deacon, 2000; Mezei, 2012; Školkay, 2002). Alternative combinations of nations (including Cyprus with Malta, Spain with Malta, Slovakia with Bulgaria, and Slovakia with Latvia) within each of these two groupings of welfare states that permitted our models to converge produced substantively identical results.

2.3. Analysis

Because we employed dichotomous outcomes, our analyses were based on logistic regressions. Using logistic regressions, comparisons of regression coefficients across same-sample nested models, central to mediation analyses, pose the statistical concern of “rescaling” (Karlson et al., 2012). Each predictor’s coefficient within each model is developed based on the model-specific scale parameters, which differ across nested models. The Karlson-Holm-Breen (KHB) method (implemented in Stata) permits adjustment for rescaling, allowing for accurate comparisons of the coefficients within each of the nested models (Karlson et al., 2012). Beyond estimation of total mediation through all included mediators, the KHB command’s “disentangle” option reveals each individual mediator’s unique contribution to the relationship between the central independent variable and the dependent variable.

Each of our three KHB analyses, predicting worsened health, depressive symptoms, and anxiety symptoms, comprised two models. The first models (reduced) included lost work and all control variables. The second models (full) added the three mediators. Table 2 displays all predictors’ ORs. Table 3 shows the coefficients and ORs of lost work within each of the three reduced and full models. Table 3 further displays for each dependent variable the difference scores (coefficient and OR) between the reduced and full models.

For each dependent variable, Table 3 also shows the percentages of lost work’s associations with the three health outcomes mediated through 1) households’ economic difficulties, 2) both social activity variables in unison, and 3) all three mediators in unison. As per Karlson et al. (2012), these extents of mediation were established through the coefficients. Including all three mediators within the same models statistically adjusted for their intercorrelations. Accordingly, while households’ difficulties making ends meet was an overall indicator of financial stress, loneliness and lack of face-to-face contact with non-relatives together constituted an overall measure of pandemic-era curtailed social life. Additional models (not presented, but commented on in Table 3), two for each outcome, assessed 1) mediation solely through households’ financial difficulties, and 2) mediation solely through the two social activity variables. For each dependent variable, these latter models revealed whether each of the two mediation processes individually reached statistical significance.

Because the KHB command’s “disentangle” option does not work with multiply imputed data, and is here of central importance, we could not multiply impute the missing data. The only variable with a substantial amount of missing data was education (4.78%). For education

only, missing data were assigned to a missingness indicator category, which further included the two respondents declaring “other” for education. The final models included few missing data, not requiring multiple imputation: worsening health (2.62%), depressive symptoms (2.71%), and anxiety symptoms (2.65%). These missing data were addressed through listwise deletion.

To account for attrition and non-response, all analyses employed the survey weights from the SHARE’s first COVID-19 module, which adjusted for differing probabilities of selection into the sample. The Stata 17 statistical software package was used for all analyses.

3. Results

Table 1 presents the key descriptive statistics. 5.76% of respondents reported worsened health since the COVID-19 outbreak. Substantial proportions of respondents experienced depressive (19.19%) or anxiety (26.70%) symptoms in the previous month.

A notable minority of respondents lost their employment or businesses due to the pandemic (18.51%). The modal category for households’ difficulties making ends meet was “fairly easily” (36.17%). While 35.51% of the sample answered “easily,” 6.60% of the sample answered “with great difficulty.” Over four-fifths of the sample (81.72%) “hardly ever or never” felt lonely. 3.17% felt lonely “often.” The modal category for face-to-face contact with non-relatives from outside of one’s home was “less often” than about once a week (35.10%). While 16.26% reported “daily,” 19.31% answered “never.”

Most of the sample were women (54.06%). The average age was 61.3 years. Pre-pandemic self-assessed health’s modal category was “good” (46.01%). While 12.23% reported “excellent” health, 1.63% reported “poor” health. The two most prevalent educational categories were “ISCED 3: Upper Secondary” (40.20%) and “ISCED 5: First Stage of Tertiary” (32.16%). The sparsest educational category was “ISCED 6: Second Stage of Tertiary” (1.32%). Respondents were broadly distributed across the European countries, the modal country being Estonia (12.31%).

Table 2 shows the KHB logistic regression results (ORs) for each of the two models pertaining to each of the three dependent variables. While each model included countries of residence (statistically significant differences within all models), they are not presented in Table 2 for brevity. The following elaboration on findings is focused on the central independent variable and mediators. The reduced-form models show COVID-19-era lost work to be significantly associated with reduced health, and worse depressive and anxiety symptoms, confirming Hypothesis 1.

For worsened health, lost work’s OR substantially dropped between the reduced (OR: 2.134, $p < 0.001$) and full (OR: 1.789, $p < 0.05$) models. While not reaching statistical significance, those making ends meet “with great difficulty” were more likely to have had worsened health (OR: 1.397) than those doing so “easily.” More frequent loneliness predicted worsened health, with those reporting “often” having an OR of 2.686 ($p < 0.001$) when compared with those reporting “hardly ever or never.” Likewise, less frequent face-to-face contact with non-relatives predicted worsened health, with those reporting “never” having an OR of 2.223 ($p < 0.01$) when compared with those reporting “daily.” Less favorable pre-pandemic health predicted worsened pandemic-era health.

For depressive symptoms in the last month, lost work’s OR also substantially dropped between the reduced (OR: 1.696, $p < 0.01$) and full (OR: 1.361, $p < 0.10$) models. The latter did not reach full statistical significance. There was a marginally significant trend of those making ends meet “with great difficulty” having more depressive symptoms (OR: 1.598, $p < 0.10$) than those doing so “easily.” Loneliness predicted depressive symptoms, with those having felt lonely “often” having an OR of 10.868 ($p < 0.001$) when compared with those having felt lonely “hardly ever or never.” Less frequent face-to-face contact with non-relatives also predicted depressive symptoms, with those reporting

Table 1
Descriptive statistics (N = 11,231).

Variables	Mean/Proportion (%)	Standard Deviation
<u>Dependent Variables</u>		
Worsened Health since COVID-19		
Outbreak		
No	94.24%	
Yes	5.76%	
Depressive Symptoms in the Last Month		
No	80.81%	
Yes	19.19%	
Anxiety Symptoms in the Last Month		
No	73.30%	
Yes	26.70%	
<u>Independent Variable</u>		
Lost Employment or Business due to COVID-19 Outbreak		
No	81.49%	
Yes	18.51%	
<u>Mediating Variables</u>		
Household Making Ends Meet since COVID-19 Outbreak		
Easily	35.51%	
Fairly Easily	36.17%	
With Some Difficulty	21.72%	
With Great Difficulty	6.60%	
Feeling Lonely		
Hardly Ever or Never	81.72%	
Some of the Time	15.11%	
Often	3.17%	
Face-to-Face Contact with Non-Relatives		
Outside of Home since COVID-19 Outbreak		
Daily	16.26%	
Several Times a Week	17.50%	
About Once a Week	11.84%	
Less Often	35.10%	
Never	19.31%	
<u>Control Variables</u>		
Gender		
Men	45.94%	
Women	54.06%	
Age/10	6.13	0.51
Self-Assessed Health before COVID-19		
Outbreak		
Poor	1.63%	
Fair	14.38%	
Good	46.01%	
Very Good	25.75%	
Excellent	12.23%	
Education		
ISCED 0 and 1: Pre-Primary and Primary	4.91%	
ISCED 2: Lower Secondary	9.30%	
ISCED 3: Upper Secondary	40.20%	
ISCED 4: Post-Secondary Non-Tertiary	7.18%	
ISCED 5: First Stage of Tertiary	32.16%	
ISCED 6: Second Stage of Tertiary	1.32%	
Other or Missing	4.93%	
Country of Residence		
Austria	2.36%	
Belgium	7.49%	
Bulgaria	2.14%	
Croatia	2.69%	
Cyprus	1.24%	
Czech Republic	4.47%	
Denmark	6.48%	
Estonia	12.31%	
Finland	4.35%	
France	2.90%	
Germany	6.67%	
Greece	5.21%	
Hungary, Slovakia, and Slovenia	6.91%	
Italy and Malta	6.81%	
Latvia	2.79%	
Lithuania	3.71%	
Luxembourg	1.05%	

(continued on next page)

Table 1 (continued)

Variables	Mean/Proportion (%)	Standard Deviation
Netherlands	1.58%	
Poland	6.69%	
Portugal	1.68%	
Romania	1.98%	
Spain	1.59%	
Sweden	2.82%	
Switzerland	4.08%	

“never” having an OR of 1.909 ($p < 0.01$) when compared with those reporting “daily.”

Women had more depressive symptoms in both models. In the full model, older respondents had fewer depressive symptoms. Worse pre-pandemic self-assessed health predicted more depressive symptoms.

Concerning anxiety symptoms in the previous month, lost work’s OR also declined across the reduced (OR: 1.792, $p < 0.001$) and full (OR: 1.567, $p < 0.01$) models. There was an insignificantly higher likelihood of anxiety symptoms among those making ends meet “with great difficulty” (OR: 1.208) than among those doing so “easily.” Greater loneliness predicted anxiety symptoms, with those feeling lonely “often” having an OR of 3.323 ($p < 0.001$) when compared with those “hardly ever or never” feeling lonely. Concerning extent of face-to-face contact with non-relatives, there was a significant trend of those reporting “less often” than about once a week having more anxiety symptoms (OR: 1.440, $p < 0.05$) than those reporting “daily.”

In both models, women had more anxiety symptoms. Worse pre-pandemic self-assessed health predicted more anxiety symptoms.

Table 3 more specifically displays mediation through households’ economic difficulties and social activity. As explained above, the extents of mediation were best established through the coefficients (see Karlson et al., 2012). Concerning worsened health, the difference in coefficients of lost work between the reduced (0.758, $p < 0.001$) and full models (0.582, $p < 0.05$) was a statistically significant 0.177 ($p < 0.05$). The “disentangle” option revealed that while 7.83% of this association occurred through households’ financial difficulties, 15.46% of this association was due to the two social activity variables (total mediation of 23.29%). When households’ difficulties making ends meet was the sole mediator, the difference coefficient reached marginal statistical significance ($p < 0.10$). When the two social activity variables were the sole mediators, the difference coefficient reached statistical significance ($p < 0.01$).

Regarding depressive symptoms in the previous month, while the reduced model’s coefficient of lost work was 0.528 ($p < 0.01$), that of the full model was 0.308 ($p < 0.10$), producing a statistically significant difference coefficient of 0.220 ($p < 0.001$). While 12.82% of this association occurred through households’ financial troubles, 28.78% of this association was due to the social activity variables, resulting in a total mediation of 41.60%. When households’ economic difficulties was the sole mediator, the difference coefficient reached statistical significance ($p < 0.01$). Likewise, when the two social activity variables were the sole mediators, the difference coefficient was statistically significant ($p < 0.001$).

Concerning anxiety symptoms in the last month, since lost work’s coefficient was 0.583 ($p < 0.001$) in the reduced-form model and 0.449 ($p < 0.01$) in the full model, the statistically significant difference coefficient was 0.135 ($p < 0.01$). The addition of the extents of mediation through households’ economic troubles (6.53%) and the two social activity variables (16.52%) resulted in a total mediation of 23.05%. When households’ difficulties making ends meet was the sole mediator, the difference coefficient reached statistical significance ($p < 0.05$). When the two social activity variables were the sole mediators, the difference coefficient also reached statistical significance ($p < 0.05$).

These mediation findings confirm Hypothesis 2: COVID-19-era lost work’s associations with health, depressive symptoms, and anxiety

symptoms will be substantially mediated through households’ financial difficulties. They also confirm Hypothesis 3: under the socially-restrictive circumstances of the COVID-19 era, lost work’s associations with health, depressive symptoms, and anxiety symptoms will be substantially mediated through reduced social activity.

Further analyses confirmed that lost work significantly predicted worse household financial difficulties and loneliness, and significantly predicted decreased face-to-face contact with non-relatives (results not shown).

3.1. Robustness checks

Supplementary KHB mediation analyses of all three health outcomes subdivided continuing workers by whether they performed their work completely remotely or at least partly from their usual locations and compared both groups with those who lost their work (ref.) during the pandemic. The patterns of mediation pertaining to the two working groups were largely similar, thus mostly concordant with the central findings. However, in the prediction of worsened health, mediation through the social activity variables was considerably lower for those working entirely from home. Moreover, in the prediction of anxiety symptoms, mediation through households’ financial difficulties was appreciably lower for those working at least partly from their usual locations (results not shown).

Because of likely work-related differences (e.g., type of work performed, working hours and schedules, pension eligibility, social acceptability of not being employed) between younger and older workers within this study’s age range of 50–80 years, further robustness checks (based on standard logistic regressions) assessed interactions of the independent and mediating variables with two age-based categorical variables (50–61 years versus 62–80 years; 50–64 years versus 65–80 years) in their predictions of the dependent variables. These cutoffs were based on this study’s sample having an average age of 61.3 years, and 65 years being a common pension age in Europe and the Organisation for Economic Co-operation and Development’s (OECD) cut-off for working age (OECD, 2023). F-tests (Wald tests) revealed that no interaction terms significantly contributed to model fit.

4. Discussion

Concerning the first research question, we found substantial unfavorable associations of COVID-19-era lost work with health, depressive symptoms, and anxiety symptoms (supporting Hypothesis 1). Regarding the second research question, we found considerable mediation of these associations through households’ economic difficulties, loneliness, and fewer face-to-face contacts with non-relatives (supporting Hypotheses 2 and 3). For all three outcomes, mediation through the social activity variables was approximately twice as extensive as mediation through households’ financial difficulties. This evidence reveals the extent of employment’s value for friendship formation and sustenance, and social activity, during the pandemic-era social restrictions.

Mediation of depressive symptoms was particularly strong, reaching a total of 41.60%. This concurs with stress process scholarship arguing that depressive symptoms are predominant outcomes of stressful circumstances and serve as global assessments of stress levels (Pearlin et al., 1981, 1997), perhaps especially among older persons (Blazer, 2003). Notably, household economic difficulties associated with lost work can create feelings of guilt and personal inadequacy, which affect depressive symptoms (Luck & Luck-Sikorski, 2021). While social isolation is not uncommonly studied as a component of depressive symptoms, its empirical distinguishability is supported by scholarship finding it to potentially influence depressive symptoms (Allen & Allen, 2015), and research revealing moderation of this relationship by other personal characteristics (Luo et al., 2021). Conceptually, social isolation is more a feature of one’s life circumstances, while depressive symptoms are based more on one’s internal subjective state.

Table 2
KHB logistic regression results, odds ratios.

Variables	Worsened Health	Worsened Health	Depressive Symptoms	Depressive Symptoms	Anxiety Symptoms	Anxiety Symptoms
	Reduced Model	Full Model	Reduced Model	Full Model	Reduced Model	Full Model
Lost Employment or Business (ref. has not)	2.134*** (1.384–3.292)	1.789* (1.116–2.868)	1.696** (1.207–2.381)	1.361^ (0.955–1.940)	1.792*** (1.338–2.401)	1.567** (1.169–2.099)
Household Making Ends Meet (ref. easily)						
Fairly Easily		0.796 (0.558–1.136)		0.903 (0.669–1.218)		0.947 (0.719–1.249)
With Some Difficulty		0.901 (0.540–1.506)		0.954 (0.655–1.392)		1.151 (0.827–1.602)
With Great Difficulty		1.397 (0.732–2.666)		1.598* (0.967–2.641)		1.208 (0.745–1.959)
Feeling Lonely (ref. hardly ever or never)						
Some of the Time		1.819** (1.228–2.695)		4.059*** (3.024–5.447)		2.927*** (2.212–3.873)
Often		2.686*** (1.562–4.619)		10.868*** (5.711–20.682)		3.323*** (1.915–5.764)
Face-to-Face Contact with Non-Relatives (ref. daily)						
Several Times a Week		1.080 (0.624–1.867)		1.584* (1.075–2.334)		1.162 (0.778–1.737)
About Once a Week		1.403 (0.723–2.723)		1.335 (0.841–2.118)		0.961 (0.623–1.482)
Less Often		1.871* (1.113–3.147)		1.408* (1.013–1.956)		1.440* (1.006–2.062)
Never		2.223** (1.277–3.869)		1.909** (1.242–2.936)		1.315 (0.843–2.051)
Gender (ref. men)						
Women	1.181 (0.809–1.723)	1.097 (0.749–1.605)	2.321*** (1.742–3.092)	1.890*** (1.426–2.506)	1.927*** (1.505–2.468)	1.682*** (1.315–2.152)
Age/10	1.084 (0.800–1.469)	1.026 (0.754–1.396)	0.730^ (0.530–1.006)	0.665* (0.480–0.921)	0.830 (0.633–1.089)	0.784^ (0.599–1.028)
Self-Assessed Health before the COVID-19 era (ref. excellent)						
Poor	8.441*** (3.686–19.332)	5.852*** (2.509–13.651)	11.486*** (5.147–25.634)	5.706*** (2.535–12.840)	12.306*** (6.004–25.223)	8.253*** (4.020–16.942)
Fair	6.134*** (3.311–11.366)	5.601*** (3.016–10.400)	2.536** (1.431–4.495)	2.039* (1.150–3.616)	3.778*** (2.326–6.137)	3.208*** (1.973–5.215)
Good	2.398** (1.379–4.170)	2.474** (1.424–4.299)	1.315 (0.788–2.194)	1.343 (0.805–2.239)	2.362*** (1.546–3.607)	2.377*** (1.551–3.643)
Very Good	0.979 (0.528–1.817)	1.030 (0.555–1.909)	0.749 (0.427–1.314)	0.806 (0.462–1.406)	1.453 (0.929–2.273)	1.504^ (0.962–2.350)
Education (ref. ISCED 0–1: Pre-Primary or Primary)						
ISCED 2: Lower Secondary	0.624 (0.221–1.762)	0.566 (0.193–1.657)	0.750 (0.377–1.491)	0.676 (0.338–1.350)	0.850 (0.474–1.524)	0.799 (0.446–1.431)
ISCED 3: Upper Secondary	0.915 (0.339–2.468)	0.832 (0.304–2.280)	0.968 (0.532–1.761)	0.932 (0.513–1.693)	0.851 (0.524–1.381)	0.830 (0.511–1.347)
ISCED 4: Post-Secondary Non-Tertiary	1.230 (0.429–3.525)	1.111 (0.384–3.214)	1.169 (0.562–2.432)	1.111 (0.534–2.310)	1.355 (0.736–2.496)	1.306 (0.710–2.403)
ISCED 5: First Stage of Tertiary	0.816 (0.323–2.057)	0.749 (0.297–1.888)	0.914 (0.510–1.638)	0.889 (0.495–1.596)	0.879 (0.544–1.421)	0.862 (0.531–1.400)
ISCED 6: Second Stage of Tertiary	2.773 (0.735–10.46)	2.409 (0.643–9.025)	1.198 (0.462–3.111)	1.028 (0.395–2.677)	1.291 (0.568–2.931)	1.227 (0.537–2.802)
Other or Missing	1.167 (0.351–3.883)	0.990 (0.291–3.369)	0.600 (0.250–1.438)	0.591 (0.246–1.421)	0.879 (0.446–1.730)	0.882 (0.450–1.728)
Constant	0.005*** (0.000–0.052)	0.005*** (0.000–0.060)	0.451 (0.053–3.833)	0.557 (0.064–4.870)	0.286 (0.048–1.690)	0.322 (0.052–1.981)
Pseudo R-square	0.101	0.101	0.158	0.158	0.107	0.107
Observations	10,937	10,937	10,927	10,927	10,933	10,933

Notes. Robust exponentiated form 95% confidence intervals are in parentheses. Two-tailed tests ***p < 0.001, **p < 0.01, *p < 0.05, ^p < 0.10.

Countries of residence were controlled (significant differences within all models) but are not here presented for parsimonious presentation of results.

These findings concord with stress process scholarship showing unemployment and loss of work (Savage et al., 2013), economic troubles (Drentea & Reynolds, 2015), and social restrictions (Lepore, 1997) to be stressors negatively affecting health. They further support the stress

process model’s emphasis on mediators of the effects of stressors (Pearlin et al., 1981) and thus the proliferation of stressors across inter-linked life domains (Pearlin et al., 1997). This study’s contextualization within the early COVID-19 era supports statements that

Table 3
KHB mediation analyses.

Lost Employment or Business	Worsened Health ^a		Depressive Symptoms ^b		Anxiety Symptoms	
	Coefficients	Odds Ratios	Coefficients	Odds Ratios	Coefficients	Odds Ratios
Reduced Model	0.758*** (0.325–1.191)	2.134*** (1.384–3.292)	0.528** (0.189–0.868)	1.696** (1.207–2.381)	0.583*** (0.291–0.876)	1.792*** (1.338–2.401)
Full Model	0.582* (0.109–1.054)	1.789* (1.116–2.868)	0.308 [^] (-0.046–0.663)	1.361 [^] (0.955–1.940)	0.449** (0.157–0.741)	1.567** (1.169–2.099)
Difference	0.177* (0.035–0.318)	1.193* (1.036–1.374)	0.220*** (0.105–0.334)	1.246*** (1.111–1.397)	0.135** (0.035–0.234)	1.144** (1.036–1.263)
Percentage Explained by Household’s Difficulty in Making Ends Meet	7.83%		12.82%		6.53%	
Percentage Explained by Feeling Lonely and Face-to-Face Contact with Non-Relatives	15.46%		28.78%		16.52%	
Total Percentage Explained	23.29%		41.60%		23.05%	

Notes.

Robust 95% confidence intervals (exponentiated form for the ORs) are in parentheses.

Two-tailed tests ***p < 0.001, **p < 0.01, *p < 0.05, [^]p < 0.10.

As per [Karlson et al. \(2012\)](#), extents of mediation were established through the coefficients.

^a When household’s difficulty in making ends meet was the sole mediator, the difference coefficient reached marginal statistical significance (p < 0.10). When feeling lonely and face-to-face contact with non-relatives were the sole mediators, the difference coefficient reached statistical significance (p < 0.01).

^b When household’s difficulty in making ends meet was the sole mediator, the difference coefficient reached statistical significance (p < 0.01). When feeling lonely and face-to-face contact with non-relatives were the sole mediators, the difference coefficient reached statistical significance (p < 0.001).

^c When household’s difficulty in making ends meet was the sole mediator, the difference coefficient reached statistical significance (p < 0.05). When feeling lonely and face-to-face contact with non-relatives were the sole mediators, the difference coefficient reached statistical significance (p < 0.05).

stress-related variables’ effects are conditioned by particular settings ([Mandelbaum et al., 2020](#)).

Beyond paid work’s manifest financial function ([Jahoda, 1981](#); [Nordenmark & Strandh, 1999](#); [Paul & Batinic, 2010](#)), we show the strong importance of curtailed social life as a mechanism between pandemic-era lost work and health. This mediation process should receive thorough research and policy attention during future epidemics and public health crises. Concordant with the complementarity hypothesis and scholarship emphasizing the latent functions of employment, we highlight that for many older persons during the pandemic, employment served important social functions. While some research has revealed activity-substitution, according to which these two types of activity are negatively associated ([Mutchler et al., 2003](#); [van den Bogaard et al., 2014](#)), we might expect that during the pandemic, and perhaps especially among older persons, complementarity will prevail. This is because COVID-19-era employment constitutes a circumstance within which social activity continues to be encouraged (see [Anitha \(2014\)](#) concerning positive coworker relationships improving employees’ performance), within a broader context that discourages non-required social activity ([Slavich, 2022](#)). The latter might have precluded potential activity-substitution. More generally, employment is a circumstance for social activity and friendship creation ([McBain & Parkinson, 2017](#); [Rumens, 2017](#)). Moreover, the social restrictions often accompanying advancing age ([Cornwell et al., 2008](#); [Lawton & Nahemow, 1973](#); [Rook, 2009](#)) might also accentuate employment’s social functions.

Our findings further correspond with scholarship on issues of agency and identity (and thus, latent psychological functions (see [Jahoda, 1981](#); [Nordenmark & Strandh, 1999](#); [Paul & Batinic, 2010](#))) in employment and the importance of coping resources in stressful circumstances. For many individuals, loss of work compromises sense of agency and control over one’s life, and a valued work-based identity (see [Ezzy, 1993](#); [Nordenmark & Strandh, 1999](#)), among other stressful consequences. Our results show how pandemic-era loss of work is associated with declines in financial and social resources, both of which help buffer the many stressors linked with unemployment (see [McKee-Ryan et al., 2005](#)). The loss of sources of protection is likely an important feature of the mediation processes between loss of work and health we have revealed.

A further notable finding is that worse pre-pandemic health increased the likelihood of worsened general health during the pandemic. This concurs with scholarship conceptualizing health as a resource within which individuals can invest to garner further returns in

health ([Williamson & Carr, 2009](#)). It further corresponds with research revealing how worse health is associated with lower personal control and mastery, and higher perceptions of being constrained ([Ward, 2013](#)), which further decrease health, perhaps especially within the restraining circumstances of the COVID-19 era. Perhaps pessimistically, this might imply a vicious cycle, as those already in worse health are more vulnerable to further health declines, which might aggravate health inequalities.

Notably, economic difficulties and social restrictions mediated less than half of lost work’s association with depressive symptoms (41.60%), and less than a quarter of lost work’s associations with broader health (23.29%) and anxiety symptoms (23.05%), suggesting that other potent mechanisms exist, including those emphasized in the above discussions of the latent personal, time structuring, and activity functions of employment. These include employment’s bolstering of self-esteem, sense of competence and identity, life purpose and meaning, and sentiment of contribution to society ([Chang & Yen, 2011](#); [Luoh & Herzog, 2002](#); [Soumerai & Avorn, 1983](#)). Moreover, later life employment facilitates salubrious physical and cognitive activity, beyond social activity ([Lemon et al., 1972](#)). Relatedly, people who lost a job they enjoyed are bereft of a valued set of activities. Employment also structures one’s life and time ([Nordt et al., 2007](#)). Moreover, searching for a new job can be a potent stressor ([Wilson & Finch, 2021](#)).

4.1. Policy recommendations

During future epidemics and public health crises, provisions to prevent lost work will be required. These might include technological training programs that bolster older persons’ abilities to work remotely (see [Seifert et al., 2021](#)), while safeguarding their social lives. While not being as beneficial as face-to-face social interactions for older persons’ health-related quality of life ([Skalačka & Pajestka, 2021](#)), virtual communications might be healthier than lack of social contact ([Haase et al., 2021](#)). Especially for older persons facing inadequate social lives, mental health services should be in place (see [Vahia et al., 2020](#)), including online counselling (see [Peng et al., 2020](#)). Moreover, there should be financial protections for those who enter unemployment.

Research suggests that phone-based interventions to support the social connectedness of older adults with fewer technological skills may also be effective. One study found beneficial effects of smartphone use for pandemic-era well-being and social connectedness even among students ([David & Roberts, 2021](#)). In a study of older adults during the

pandemic, participants received wellness telephone calls for pleasant and supportive conversations, which increased sentiments of being socially connected and decreased feelings of loneliness (Noble et al., 2022).

4.2. Limitations and Future Research Paths

Our three subjective health outcomes likely include some measurement error. Self-assessed health, for example, incorporates social comparisons (Quesnel-Vallée, 2007), personal evaluations of health states and transitions across one's life course, and personal assessments of current and foreseen life events (DeSalvo et al., 2006). Scholarship has further shown that people of different European nations tend to respond differently to questions concerning self-assessments of health-related characteristics (Kristensen & Johansson, 2008). Future research should replicate this study with more objective health outcomes, including biomarkers and physician-diagnosed health conditions.

Future research should examine additional potential mediators, including those highlighted above linked with the latent psychological, time structuring, and activity functions of employment. Additionally, the stress process model encourages investigations of moderators, which might help identify vulnerable populations. The above surveyed scholarship on coping resources and identity suggests that financial circumstances, social connectedness, self-esteem, personal control, agency, the centrality of one's work identity, the effectiveness of one's time structuring, one's general extents of activity in other domains, and the type of work one previously performed potentially moderate the associations of lost work with health.

Because of data constraints, we were limited to examining three binary dependent variables. Future research replicating these analyses with continuous health measures might find stronger relationships than those here revealed.

5. Conclusion

Through investigating lost work, social restrictions, and health during the COVID-19 pandemic, our study holds implications for understanding and addressing future wide-scale epidemics. The latent social functions of employment are likely accentuated during the pandemic-era social constraints, perhaps especially for older adults who generally face social restrictions, particularly regarding weaker social ties, including those with colleagues (see Cornwell et al., 2008; Lawton & Nahemow, 1973; Löckenhoff & Carstensen, 2004; Rook, 2009; Toepoel, 2013). Scholarship showing weaker social ties' benefits (Farrell et al., 2022) indicates the consequences of the social restrictions associated with older adults' pandemic-era lost work. Through simultaneously investigating mediation through households' economic troubles and social restrictions, we examined the relative importance of each mechanism. Across worsened general health, depressive symptoms, and anxiety symptoms, both mechanisms were substantial. However, in all three cases, mediation through social restrictions was approximately twice that through economic difficulties, highlighting the importance of the former.

Funding information

Funding: This research was supported by the 2020 Research Block Grant Allocation Scheme–Merit Based Funding Scheme: Incentive B, Faculty of Humanities, Education and Social Sciences, University of Luxembourg.

This funding source had no involvement in study design; in the collection, analysis and interpretation of data; in the writing of the article; and in the decision to submit it for publication.

Author statement

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Ethical statement

No ethical approval was required as this is a secondary analysis of data gathered by third parties.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

Acknowledgements

This paper uses data from SHARE Wave 8 (DOI: 10.6103/SHARE.w8ca.800) see Börsch-Supan et al. (2013) for methodological details.

The SHARE data collection has been funded by the European Commission, DG RTD through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812), FP7 (SHARE-PREP: GA N°211909, SHARE-LEAP: GA N°227822, SHARE M4: GA N°261982, DASISH: GA N°283646) and Horizon 2020 (SHARE-DEV3: GA N°676536, SHARE-COHESION: GA N°870628, SERISS: GA N°654221, SSHOC: GA N°823782, SHARE-COVID19: GA N°101015924) and by DG Employment, Social Affairs & Inclusion through VS 2015/0195, VS 2016/0135, VS 2018/0285, VS 2019/0332, and VS 2020/0313. Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGH4_04-064, HHSN271201300071C, RAG052527A) and from various national funding sources is gratefully acknowledged (see www.share-project.org).

This paper uses data from the generated easySHARE data set (DOI: 10.6103/SHARE.easy.800), see Gruber et al. (2014) for methodological details. The easySHARE release 8.0.0 is based on SHARE Waves 1, 2, 3, 4, 5, 6, 7 and 8 (DOIs: 10.6103/SHARE.w1.800, 10.6103/SHARE.w2.800, 10.6103/SHARE.w3.800, 10.6103/SHARE.w4.800, 10.6103/SHARE.w5.800, 10.6103/SHARE.w6.800, 10.6103/SHARE.w7.800, 10.6103/SHARE.w8.800).

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