

Original Article

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Transition to retirement impact on risk of depression and suicidality: results from a longitudinal analysis of the Survey of Health, Ageing and Retirement in Europe (SHARE)

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Abstract

Aims. Depression is among the main contributors to older adults' mental health burden. Retirement, one of the major life transitions, has been claimed to influence mental health substantially. Following up on a previous meta-analysis, the study aims to assess from a longitudinal perspective short- and long-term impacts of transitioning to retirement on depression risk and suicidality in older adults across Europe.

Methods. We conducted a longitudinal study using data from the Survey of Health, Ageing and Retirement in Europe (SHARE), collected between 2004 and 2020 in 27 European countries plus Israel. To estimate relative risks (RR) and 95% confidence intervals (95% CIs) for depression and suicidality at seven time intervals before and after retirement, we fitted adjusted generalized estimating equation models for repeated measures.

Results. We included 8,998 individuals employed at baseline and retired at follow-up (median follow-up time: 9 years; maximum: 16 years). Compared to the year of retirement, the risk of depression was 11% lower in the following year (RR 0.89; 95% CI 0.81–0.99), 9% lower after 2 years (RR 0.91; 95% CI 0.82–1.00) and after 3 years (RR 0.91; 95% CI 0.81–1.01). Significant estimates remained among females, married individuals, those with an intermediate or higher level of education, former manual workers and those who retired at or before their country's median retirement age. A significant increase in depressive symptoms emerged from the tenth year after retirement among former non-manual workers (RR 1.21; 95% CI 1.05–1.40) and late retirees (RR 1.37; 95% CI 1.16–1.63). No heterogeneity emerged among strata. As for suicidality, we reported an increase in risk only 5 years or more after retirement, namely +30% 5–9 years after retirement (RR 1.30; 95% CI 1.04–1.64) and +47% 10 or more years after retirement (RR 1.47; 95% CI 1.09–1.98). Sensitivity analyses excluding subjects who reported a diagnosis of depression over the study period and those retirees who declared to receive a disability pension confirmed the results obtained in the overall analysis.

Conclusions. Longitudinal adjusted data suggest an independent effect of retiring associated with a reduction in depression and suicidality risk in the short run, with its effect decreasing in the long run. Such trends are particularly evident among selected subgroups of elderly populations. If greater flexibility in pensionable age may help prevent depression late in life, the transition to retirement is to be accompanied by targeted health promotion interventions. In an ageing society, welfare policies should be evaluated, considering their long-term impact on mental health.

Introduction

Low fertility and increasing longevity are causing the European population to grow older rapidly, with a constant rise in the share of retirees against that of working-age people (Eurostat, 2019). Despite the increase in lifespan, the proportion of life we spend in good health has not significantly changed in the last three decades, meaning we spend more years of our lives dealing with illness and disability than in the past (Vos *et al.*, 2020; WHO, 2021). The current demographic transition has profound implications for our society, raising questions about the sustainability of health and social welfare systems and posing new challenges in public policymaking, with particular reference to retirement (Eurostat, 2019).

In this scenario, identifying the determinants of healthy ageing is of crucial importance (Abud *et al.*, 2022; WHO, 2021). In older age, mental disorders represent one of the primary causes of illness and disability and are related to an increased risk of chronic physical diseases,

suicide and all-cause death (Scott *et al.*, 2016; Vos *et al.*, 2020). Among them, depression is the leading contributor to the overall global burden of mental diseases (Vos *et al.*, 2020), affecting up to one in three adults over the age of 60 (Hu *et al.*, 2022; Zenebe *et al.*, 2021). Despite the fact that depression tends to decrease significantly among older adults (WHO, 2017), recent evidence reports a progressive increase in suicide rates with age (Alicandro *et al.*, 2019), especially among men (Shah *et al.*, 2016), suggesting only partially overlapping pathogenesis (De Leo *et al.*, 2013). Even though mental health disorders' mechanisms in older life are not fully understood (De Leo, 2022), late-life well-being is recognised as the result of a complex interaction of biological, social, environmental and psychological factors with multiple life-course determinants having a role as risk factors or as protective factors (Mendonca Lima, 2011).

It has been claimed that retirement, one of life's major transitions and related social determinants, has a significant impact not only on lifestyles but also on mental health (Henning *et al.*, 2016; Vigezzi *et al.*, 2021; Westerlund *et al.*, 2009). Indeed, retirement might involve either positive or detrimental changes in psychological well-being, including depressive symptoms and suicidal ideation (Bossé *et al.*, 1991; Page *et al.*, 2021). On the one hand, retiring is a potentially stress-generating event and might determine retirees' loss of interpersonal relationships, consolidated routines and social position and role (Portnoi, 1981; Riley and Riley Jr, 1994; Zeduri *et al.*, 2022). On the other hand, the increase in free time to engage in social interactions and healthy activities adds to the relief from work-related risk factors (d'Errico *et al.*, 2022), especially for demanding jobs (Eibich, 2015; van der Heide *et al.*, 2013).

We recently conducted a systematic review and meta-analysis, pooling data from 41 original studies and suggesting a 20% protective effect of retirement on depressive symptoms. However, there was high heterogeneity between risk estimates; most studies had a cross-sectional design, which did not allow for exploring causality, and, on top of that, it was not possible to differentiate between the potential risk of depression for short- or long-term exposure to retirement (most of the included longitudinal studies had less than 10 years of follow-up) (Odone *et al.*, 2021). Concerning suicidality, evidence of association between an increased risk of suicide and retirement is limited and mainly relies on unrepresentative cross-sectional studies (Harwood *et al.*, 2006; Minayo *et al.*, 2012; Schneider *et al.*, 2011). In considering the complex and bidirectional relationship that links work, retirement and health (Oksanen and Virtanen, 2012) and the previously conceptualised frameworks on the topic (Kuhn, 2018; van Solinge, 2007), we aimed to fill such research gaps by analysing longitudinal data from a large cohort derived from the Survey of Health, Ageing and Retirement in Europe (SHARE) (Börsch-Supan *et al.*, 2013). In particular, our objective was to define and quantify the effect of retirement on depressive symptoms and suicidality, as well as to track the temporal evolution of these associations.

Methods

Study design and data source

Using individual-level SHARE data, we built a longitudinal cohort to investigate the impact of the transition to retirement on depressive symptoms and suicidality and their determinants, stratifying results according to individual and contextual characteristics. The SHARE project is based on an extensive and comprehensive data

collection, including cross-sectional and longitudinal individual-level data on current characteristics, behaviours and retrospective life histories of people aged 50 years or older from 28 European countries plus Israel, collected in biennial waves since 2004. To enable cross-country comparisons, SHARE data are collected through homogeneous computer-assisted personal interviews using a questionnaire covering several domains, including information on health, socioeconomic status and family environment. Every aspect of the data generation process is carried out according to defined standards. Additionally, ex post harmonisation allows to overcome the problems associated with the international variability of country-specific variables and measurements (Börsch-Supan *et al.*, 2013). SHARE protocol, study design and all study-related details can be retrieved elsewhere (Börsch-Supan *et al.*, 2013, 2005).

Data linkage

As done before (Bertuccio *et al.*, 2023), through a record-linkage procedure, we pooled individual-level data of SHARE waves 1 to 8, covering the period from 2004 to 2020. We combined three publicly available datasets for each wave, including data on sociodemographic traits (module DN), behavioural aspects (module BR) and job and pension variables (module EP). To gather harmonised data on education, occupation and health, we also integrated three additional databases, including the so-called 'generated variables' (i.e., the gv isced, gv isco and gv health databases). A key variable, named *mergeid*, allows a constant and unique identification of all participants through all the waves. By merging longitudinal micro-data from all the waves 1 to 8, we built a cohort of European subjects aged 50 years or older who were employed at baseline and transitioned to retirement at follow-up.

Variables of interest

The exposure of interest was time (in years) before and after retirement, computed as the difference between the year of retirement and the year of the interview. Time before and after retirement was split into seven periods: 10 years or more before retirement, from 9 to 5 years before retirement, from 4 to 1 year before retirement, the year of retirement (i.e., time 0), from 1 to 4 years after retirement, from 5 to 9 years after and 10 years or more after retirement. The year of retirement was considered as the reference category.

The primary outcome of interest was the risk of depression, as derived from the EURO-D scale (Maskileysen *et al.*, 2021; Prince *et al.*, 1999). The EURO-D is a score obtained by summing the presence in the 4 weeks before the interview of 12 symptoms, including depressed mood, pessimism, suicidality, guilt, sleep, interest, irritability, appetite, fatigue, concentration, enjoyment and tearfulness. The optimal cutoff point on the EURO-D scale for prediction of Geriatric Mental Scale depression (DN, neurotic clinical depression or DP, psychotic clinical depression) and SHORT-CARE (Comprehensive Assessment and Referral Evaluation) pervasive depression is 4, with high positive predictive values (Prince *et al.*, 1999). Therefore, we considered it a binary outcome with a score of 4 or more predicting the risk of depression (Prince *et al.*, 1999). In addition, we considered suicidality (yes vs. no) as the secondary outcome of our study, and single component of the EURO-D scale, which expresses suicidal feelings or the wish to be dead.

We considered the following variables as covariates: geographical area, sex, age at baseline, marital status (married/cohabiting, divorced/widowed and never married) at baseline, the highest level of education attained, occupational category at baseline

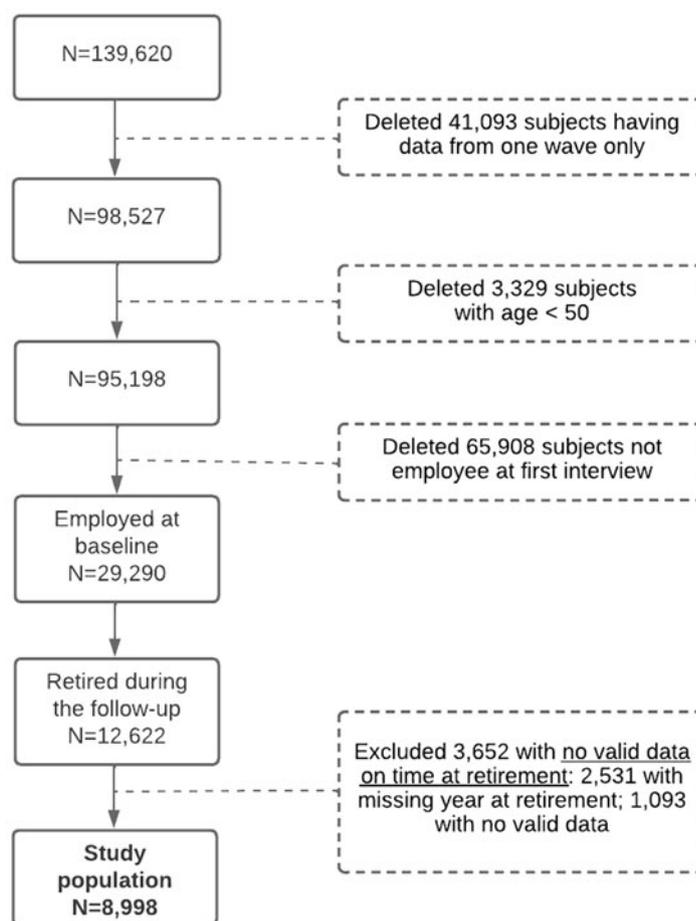


Figure 1. Flowchart of the study cohort selection.

and the current presence of at least one chronic disease (yes vs. no). Education was classified into three levels following the International Standard Classification of Education (ISCED): low (ISCED levels: 1–3), intermediate (ISCED levels: 5–6) and high (ISCED levels: 7–8). To define the occupational category, we considered the 10 primary groupings of the International Standard Classification of Occupations (ISCO; ILO, 2012): (1) managers, (2) professionals, (3) technicians and associate professionals, (4) clerical support workers, (5) services and sales workers, (6) skilled agricultural, forestry and fishery workers, (7) craft and related trades workers, (8) plant and machine operators and assemblers, (9) elementary occupations and (10) armed forces. European countries have been grouped according to the World Bank classification (TheWorld Bank, 2022) into the following geographical areas: North (including Denmark, Finland and Sweden), West (Austria, Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland), South (Cyprus, Greece, Italy, Malta, Portugal and Spain), East (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia), plus Israel.

Finally, we constructed a variable to classify the whole cohort into two groups based on the vulnerability of each individual to mental health disorders. The ‘vulnerable group’ was identified as the subgroup of individuals who declared ever to be treated for depression by a doctor or psychiatrist (wave 1, 2 and 4) or have had a diagnosis of affective or emotional disorders in the past or at the time of interview (wave 5, 6, 7 and 8).

Statistical analysis

To estimate the relative risk (RR) and the corresponding 95% confidence intervals (95% CI) of obtaining a EURO-D score ≥ 4 (i.e., primary outcome) and reporting suicidal thoughts (i.e., secondary outcome) at different time intervals (in years) before and after retirement using the ‘year of retirement’ as the reference category, we fitted generalized estimating equation (GEE) models for repeated measures (with binomial distribution and a log link function). A set of covariates was included in the GEE models: geographical area, sex, age (continuous), marital status (married/registered partnership, divorced/widowed and never married), educational level (low, intermediate and high), occupation (ISCO major categories) as baseline covariates and the presence of at least one chronic disease (yes vs. no) as a time-varying covariate.

We conducted stratified analyses according to strata of geographic area, sex, educational level (low, intermediate and high), age at retirement (equal or less and higher than the country-specific median age of retirement), marital status (married/registered partnership and divorced/widowed) and occupation type (non-manual workers and manual workers) to verify the presence of potential effect modification or confounding factors on the risk of depression and suicidality. We assessed the heterogeneity across strata using likelihood ratio tests.

As sensitivity analyses, we carried out the overall analysis among individuals ($n = 7,400$) from the not-vulnerable subgroup and among individuals ($n = 8,262$) who declared not to receive a disability pension.

Results

The study cohort selection, including detailed inclusion and exclusion criteria, is reported in Figure 1. From a total of 139,620 subjects included in at least one SHARE wave, we selected a cohort of 8,998 subjects aged 50 and older who declared being 'employed' at baseline (i.e., at the first interview) and retired during follow-up. The median age at retirement was 62 years; the maximum follow-up time was 16 years and the median was 9 years.

The distribution of the study cohort according to the main baseline characteristics is reported in Table 1. The study's cohort consisted of about 53% males, 42.6% individuals aged between 55 and 59 years old (mean age 57 years; standard deviation 4.2), 56.7% and 31% with an intermediate and high education level, respectively, and 83.9% married. Professionals were the most frequent occupation group (15.5%), followed by technicians and associate professionals, clerical support workers, services and sales workers, with proportions of about 13.5%, and managers (10.5%).

Risk of depression

Figure 2 shows the forest plot of the RR and corresponding 95% CI for EURO-D score ≥ 4 vs. < 4 in the whole cohort and in the vulnerable group, at seven time periods before and after retirement. Compared to the year of retirement, the risk of depression resulted 17% higher in the period from 10 years or more before retirement (RR 1.17; 95% CI 1.03–1.32). Conversely, the risk started to decline after retirement, by 11% after 1 year (RR 0.89; 95% CI 0.81–0.99), by 9% both after 2 years (RR 0.91; 95% CI 0.82–1.00) and after 3 years (RR 0.91; 95% CI 0.81–1.01). Reductions in the risk of depression in the immediate years following retirement remained when considering only the not-vulnerable subgroup as a sensitivity analysis. The risk decreased by 15% after 1 year (RR 0.85; 95% CI 0.74–0.97) and 13% after 2 years (RR 0.87; 95% CI 0.76–0.99) from retirement.

Results from the stratified analyses are reported in Figure 3 by sex and Figure 4 by age at retirement.

As for sex, the associations remained consistent among females for whom the risk of depression was 26% higher 10 years or more before retirement (RR 1.26; 95% CI 1.09–1.46), while it decreased by 15% 1 year after retirement (RR 0.85; 95% CI 0.74–0.96) and by 13% after 2 years (RR 0.87; 95% CI 1.09–1.46).

Decreased risk of depression at 1, 2 and 3 years after retirement was also found among individuals whose age was below (or equal to) their country-specific median retirement age, with RRs of 0.80 (95% CI 0.68–0.93), 0.82 (95% CI 0.71–0.94), and 0.76 (95% CI 0.64–0.89), respectively. In contrast, among subjects whose age was over their country-specific median retirement age, the risk of depression showed an increase at 10 years or more before retirement (RR 1.29; 95% CI 1.11–1.50), between 5 and 9 years before retirement (RR 1.15, CI 1.02–1.29) and at 10 or more years after retirement (RR 1.37, CI 1.16–1.63).

Further stratified analyses are reported in the Supplementary Figure S1 by education, Supplementary Figure S2 by marital status and Supplementary Figure S3 by occupation. We reported patterns consistent with those of the whole cohort among strata of individuals with an intermediate level of education, married retirees and manual workers. However, estimates between strata were not statistically heterogeneous.

Suicidality

As compared to the year of retirement, the risk of suicidality in the whole cohort (Figure 5) was 33% higher between 5 and

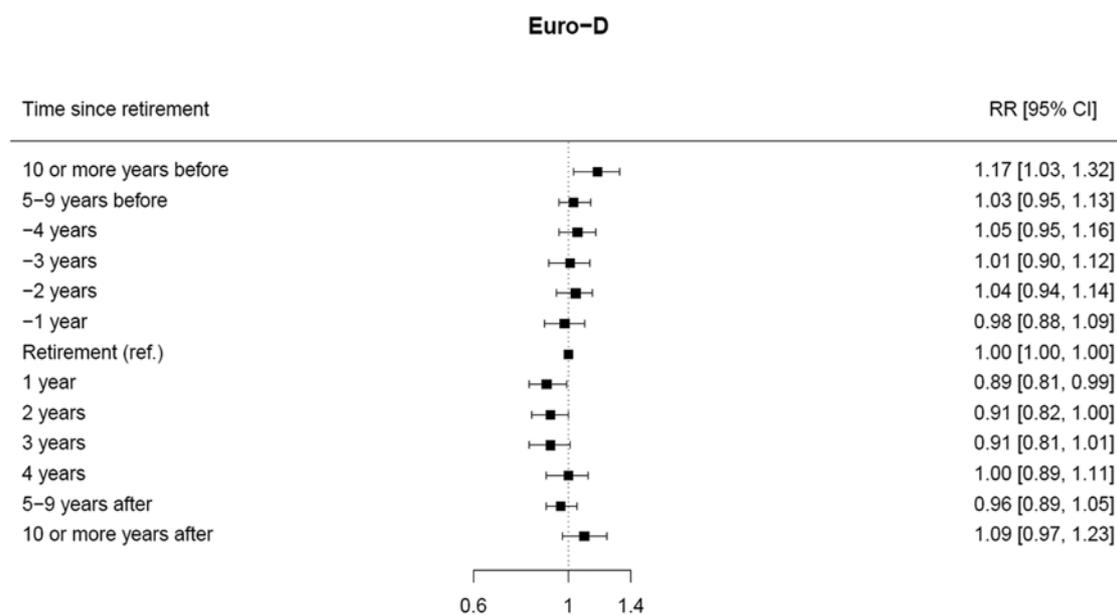
Table 1. Distribution of the overall study population aged 50 or more ($n = 8998$) according to European geographical area and selected baseline characteristics, 2004–2017.

	N	%
<i>European area</i>		
North	1626	18.07
West	3738	41.54
South	1480	16.45
East	1880	20.89
Israel	274	3.05
<i>Sex</i>		
Male	4797	53.31
Female	4201	46.69
<i>Age group</i>		
50–54	2504	27.83
55–59	3831	42.58
≥ 60 (max: 83)	2663	29.60
<i>Education level (ISCED)</i>		
Low (0–1)	1044	11.60
Intermediate (2–4)	5102	56.70
High (5–6)	2787	30.97
Missing	65	0.72
<i>Marital status</i>		
Married/registered partnership	7552	83.93
Divorced/widowed	1229	13.66
Never married	107	1.19
Missing	110	1.22
<i>Occupation (ISCO categories)</i>		
Managers	944	10.49
Professionals	1397	15.53
Technicians and Associate Professionals	1230	13.67
Clerical Support Workers	1209	13.44
Services and Sales Workers	1223	13.59
Skilled Agricultural, Forestry and Fishery Workers	341	3.79
Craft and Related Trades Workers	872	9.69
Plant and Machine Operators and Assemblers	483	5.37
Elementary Occupations	715	7.95
Armed Forces	88	0.98
Missing	496	5.51

9 years before retirement (RR 1.33; 95% CI 1.06–1.67), 30% higher between 5 and 9 after retirement point (RR 1.30; 95% CI 1.04–1.64) and 47% higher at 10 years or more after retirement (RR 1.47; 95% CI 1.09–1.98).

The stratified analyses by sex are reported in Supplementary Figure S4a and S4b. Suicidality risk was 54% higher at 2 years after retirement (RR 1.54; 95% CI: 1.05–2.26) among men. Moreover, an increased risk persisted from the second year

a)



b)

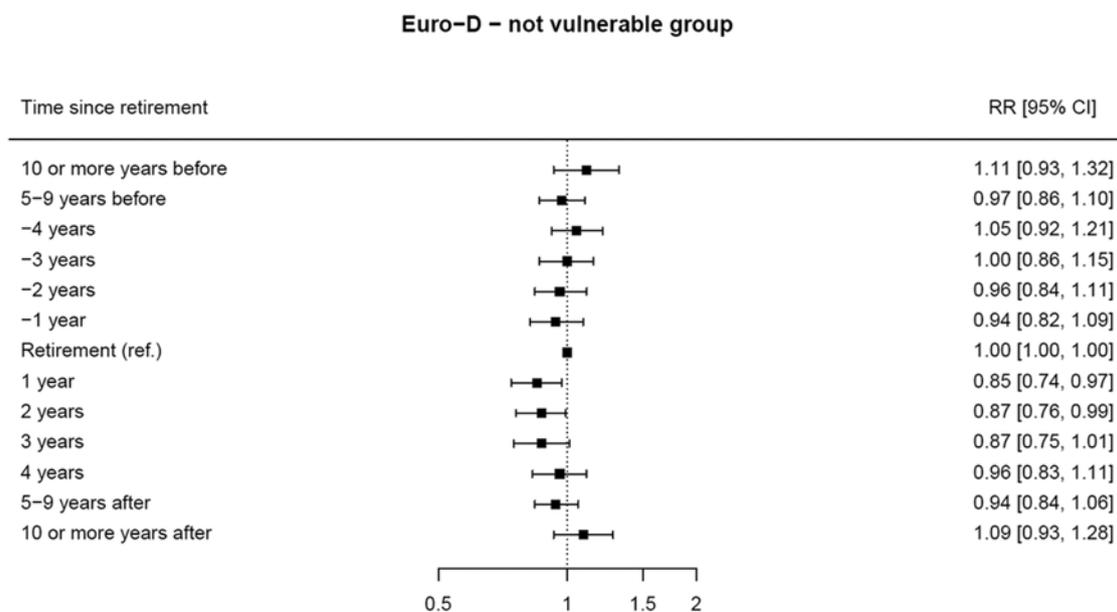


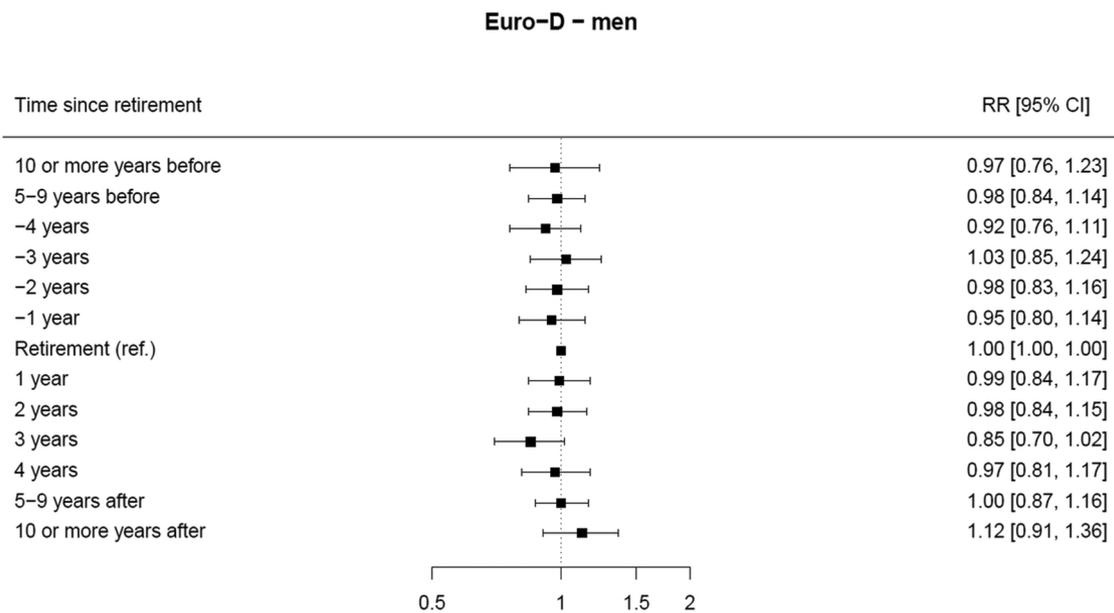
Figure 2. Forest plot of the RR* and corresponding 95% CIs for depression status (Euro-D \geq 4 vs. Euro-D < 4) at different times before and after retirement (reference category: the year of retirement): (a) overall and (b) not-vulnerable group.

*Estimates were obtained from a GEE model for repeated measures, adjusted by geographical area, sex, age group (50–54, 55–59 and 60+), marital status (married/registered partnership, divorced/widowed and never married), educational level (low, intermediate and high), occupation (ISCO major categories) as baseline covariates and the presence of at least one chronic disease as time-varying covariate (yes vs. no).

onwards, although it was statistically significant only at 10 years or more after retirement (RR 1.78; 95% CI: 1.11–2.86). Among females, the risk of suicidality was 55% higher at 10 years or more before retirement (RR 1.55; 95% CI: 1.07–2.25) and 35% higher between 5 and 9 years before retirement (RR 1.35; 95% CI: 1.01–1.80).

The results of the sensitivity analysis are reported in Supplementary Figure S5. Among the not-vulnerable subgroup, as compared to the year of retirement, the risk of suicidality was 54% higher between 5 and 9 years after retirement (RR 1.54; 95% CI 1.10–2.15) and 92% higher after 10 or more years (RR 1.92; 95% CI 1.24–2.96).

a)



b)

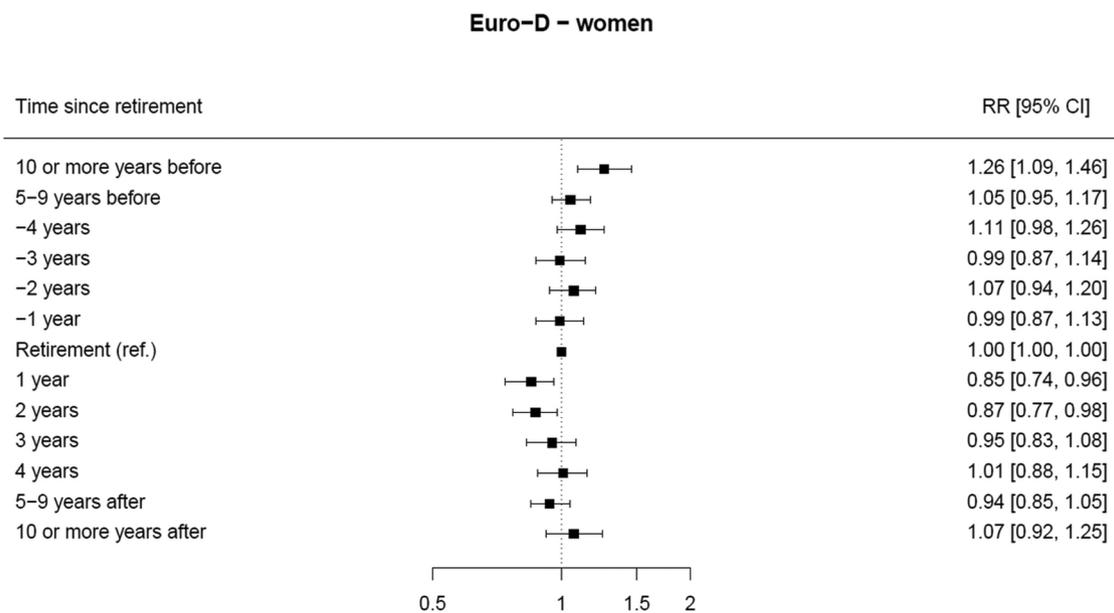


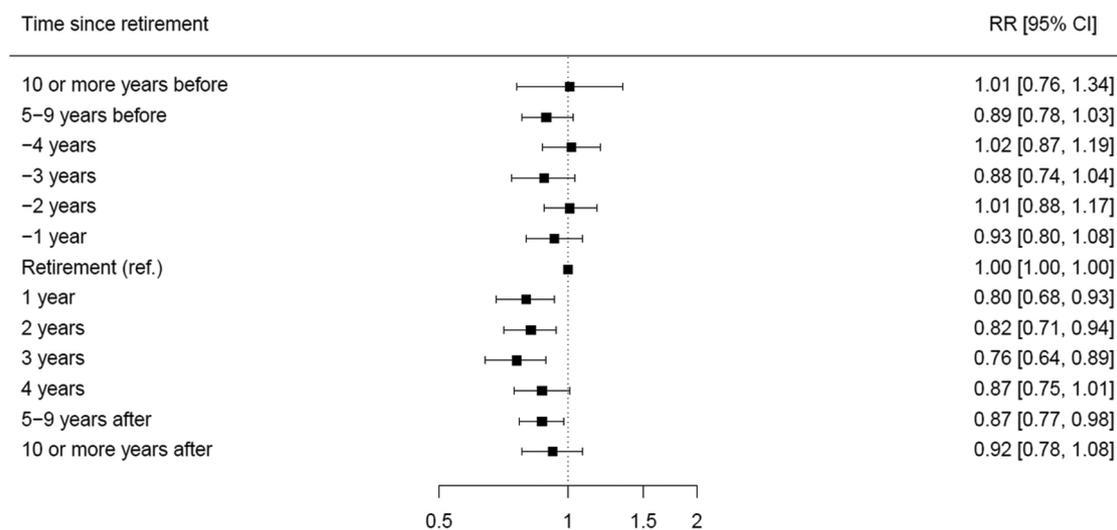
Figure 3. Forest plot of the stratified RR* and corresponding 95% CIs for depression status (Euro-D \geq 4 vs. Euro-D $<$ 4) at different times before and after retirement (reference category: the year of retirement) by sex: (a) men and (b) women.

Discussion

We assessed the short- and long-term effects of retirement transition on depressive symptoms and suicidality in a large European longitudinal cohort of almost 9,000 individuals who transitioned from work to retirement during the study period. Overall, compared to the year of retirement, we observed a 9% to 11% reduction in the risk of depression in the following 3 years. Moreover, in the final 9 years of employment, we observed a risk reduction compared to the earlier period, suggesting a possible anticipatory

effect. A sensitivity analysis performed excluding subjects who reported a diagnosis of depression over the study period showed comparable results. When stratified by selected covariates, estimates remained consistent among females, married individuals, those with an intermediate or higher level of education, former manual workers and those who retired at or before their country's median retirement age. By contrast, an increase in risk was particularly notable among former non-manual workers and late retirees from the tenth year after retirement. As for suicidality, our results

a)

Euro-D – Age at retirement \leq country-specific median

b)

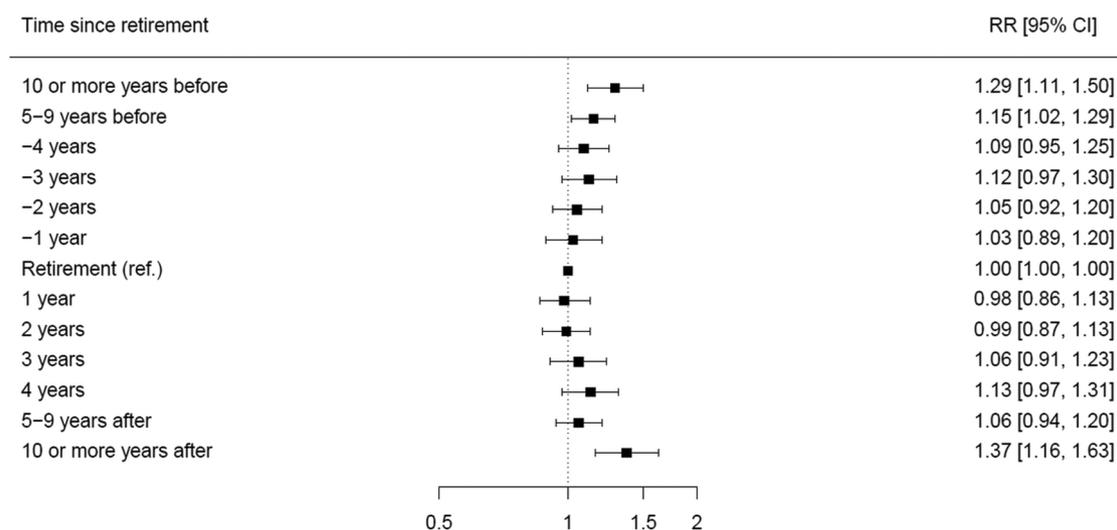
Euro-D – Age at retirement $>$ country-specific median

Figure 4. Forest plot of the stratified RR* and corresponding 95% CIs for depression status (Euro-D \geq 4 vs. Euro-D $<$ 4) at different times before and after retirement (reference category: the year of retirement) by age at retirement: (a) age equal or less than the country-specific median and (b) age greater than the country-specific median.

showed an evident increase in risk only a few years after retirement: in particular, 30% increased risk 5–9 years after retirement and 47% 10 or more years after.

Our systematic review and meta-analysis published in 2021 suggested that retirement might be followed by a reduction in the risk of depression of around 20% (Odone *et al.*, 2021). However, the results of the present study suggest that the supposed retirement's protective effect may be limited to a relatively narrow time window. According to a well-established interpretive model of the adjustments to life transitions, retirement, in the short term, can be

followed by a 'honeymoon phase' in which retirees may experience relief from occupational stress and enjoy a momentary improvement in mood due to new-found freedom and increased availability of leisure time (Atchley, 1976). Indeed, although employment is generally associated with a better mental health status than unemployment (Modini *et al.*, 2016), some work-related factors have been linked to different adverse outcomes, including psychological distress (Harvey *et al.*, 2017). In particular, individuals who perceive their job as more draining and demanding experience increased levels of anxiety and depression (Mc Carthy *et al.*, 2017;

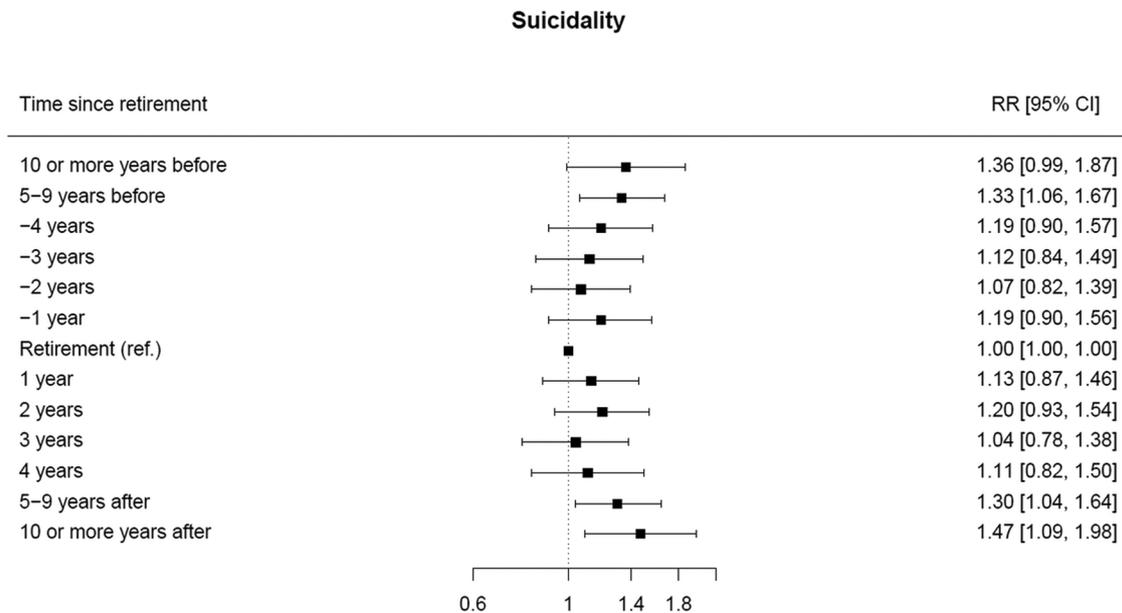


Figure 5. Forest plot of the RR* and corresponding 95% CIs for suicidality risk at different times before and after retirement (reference category: the year of retirement).

Mezuk *et al.*, 2011) and might therefore have a considerable benefit from retirement. Furthermore, due to the disruption of daily routines, consolidated social patterns and lifestyles, retiring can offer the chance to spend time on leisure, social and healthy activities that were sacrificed during working life, fostering an improvement in psychological well-being (Vigezzi *et al.*, 2021). However, it is possible that this initial phase also brings with it certain expectations that, after a while, may become unreasonable and over-optimistic, resulting in disenchantment (Sohier *et al.*, 2021). Other studies confirm that mental health advantages are most evident in the early retirement years (Fleischmann *et al.*, 2020). It is noteworthy that, compared to the previous period, experiencing depressive symptoms in the last years of employment seems to decrease, suggesting that, since the statutory pension age is in most cases predictable, workers may experience anticipatory psychological relief (Vigezzi *et al.*, 2021).

Several factors are likely to influence the reduced risk of depression observed after retirement. In 2007, van Solinge proposed that the relationship between transition to retirement and mental health status not only changes over time but is the result of a complex balance of individual and environmental factors, including demographic aspects, work and retirement transition characteristics and access to cultural and socioeconomic resources (van Solinge, 2007).

First of all, the role of age must be considered: available evidence reports that depression prevalence decreases with ageing (WHO, 2017). Hence, we adjusted our models for age at baseline in order to purge its potentially confounding effect, thus highlighting the independent effect of retirement on mental health status.

Second, according to the 'role hypothesis', retirement causes people to lose part of their social role, networks and stimulation, which can lead to anxiety and depressive symptoms and lower levels of well-being. Several authors observed that men are more susceptible to this phenomenon than women (Wang *et al.*, 2011) with a mitigation of the possible beneficial effects of the 'honeymoon phase'. This may be explained by the fact that distinct coping mechanisms facing the transition to retirement may result from the

primary roles traditionally played at work and home by men and women, respectively (Forman-Hoffman *et al.*, 2008; Moen, 1996). Our results are in accordance with this theory, showing a statistically significant protective effect of the transition to retirement on depressive symptoms only among women.

Third, although retiring too far in advance of cultural and institutional timetables is thought to have a detrimental effect on health (Calvo *et al.*, 2012), we report that those who withdrew from the labour market before their countries' median age at retirement experience a 3-year significant 'honeymoon phase'. Moreover, in contrast with late retirees, these subjects did not show a sustained increase in the risk of depression 10 or more years after pension. In view of the recent pension reforms implemented across Europe, which considerably raised the pensionable age, our findings suggest that greater flexibility in the timing of retirement may positively impact mental well-being, protecting against the risk of depression, especially in the long run. As a matter of fact, flexibility is strictly related to the desirability and degree of control of the transition, considering that involuntary retirement generally has a negative impact on mental health status (Mosca and Barrett, 2016).

Moreover, the greater benefit in terms of mental health outcomes experienced by manual workers after retirement compared to non-manual workers confirms recent evidence from the literature highlighting the crucial role of employment history, time and workload on the risk of mental health disorders' onset in this phase of life (Ardito *et al.*, 2020; de Wind *et al.*, 2014).

Finally, access to social, cultural and financial resources can also mitigate the impact of the psychological consequences of retiring (Arias-de la Torre *et al.*, 2018; Choi *et al.*, 2013; Deeg and Bath, 2003; Park and Kang, 2016; Sabbath *et al.*, 2015; Shiba *et al.*, 2017). In line with our hypotheses, we found that marriage and intermediate or higher education (i.e., a reliable proxy of socioeconomic status) emerged as possible protective factors from the adverse effects of retirement on mental health.

Although previous research has generally linked retirement to an increased risk of suicide and suicidal behaviours (Harwood *et al.*, 2006; Minayo *et al.*, 2012; Page *et al.*, 2021;

Schneider *et al.*, 2011), our results showed a significant increase in the risk of experiencing suicidal thoughts only at least 5 years after retirement, supporting the hypothesis that the first years after the end of working life are accompanied by a reduction in depressive symptoms. Moreover, these findings on the increased suicidal ideation in late life, several years after pension, are in line with the alarming rate of older people committing suicide, particularly those over 80 years of age (Naghavi, 2019). While depression is a major risk factor for suicidal ideation, its role has been generalised too far (De Leo, 2019), especially in old age, when its prevalence tends to decrease (WHO, 2017). Other factors, including social determinants of health (Wilkinson and Marmot, 2003) and the transition to retirement among them, might play a role. By leveraging them, we could improve older people's mental health (De Leo, 2022). After stratification by sex, a significant risk increase in suicidal ideation was observable among men even 2 years after retirement. This latter finding reaffirms the concept that the positive effects of retirement on mental health may be less pronounced in men, and it should presumably still be read in the context of the 'role hypothesis' and related sex differences.

This study needs to be interpreted in light of several strengths and limitations. Among its strengths, we acknowledge the use of high-quality data with standard protocols and definitions across countries and waves, the adoption of a validated evidence-based screening tool for depression risk and the conduction of both stratified and sensitivity analysis to test the role of determinants and our results' consistency in selected subgroups. More importantly, a longitudinal cohort analysis allowed us to study the most extended possible follow-up period within SHARE. Limitations of our study include possible information bias due to the self-reported symptoms assessment and potential recall bias. Moreover, differences in retirement policies across the included countries that may have affected exits from employment should have been considered. Given that the study cohort was selected following rigorous but subjective criteria, as done in previous studies which analysed the same population (Bertuccio *et al.*, 2023), the representativeness of the cohort and the generalizability of our results might be limited.

If confirmed by future studies, our findings could support evidence-based health and welfare policies as well as the planning and implementation of appropriate and targeted interventions centred on the most vulnerable individuals. On the one hand, primary mental health interventions might fruitfully support social roles and promote healthy lifestyles (Lindwall *et al.*, 2017) so as to reduce the risk of depression and suicide in old age (Lapierre *et al.*, 2011). More multidisciplinary efforts should be devoted to boosting and prolonging in the long term the benefits of retirement on mental health status, exploiting life-course transitions' tendency to bring along health-related changes and synchronising them with public health, prevention and health promotion interventions (Ben-Shlomo and Kuh, 2002; Heaven *et al.*, 2016). On the other hand, although the pensionable age is set to increase in Organization for Economic Co-operation and Development (OECD) countries (Eisen *et al.*, 2022), our findings suggest that the adverse health effects of late retirement may have been underestimated and should be taken into account in cost-effectiveness assessments of public policies.

Conclusions

Our data complement the accumulating evidence on the impact of retirement and transition to retirement on mental health. More flexibility in the timing of retirement should be granted according

to factors influencing mental health (e.g., sex, education, type of work and marital status) in order to reduce the burden of mental health in old age and reduce the risk of depression and suicidality.

In our ageing society, despite many countries implementing budget cuts to welfare, it is essential to evaluate retirement policies' impacts on healthcare and social support systems and invest in older adults' health and well-being, promoting a culture of resilience and adaptation to the different stages of life and the changes that come with advancing age.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/S2045796023000239>.

Data availability statement. The datasets supporting the conclusions of this study are publicly available from SHARE Research Data Center (<https://releases.sharedatportal.eu/>) upon request.

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Competing interests. The authors declare that they have no competing interests.

Ethical standards. The need for ethics approval and consent to participate in this non-interventional study derived from a secondary analysis of anonymized data was waived.

References

- Abud T, Kounidas G, Martin KR, Werth M, Cooper K and Myint PK (2022) Determinants of healthy ageing: A systematic review of contemporary literature. *Aging Clinical and Experimental Research* **34**, 1215–1223.
- Alicandro G, Malvezzi M, Gallus S, La Vecchia C, Negri E and Bertuccio P (2019) Worldwide trends in suicide mortality from 1990 to 2015 with a focus on the global recession time frame. *International Journal of Public Health* **64**, 785–795.
- Ardito C, Leombruni R, Blane D and d'Errico A (2020) To work or not to work? The effect of higher pension age on cardiovascular health. *Industrial Relations: A Journal of Economy and Society* **59**, 399–434.
- Arias-de la Torre J, Vilagut G, Martín V, Molina AJ and Alonso J (2018) Prevalence of major depressive disorder and association with personal and socio-economic factors. Results for Spain of the European Health Interview Survey 2014–2015. *Journal of Affective Disorders* **239**, 203–207.
- Atchley RC (1976) *The Sociology of Retirement*. Hoboken, New Jersey: John Wiley & Sons.
- Ben-Shlomo Y and Kuh D (2002) A life course approach to chronic disease epidemiology: Conceptual models, empirical challenges and interdisciplinary perspectives. *International Journal of Epidemiology* **31**, 285–293.
- Bertuccio P, G Pietro, Mosconi G, Gallus S and Odone A (2023) Transition to retirement impact on smoking habit: results from a longitudinal analysis within the Survey of Health, Ageing and Retirement in Europe (SHARE) project. *Aging Clinical and Experimental Research*. Epub ahead of print.

- Börsch-Supan A, Brandt M, Hunkler C, Kneip T, Korbmacher J, Malter F, Schaan B, Stuck S and Zuber S (2013) Data resource profile: The Survey of Health, Ageing and Retirement in Europe (SHARE). *International Journal of Epidemiology* **42**, 992–1001.
- Börsch-Supan A, Hank K and Jürges H (2005) A new comprehensive and international view on ageing: Introducing the 'Survey of Health, Ageing and Retirement in Europe'. *European Journal of Ageing* **2**, 245–253.
- Bossé R, Aldwin CM, Levenson MR and Workman-Daniels K (1991) How stressful is retirement? Findings from the Normative Aging Study. *Journal of Gerontology* **46**, 9–14.
- Calvo E, Sarkisian N and Tamborini CR (2012) Causal effects of retirement timing on subjective physical and emotional health. *The Journals of Gerontology: Series B* **68**, 73–84.
- Choi KS, Stewart R and Dewey M (2013) Participation in productive activities and depression among older Europeans: Survey of Health, Ageing and Retirement in Europe (SHARE). *International Journal of Geriatric Psychiatry* **28**, 1157–1165.
- Deeg DJ and Bath PA (2003) Self-rated health, gender, and mortality in older persons: Introduction to a special section. *The Gerontologist* **43**, 369–371.
- De Leo D (2019) Suicidal behavior in late life: Reasons and reactions to it. *International Psychogeriatrics* **31**, 1531–1533.
- De Leo D (2022) Late-life suicide in an aging world. *Nature Aging* **2**, 7–12.
- De Leo D, Draper BM, Snowden J and Kólves K (2013) Suicides in older adults: A case-control psychological autopsy study in Australia. *Journal of Psychiatric Research* **47**, 980–988.
- d'Errico A, Ardito C, Leombruni R, Ricceri F, Costa G, Sacerdote C, Odone A, Amerio A, Ardito C, Carioli G, Costa G, d'Errico A, Fontana D, Frascella B, Gaetti G, Gentile L, Gianfredi V, Leombruni R, Odone A, Ricceri F, Sacerdote C, Stuckler D, Vigezzi GP, Zengarini N and the 'Italian Working Group on R and Health' (2022) Working conditions and health among Italian ageing workers. *Social Indicators Research* **162**, 1043–1067.
- de Wind A, Geuskens GA, Ybema JF, Blatter BM, Burdorf A, Bongers PM and van der Beek AJ (2014) Health, job characteristics, skills, and social and financial factors in relation to early retirement—results from a longitudinal study in the Netherlands. *Scandinavian Journal of Work, Environment & Health* **40**, 186–194.
- Eibich P (2015) Understanding the effect of retirement on health: Mechanisms and heterogeneity. *Journal of Health Economics* **43**, 1–12.
- Eisen B, Lafleur S, and Clemens J (2022) The age of eligibility for public retirement programs in the OECD: 2022 Update. Vancouver, Canada: Fraser Institute.
- Eurostat (2019) Looking at the lives of older people in the EU. *Publications Office of the European Union, Luxembourg*.
- Fleischmann M, Xue B and Head J (2020) Mental health before and after retirement—assessing the relevance of psychosocial working conditions: The Whitehall II prospective study of British Civil Servants. *The Journals of Gerontology: Series B* **75**, 403–413.
- Forman-Hoffman VL, Richardson KK, Yankey JW, Hillis SL, Wallace RB and Wolinsky FD (2008) Retirement and weight changes among men and women in the health and retirement study. *The Journal of Gerontology, Series B: Psychological Sciences and Social Sciences* **63**, S146–S153.
- Harvey SB, Modini M, Joyce S, Milligan-Saville JS, Tan L, Mykletun A, Bryant RA, Christensen H and Mitchell PB (2017) Can work make you mentally ill? A systematic meta-review of work-related risk factors for common mental health problems. *Occupational and Environmental Medicine* **74**, 301–310.
- Harwood DM, Hawton K, Hope T, Harriss L and Jacoby R (2006) Life problems and physical illness as risk factors for suicide in older people: A descriptive and case-control study. *Psychological Medicine* **36**, 1265–1274.
- Heaven B, O'Brien N, Evans EH, White M, Meyer TD, Mathers JC and Moffatt S (2016) Mobilizing resources for well-being: Implications for developing interventions in the retirement transition. *The Gerontologist* **56**, 615–629.
- Henning G, Lindwall M and Johansson B (2016) Continuity in well-being in the transition to retirement. *GeroPsych: The Journal of Gerontopsychology and Geriatric Psychiatry* **29**, 225–237.
- Hu T, Zhao X, Wu M, Li Z, Luo L, Yang C and Yang F (2022) Prevalence of depression in older adults: A systematic review and meta-analysis. *Psychiatry Research* **311**, 114511.
- ILO (2012) International Standard Classification of Occupations 2008 (ISCO-08): Structure, Group Definitions and Correspondence Tables. Geneva, Switzerland: International Labour Office.
- Kuhn A (2018) The complex effects of retirement on health. *IZA World of Labor*.
- Lapierre S, Erlangsen A, Waern M, De Leo D, Oyama H, Socco P, Gallo J, Szanto K, Conwell Y, Draper B and Quinnett P (2011) Crisis: The Journal of Crisis Intervention and Suicide Prevention. *Crisis* **32**, 88–98.
- Lindwall M, Berg AI, Bjälkebring P, Buratti S, Hansson I, Hassing L, Henning G, Kivi M, König S, Thorvaldsson V and Johansson B (2017) Psychological health in the retirement transition: Rationale and first findings in the Health, Ageing and Retirement Transitions in Sweden (HEARTS) Study. *Frontiers in Psychology* **8**, 1634.
- Maskileysen D, Seddig D, and Davidov E (2021) The EURO-D measure of depressive symptoms in the aging population: Comparability Across European Countries and Israel. *Frontiers in Political Science* **90**, 665004.
- Mc Carthy VJC, Cronly J and Perry IJ (2017) Job characteristics and mental health for older workers. *Occupational Medicine* **67**, 394–400.
- Mendonca Lima CA (2011) Social determinants of health and promotion of mental health in old age: The role of policies. In *International Psychogeriatrics*. New York, NY: Cambridge University Press, S270–S270.
- Mezuk B, Bohnert AS, Ratliff S and Zivin K (2011) Job strain, depressive symptoms, and drinking behavior among older adults: Results from the health and retirement study. *The Journal of Gerontology, Series B: Psychological Sciences and Social Sciences* **66**, 426–434.
- Minayo MC, Meneghel SN and Cavalcante FG (2012) Suicide of elderly men in Brazil. *Ciência & Saúde Coletiva* **17**, 2665–2674.
- Modini M, Joyce S, Mykletun A, Christensen H, Bryant RA, Mitchell PB and Harvey SB (2016) The mental health benefits of employment: Results of a systematic meta-review. *Australasian Psychiatry* **24**, 331–336.
- Moen P (1996) A life course perspective on retirement, gender, and well-being. *Journal of Occupational Health Psychology* **1**, 131–144.
- Mosca I and Barrett A (2016) The impact of voluntary and involuntary retirement on mental health: Evidence from older Irish adults. *The Journal of Mental Health Policy and Economics* **19**, 33–44.
- Naghavi M (2019) Global, regional, and national burden of suicide mortality 1990 to 2016: Systematic analysis for the Global Burden of Disease Study 2016. *The British Medical Journal* **364**, 194.
- Odone A, Gianfredi V, Vigezzi GP, Amerio A, Ardito C, d'Errico A, Stuckler D and Costa G (2021) Does retirement trigger depressive symptoms? A systematic review and meta-analysis. *Epidemiology and Psychiatric Sciences* **30**, e77.
- Oksanen T and Virtanen M (2012) Health and retirement: A complex relationship. *European Journal of Ageing* **9**, 221–225.
- Page A, Sperandei S, Spittal MJ, Milner A and Pirkis J (2021) The impact of transitions from employment to retirement on suicidal behaviour among older aged Australians. *Social Psychiatry and Psychiatric Epidemiology* **56**, 759–771.
- Park H and Kang MY (2016) Effects of voluntary/involuntary retirement on their own and spouses' depressive symptoms. *Comprehensive Psychiatry* **66**, 1–8.
- Portnoi VA (1981) The natural history of retirement: Mainly good news. *JAMA* **245**, 1752–1754.
- Prince MJ, Reischies F, Beekman AT, Fuhrer R, Jonker C, Kivela SL, Lawlor BA, Lobo A, Magnusson H, Fichter M, van Oyen H, Roelands M, Skoog I, Turrina C and Copeland JR (1999) Development of the EURO-D scale – A European Union initiative to compare symptoms of depression in 14 European centres. *The British Journal of Psychiatry* **174**, 330–338.
- Riley MW and Riley JW, Jr (1994) Structural lag: Past and future. In *Age and structural lag: Society's failure to provide meaningful opportunities in work, family, and leisure*. Hoboken, New Jersey: John Wiley & Sons.
- Sabbath EL, Lubben J, Goldberg M, Zins M and Berkman LF (2015) Social engagement across the retirement transition among 'young-old' adults in the French GAZEL cohort. *European Journal of Ageing* **12**, 311–320.
- Schneider B, Grebner K, Schnabel A, Hampel H, Georgi K and Seidler A (2011) Impact of employment status and work-related factors on risk of

- completed suicide. A case-control psychological autopsy study. *Psychiatry Research* 190, 265–270.
- Scott KM, Lim C, Al-Hamzawi A, Alonso J, Bruffaerts R, Caldas-de-almeida JM, Florescu S, de Girolamo G, Hu C, de Jonge P, Kawakami N, Medina-Mora ME, Moskalewicz J, Navarro-Mateu F, O'Neill S, Piazza M, Posada-Villa J, Torres Y and Kessler RC (2016) Association of mental disorders with subsequent chronic physical conditions: World Mental Health Surveys From 17 Countries. *JAMA Psychiatry* 73, 150–158.
- Shah A, Bhat R, Zarate-Escudero S, DeLeo D and Erlangsen A (2016) Suicide rates in five-year age-bands after the age of 60 years: The international landscape. *Aging & Mental Health* 20, 131–138.
- Shiba K, Kondo N, Kondo K and Kawachi I (2017) Retirement and mental health: Dose social participation mitigate the association? A fixed-effects longitudinal analysis. *BMC Public Health* 17, 526.
- Sohier L, Van Ootegem L and Verhofstadt E (2021) Well-being during the transition from work to retirement. *Journal of Happiness Studies* 22, 263–286.
- TheWorldBank (2022) The world bank. Countries. <https://data.worldbank.org/country> (accessed 15 January 2023).
- van der Heide I, van Rijn RM, Robroek SJ, Burdorf A and Proper KI (2013) Is retirement good for your health? A systematic review of longitudinal studies. *BMC Public Health* 13, 1180.
- van Solinge H (2007) Health change in retirement: A longitudinal study among older workers in The Netherlands. *Research on Aging* 29, 225–256.
- Vigezzi GP, Gaetti G, Gianfredi V, Frascella B, Gentile L, d'Errico A, Stuckler D, Ricceri F, Costa G and Odone A (2021) Transition to retirement impact on health and lifestyle habits: Analysis from a nationwide Italian cohort. *BMC Public Health* 21, 1670.
- Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, Abbasi-Kangevari M, Abbastabar H, Abd-Allah F, Abdelalim A, Abdollahi M, Abdollahpour I, Abolhassani H, Aboyans V, Abrams EM, Abreu LG, Abrigo MRM, Abu-Raddad LJ, Abushouk AI, Acebedo A, Ackerman IN, Adabi M, Adamu AA, Adebayo OM, Adekanmbi V, Adelson JD, Adetokunboh OO, Adham D, Afshari M, Afshin A, Agarath EE, Agarwal G, Agesa KM, Aghaali M, Aghamir SMK, Agrawal A, Ahmad T, Ahmadi A, Ahmadi M, Ahmadi H, Ahmadpour E, Akalu TY, Akinyemi RO, Akinyemiju T, Akombi B, Al-Aly Z, Alam N, Alam S, Alam T, Alanzi TM, Albertson SB, Alcalde-Rabanal JE, Alema NM, Ali M, Ali S, Alicandro G, Alijanzadeh M, Alinia C, Alipour V, Aljunid SM, Alla F, Allebeck P, Almasi-Hashiani A, Alonso J, Al-Raddadi RM, Altirkawi KA, Alvis-Guzman N, Alvis-Zakzuk NJ, Amini S, Amini-Rarani M, Aminorroaya A, Amiri F, Amit AML, Amugsi DA, Amul GGH, Anderlini D, Andrei CL, Andrei T, Anjomshoa M, Ansari F, Ansari I, Ansari-Moghaddam A, Antonio CAT, Antony CM, Antriyandarti E, Anvari D, Anwer R, Arabloo J, Arab-Zozani M, Aravkin AY, Ariani F, Ärnlöv J, Aryal KK, Arzani A, Asadi-Aliabadi M, Asadi-Pooya AA, Asghari B, Ashbaugh C, Atnafu DD, Atre SR, Ausloos F, Ausloos M, Ayala QBP, Ayano G, Ayanoore MA, Aynalem YA, Azari S, Azarian G, Azene ZN, Babae E, Badawi A, Bagherzadeh M, Bakhshaei MH, Bakhtiari A, Balakrishnan S, Balalla S, Balassyano S, Banach M, Banik PC, Bannick MS, Bante AB, Baraki AG, Barboza MA, Barker-Collo SL, Barthelme CM, Barua L, Barzegar A, Basu S, Baune BT, Bayati M, Bazmandegan G, Bedi N, Beghi E, Béjot Y, Bello AK, Bender RG, Bennett DA, Bennett FB, Bensenor IM, Benziger CP, Berhe K, Bernabe E, Bertolacci GJ, Bhageerath R, Bhala N, Bhandari D, Bhardwaj P, Bhattacharyya K, Bhutta ZA, Bibi S, Biehler MH, Bikbov B, Bin SMS, Biondi A, Birihane BM, Bisanzio D, Bisignano C, Biswas RK, Bohloulou S, Bohloulou M, Bolla SRR, Boloor A, Boon-Dooley AS, Borges G, Borzi AM, Bourne R, Brady OJ, Brauer M, Brayne C, Breitborde NJK, Brenner H, Briant PS, Briggs AM, Briko NI, Britton GB, Bryazka D, Buchbinder R, Bumgarner BR, Busse R, Butt ZA, Caetano dos Santos FL, Cámara LLAA, Campos-Nonato IR, Car J, Cárdenas R, Carreras G, Carrero JJ, Carvalho F, Castaldelli-Maia JM, Castañeda-Orjuela CA, Castelpietra G, Castle CD, Castro F, Catalá-López E, Causey K, Cederroth CR, Cercy KM, Cerin E, Chandan JS, Chang AR, Charlson FJ, Chattu VK, Chaturvedi S, Chimed-Ochir O, Chin KL, Cho DY, Christensen H, Chu D-T, Chung MT, Cicuttini FM, Ciobanu LG, Cirillo M, Collins EL, Compton K, Conti S, Cortesi PA, Costa VM, Cousin E, Cowden RG, Cowie BC, Cromwell EA, Cross DH, Crowe CS, Cruz JA, Cunningham M, Dahlawi SMA, Damiani G, Dandona L, Dandona R, Darwesh AM, Daryani A, Das JK, Das GR, Neves J, Dávila-Cervantes CA, Davletov K, De LD, Dean FE, DeCleene NK, Deen A, Degenhardt L, Dellavalle RP, Demeke FM, Demsie DG, Denova-Gutiérrez E, Dereje ND, Derveniz N, Desai R, Desalew A, Dessie GA, Dharmaratne SD, Dhungana GP, Dianatinasab M, Diaz D, Dibaji Forooshani ZS, Dingels ZV, Dirac MA, Djalalinia S, Do HT, Dokova K, Dorostkar F, Doshi CP, Doshmangir L, Douiri A, Doxey MC, Driscoll TR, Dunachie SJ, Duncan BB, Duraes AR, Eagan AW, Ebrahimi KM, Edvardsson D, Ehrlich JR, El Nahas N, El Sayed I, El Tantawi M, Elbarazi I, Elgendy IY, Elhabashy HR, El-Jaafari SI, Elyazar IRF, Emamian MH, Emmons-Bell S, Erskine HE, Eshrati B, Eskandari S, Esmailnejad S, Esmailzadeh F, Esteghamati A, Estep K, Etemadi A, Etitso AE, Farahmand M, Faraj A, Fareed M, Faridnia R, Farinha CSeS, Farioli A, Faro A, Faruque M, Farzadfar F, Fattahi N, Fazlzadeh M, Feigin VL, Feldman R, Fereshtehnejad S-M, Fernandes E, Ferrari AJ, Ferreira ML, Filip I, Fischer F, Fisher JL, Fitzgerald R, Flohr C, Flor LS, Foigt NA, Folleyan MO, Force LM, Fornari C, Foroutan M, Fox JT, Freitas M, Fu W, Fukumoto T, Furtado JM, Gad MM, Gakidou E, Galles NC, Gallus S, Gamkrelidze A, Garcia-Basteiro AL, Gardner WM, Geberemariam BS, Gebrehiwot AM, Gebremedhin KB, Gebreslassie AAAA, Gershberg Hayoon A, Gething PW, Ghadimi M, Ghadiri K, Ghafourifard M, Ghajar A, Ghamari F, Ghahshgaae A, Ghiasvand H, Ghith N, Gholamian A, Gilani SA, Gill PS, Gitimoghaddam M, Giussani G, Goli S, Gomez RS, Gopalani SV, Gorini G, Gorman TM, Gottlich HC, Goudarzi H, Goulart AC, Goulart BNG, Grada A, Grivna M, Grosso G, Gubari MIM, Gugnani HC, Guimaraes ALS, Guimaraes RA, Guled RA, Guo G, Guo Y, Gupta R, Haagsma JA, Haddock B, Hafezi-Nejad N, Hafiz H, Hagins H, Haile LM, Hall BJ, Halvaei I, Hamadeh RR, Hamagharib Abdullah K, Hamilton EB, Han C, Han H, Hankey GJ, Haro JM, Harvey JD, Hasaballah AI, Hasanizadeh A, Hashemian M, Hassanipour S, Hassankhani H, Havmoeller RJ, Hay RJ, Hay SI, Hayat K, Heidari B, Heidari G, Heidari-Soureshjani R, Hendrie D, Henrikson HJ, Henry NJ, Herteliu C, Heydarpour F, Hird TR, Hoek HW, Hole MK, Holla R, Hoogar P, Hosgood HD, Hosseinzadeh M, Hostiuc M, Hostiuc S, Houssein M, Hoy DG, Hsairi M, Hsieh VC-r, Hu G, Huda TM, Hugo FN, Huynh CK, Hwang B-F, Iannucci VC, Ibitoye SE, Ikuta KS, Ilesanmi OS, Ilic IM, Ilic MD, Inbaraj LR, Ippolito H, Irvani SSN, Islam MM, Islam M, Islam SMS, Islami F, Iso H, Ivers RQ, Iwu CCD, Iyamu IO, Jaafari J, Jacobsen KH, Jadidi-Niaragh F, Jafari H, Jafarinia M, Jahagirdar D, Jahani MA, Jahanmehr N, Jakovljevic M, Jalali A, Jalilian F, James SL, Janjani H, Janodia MD, Jayatilake AU, Jeemon P, Jenabi E, Jha RP, Jha V, Ji JS, Jia P, John O, John-Akinola YO, Johnson CO, Johnson SC, Jonas JB, Joo T, Joshi A, Jozwiak JJ, Jürisson M, Kabir A, Kabir Z, Kalani H, Kalani R, Kalankesh LR, Kalhor R, Kamiab Z, Kanchan T, Karami Matin B, Karch A, Karim MA, Karimi SE, Kassa GM, Kassebaum NJ, Katikireddi SV, Kawakami N, Kayode GA, Keddie SH, Keller C, Kerelidze M, Khafaie MA, Khalid N, Khan M, Khatab K, Khater MM, Khatib MN, Khayamzadeh M, Khodayari MT, Khundkar R, Kianipour N, Kieling C, Kim D, Kim Y-E, Kim YJ, Kimokoti RW, Kisa A, Kisa S, Kissimova-Skarbek K, Kivimäki M, Kneib CJ, Knudsen AKS, Kocarnik JM, Kolola T, Kopec JA, Kosen S, Koul PA, Koyanagi A, Kravchenko MA, Krishan K, Krohn KJ, Kuate Defo B, Kucuk Bicer B, Kumar GA, Kumar M, Kumar P, Kumar V, Kumaresh G, Kurmi OP, Kusuma D, Kyu HH, La Vecchia C, Lacey B, Lal DK, Lalloo R, Lam JO, Lami FH, Landires I, Lang JJ, Lansingh VC, Larson SL, Larsson AO, Lasrado S, Lassi ZS, Lau KM-M, Lavados PM, Lazarus JV, Ledesma JR, Lee PH, Lee SWH, LeGrand KE, Leigh J, Leonardi M, Lescinsky H, Leung J, Levi M, Lewington S, Li S, Lim L-L, Lin C, Lin R-T, Linehan C, Linn S, Liu H-C, Liu S, Liu Z, Looker KJ, Lopez AD, Lopukhov PD, Lorkowski S, Lotufo PA, Lucas TCD, Lugo A, Lunevicius R, Lyons RA, Ma J, MacLachlan JH, Maddison ER, Maddison R, Madotto F, Mahasha PW, Mai HT, Majeed A, Maled V, Maleki S, Malekzadeh R, Malta DC, Mamun AA, Manafi A, Manafi N, Manguerra H, Mansouri B, Mansournia MA, Mantilla Herrera AM, Maravilla JC, Marks A, Martins-Melo FR, Martopullo I, Masoumi SZ, Massano J, Massenburg BB, Mathur MR, Maulik PK, McAlindin C, McGrath JJ, McKee M, Mehndiratta MM, Mehri F, Mehta KM, Meitei WB, Memiah PTN, Mendoza W, Menezes RG, Mengesha EW, Mengesha

- MB, Mereke A, Meretoja A, Meretoja TJ, Mestrovic T, Miazgowski B, Miazgowski T, Michalek IM, Mihretie KM, Miller TR, Mills EJ, Mirica A, Mirzakhimov EM, Mirzaei H, Mirzaei M, Mirzaei-Alavijeh M, Misganaw AT, Mithra P, Moazen B, Moghadaszadeh M, Mohamadi E, Mohammad DK, Mohammad Y, Mohammad Gholi Mezerji N, Mohammadian-Hafshejani A, Mohammadifard N, Mohammadpourhodki R, Mohammed S, Mokdad AH, Molokhia M, Momen NC, Monasta L, Mondello S, Mooney MD, Moosazadeh M, Moradi G, Moradi M, Moradi-Lakeh M, Moradzadeh R, Moraga P, Morales L, Morawska L, Moreno Velásquez I, Morgado-da-Costa J, Morrison SD, Mosser JE, Mouodi S, Mousavi SM, Mousavi Khaneghah A, Mueller UO, Munro SB, Muriithi MK, Musa KI, Muthupandian S, Naderi M, Nagarajan AJ, Nagel G, Naghshtabrizi B, Nair S, Nandi AK, Nangia V, Nansseu JR, Nayak VC, Nazari J, Negoï I, Negoï RI, Netsere HBN, Ngunjiri JW, Nguyen CT, Nguyen J, Nguyen M, Nguyen M, Nichols E, Nigatu D, Nigatu YT, Nikbakhsh R, Nixon MR, Nnaji CA, Nomura S, Norrving B, Noubiap JJ, Nowak C, Nunez-Samudio V, Ofoïu A, Oancea B, Odell CM, Ogbo FA, Oh I-H, Okunga EW, Oladnabi M, Olagunju AT, Olusanya BO, Olusanya JO, Oluwasanu MM, Omar Bali A, Omer MO, Ong KL, Onwujekwe OE, Orji AU, Orpana HM, Ortiz A, Ostroff SM, Otstavnov N, Otstavnov SS, Øverland S, Owolabi MO, Padubidri JR, Pakhare AP, Palladino R, Pana A, Panda-Jonas S, Pandey A, Park E-K, Parmar PGK, Pasupula DK, Patel SK, Paternina-Cacedo AJ, Pathak A, Pathak M, Patten SB, Patton GC, Paudel D, Pazoki Toroudi H, Peden AE, Pennini A, Pepito VCF, Peprah EK, Pereira A, Pereira DM, Perico N, Pham HQ, Phillips MR, Pigott DM, Pilgrim T, Pilz TM, Pirsaeheb M, Plana-Ripoll O, Plass D, Pokhrel KN, Polibin RV, Polinder S, Polkinghorne KR, Postma MJ, Pourjafar H, Pourmalek F, Pourmirza Kalhori R, Poursams A, Poznańska A, Prada SI, Prakash V, Pribadi DRA, Pupillo E, Quazi Syed Z, Rabiee M, Rabiee N, Radfar A, Rafiee A, Rafiei A, Raggi A, Rahimi-Movaghar A, Rahman MA, Rajabpour-Sanati A, Rajati F, Ramezanzadeh K, Ranabhat CL, Rao PC, Rao SJ, Rasella D, Rastogi P, Rathi P, Rawaf DL, Rawaf S, Rawal L, Razo C, Redford SB, Reiner RC, Jr., Reinig N, Reitsma MB, Remuzzi G, Renjith V, Renzaho AMN, Resnikoff S, Rezaei N, Rezaei Ms, Rezapour A, Rhinehart P-A, Riahi SM, Ribeiro ALP, Ribeiro DC, Ribeiro D, Rickard J, Roberts NLS, Roberts S, Robinson SR, Roeber L, Rolfe S, Ronfani L, Roshandel G, Roth GA, Rubagotti E, Rumisha SF, Sabour S, Sachdev PS, Saddik B, Sadeghi E, Sadeghi M, Saeidi S, Safi S, Safiri S, Sagar R, Sahebkar A, Sahraian MA, Sajadi SM, Salahshoor MR, Salamati P, Salehi Zahabi, Salem H, Salem MRR, Salimzadeh H, Salomon JA, Salz I, Samad Z, Samy AM, Sanabria J, Santomauro DF, Santos IS, Santos JV, Santric-Milicevic MM, Saraswathy SYI, Sarmiento-Suárez R, Sarrafzadegan N, Sartorius B, Sarveazad A, Sathian B, Sathish T, Sattin D, Sbarra AN, Schaeffer LE, Schiavolin S, Schmidt MI, Schutte AE, Schwebel DC, Schwendicke F, Senbeta AM, Senthilkumaran S, Sepanlou SG, Shackelford KA, Shadid J, Shahabi S, Shaheen AA, Shaikh MA, Shalash AS, Shams-Beyranvand M, Shamsizadeh M, Shannawaz M, Sharafi K, Sharara F, Sheena BS, Sheikhtaheri A, Shetty RS, Shibuya K, Shiferaw WS, Shigematsu M, Shin JI, Shiri R, Shirkoobi R, Shrim MG, Shuval K, Siabani S, Sigfusdottir ID, Sigurvinsdottir R, Silva JP, Simpson KE, Singh A, Singh JA, Skiadaresi E, Skou ST, Skryabin VY, Sobngwi E, Sokhan A, Soltani S, Sorensen RJD, Soriano JB, Sorrie MB, Soyiri IN, Sreeramareddy CT, Stanaway JD, Stark BA, Ștefan SC, Stein C, Steiner C, Steiner TJ, Stokes MA, Stovner LJ, Stubbs JL, Sudaryanto A, Sufiyana MaB, Sulo G, Sultan I, Sykes BL, Sylte DO, Szócska M, Tabarés-Seisdedos R, Tabb KM, Tadakamadla SK, Taherkhani A, Tajdini M, Takahashi K, Taveira N, Teagle WL, Teame H, Tehrani-Banhashemi A, Teklehaimanot BF, Terrason S, Tessema ZT, Thankappan KR, Thomson AM, Tohidinik HR, Tonelli M, Topor-Madry R, Torre AE, Touvier M, Tovani-Palone MRR, Tran BX, Travillian R, Troeger CE, Truelsen TC, Tsai AC, Tsatsakis A, Tudor Car L, Tyrovolas S, Uddin R, Ullah S, Undurraga EA, Unnikrishnan B, Vacante M, Vakilian A, Valdez PR, Varughese S, Vasankari TJ, Vasseghian Y, Venketasubramanian N, Violante FS, Vlassov V, Vollset SE, Vongpradith A, Vukovic A, Vukovic R, Waheed Y, Walters MK, Wang J, Wang Y, Wang Y-P, Ward JL, Watson A, Wei J, Weintraub RG, Weiss DJ, Weiss J, Westerman R, Whisnant JL, Whiteford HA, Wiangkham T, Wiens KE, Wijeratne T, Wilner LB, Wilson S, Wojtyniak B, Wolfe CDA, Wool EE, Wu A-M, Wulf Hanson S, Wunrow HY, Xu G, Xu R, Yadgir S, Yahyazadeh Jabbari SH, Yamagishi K, Yaminifrooz M, Yano Y, Yaya S, Yazdi-Fezabadi V, Yearwood JA, Yeheyis TY, Yeshitila YG, Yip P, Yonemoto N, Yoon S-J, Yousefi Lebni J, Younis MZ, Younker TP, Yousefi Z, Yousefifard M, Yousefinezhadhi T, Yousef AY, Yu C, Yusefzadeh H, Zahirian Moghadam T, Zaki L, Zaman SB, Zamani M, Zamanian M, Zandian H, Zangeneh A, Zastrozhin MS, Zewdie KA, Zhang Y, Zhang Z-J, Zhao JT, Zhao Y, Zheng P, Zhou M, Ziapour A, Zimsen SRM, Naghavi M and Murray CJL (2020) Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. *The Lancet* 396, 1204–1222.
- Wang M, Henkens K and van Solinge H (2011) A review of theoretical and empirical advancements. *American Psychologist* 66, 204–213.
- Westerlund H, Kivimäki M, Singh-Manoux A, Melchior M, Ferrie JE, Pentti J, Jokela M, Leineweber C, Goldberg M, Zins M and Vahtera J (2009) Self-rated health before and after retirement in France (GAZEL): A cohort study. *The Lancet* 374, 1889–1896.
- WHO (2017) Depression and other common mental disorders: Global health estimates. World Health Organization.
- WHO (2021) UN decade of healthy ageing 2021–2030. Geneva, Switzerland: World Health Organization. <https://www.who.int/initiatives/decade-of-healthy-ageing> (accessed 10 April 2021).
- Wilkinson RG and Marmot M (2003) Social determinants of health: The solid facts. Geneva, Switzerland: World Health Organization.
- Zeduri M, Vigezzi GP, Carioli G, Lugo A, Stival C, Amerio A, Gorini G, Pacifici R, Politi P, Gallus S and Odone A (2022) COVID-19 lockdown impact on familial relationships and mental health in a large representative sample of Italian adults. *Social Psychiatry and Psychiatric Epidemiology* 57, 1543–1555.
- Zenebe Y, Akele B, WS M and Necho M (2021) Prevalence and determinants of depression among old age: A systematic review and meta-analysis. *Annals of General Psychiatry* 20, 55.