DOI: 10.1111/labr.12205

ORIGINAL ARTICLE

Work beyond the age of 50. What role for mental versus physical health?

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Abstract

This paper contributes to the literature on old employment barriers by exploring empirically the relative importance of mental versus physical health in determining work. It combines regression and variance decomposition analyses to quantify the respective role of mental and physical health. The data used are from SHARE and inform in great detail on the health but also work status (employment and hours) of individuals aged 50+, interviewed between 2004 and 2017 in 21 European countries. The main result of the paper is that of the rather limited role of mental health – in comparison with physical health – in accounting for older individuals' work. The paper also shows that health (physical or mental) is much better at predicting old people's propensity to be in employment than the number of hours they work. Finally, the paper reveals that, in comparison with women, men's work appears to be more driven by their health status.

KEYWORDS

Ageing, Mental v.s. Physical Health, Regressions, Variance Decomposition, Work

JEL CLASSIFICATION

J22; I10; J26; J14

1 | INTRODUCTION

This paper is about older individuals' employment and more precisely about the barriers they face that may lead to a lower propensity to be in paid employment and/or fewer hours of work. The focus is on the supply side of the labour market, but bearing in mind that when it comes to labour, what we observe is always the result of the interaction of labour supply and labour demand. More exactly, the focus is on the role of health and the relative contribution of mental vs. physical health in determining old people's work. There are, of course, many other barriers to old employment. They will not be examined here. Some of these barriers originate more on the demand side of the labour market (i.e. correspond to some firms' reluctance to employ or recruit older workers) and have been studied by Hutchens (1986), Hutchens (2010), Dorn and Sousa-Poza (2010), Dostie (2011), Skirbekk (2004), van Ours and Stoeldraijer (2011), Vandenberghe (2011), Vandenberghe et al. (2013), Vandenberghe (2013) or Delmez and Vandenberghe (2018). Other barriers point at the supply side of the labour market but should be distinguished from health barriers studied here. Economists have documented the important role of (early)pension schemes and other welfare regimes in enticing people to withdraw early from the labour force (Blöndal and Scarpetta, 1999; Jousten et al., 2010). There is also a large economic literature on joint retirement among dual-worker couples (Michaud et al., 2020).

What is our contribution to the literature on work and health and what are the main elements mobilized in this paper?

First, the main aim of this paper was to quantify the relative importance of mental health is driving key dimensions of work beyond the age of 50, namely the participation in employment and the number of hours people work. By relative, we mean in comparison with physical health. In a sense, the paper is a response to invitations (Layard, 2013) to pay more attention to mental health in labour economics.[1] There are many works of the relationship between physical health and old work or retirement (see French and Jones, 2017 for a recent review), physical health and work capacity (Jousten et al., 2010; Coile et al., 2016; Banks et al., 2016 or Wise, 2017 and Vandenberghe, 2020). Several papers have studied the role of mental health (Catalano et al., 1999; Clarfield, 2009; Frijters et al., 2010; Frijters et al., 2014; Lu et al., 2009; OECD, 2012). Surprisingly, there are few papers, at least authored by economists, that look simultaneously at physical *and* mental health, and try to quantify their respective contribution to work. One exception is Pacheco et al. (2014). Using 2008 data from New Zealand for respondents aged 15–65 (we only consider those aged 50–59), the authors find evidence that both types of health matter a lot for employment (they do not consider hours). Another difference is that they do not focus on estimating the relative importance of mental and physical health. This said, like us, they consider gender differences, and unlike us, they allow for interaction between physical and mental health.

Second, as already mentioned, this paper considers both the extensive (employment) and the intensive margin of work (hours worked when in paid employment). Most existing papers only consider the propensity to be in employment, and do not look at the relationship between (physical or mental) health and the number of hours worked.[2]

Third, the focus here is on people aged 50–59. The choice of this age range is driven by data availability.[3] More fundamentally, it is justified by the wish to capture the relationship between (mental) health and employment that exists in the absence of systematic access to (early)retirement benefits, that is, before workers attain eligibility for public pensions and other replacement benefits. As a robustness check, we replicate the analysis by using only individuals aged 50–54, who we assume are even less likely than those aged 55–59 to access (early)retirement benefits.

Fourth, this paper uses a variance decomposition method to quantify (and compare) the contribution of mental versus physical health to work past the age of 50. Traditionally, economists

rely on the direct comparison of estimated coefficients. But this approach has limitations. One of them is that the underlying metrics differ greatly and compromise interpretation. For instance, when it comes to the propensity to be employed, how to compare the coefficient capturing the contribution of body mass index and those delivered by a categorical variable reflecting people's mental health? To overcome this non-comparability/non-commensurability problem, we propose using the method pioneered by Fields (2003) in labour economics and used more recently by Jusot et al. (2013) in health economics. It consists of combining regression analysis and variance decomposition. Fields (2003) shows how regression models can be supplemented by variance decomposition analyses to learn the relative importance of different explanatory factors.[4] In regression analyses, the emphasis is on coefficients and statistical significance; in decomposition, it is on the information content of the variables in question. In short, the idea is to consider the variance of labour outcomes (employment or hours) explained by the different groups of variables of the model, singularly physical and/or mental health and compute the respective shares that can be attributed to each group. The ratio of these shares provides an estimate of the relative importance of mental vs. physical health in driving work beyond the age of 50.

Fifth and finally, it is worth stressing that we quantify the contribution of mental versus/physical health simultaneously for 21 countries (Austria-AUT, Belgium-BEL, Switzerland-CHE, Czech Rep.-CZE, Denmark-DNK, Spain-ESP, Estonia-EST, France-FRA, Greece-GRC, Croatia-HRV Hungary-HUN, Ireland-IRL, Israel-ISR, Italy-ITA, Luxembourg-LUX, the Netherlands-NLD, Poland-POL, Portugal-PRT, Slovenia-SVN, Spain, Sweden-SWE). And compared to many existing works on health and work this one has the advantage that it uses only a fully harmonized data set: the Survey of Health, Ageing and Retirement in Europe (SHARE).[5]

The rest of this paper is organized as follows. In Section 1, we present our method of analysis. The SHARE data on physical and mental health used in this empirical paper are presented in Section 2. Section 3 presents the main results of the paper, the robustness checks, as well as our discussion of the magnitude of attenuation and justification/reverse causality biases. Section 4 concludes.

2 | METHODOLOGY

The first step of the analysis consists of estimating, using data on individuals i in country j, the relationship between labour outcomes (*EMPL* or *HOURS*) and items reflecting physical (*PHEALTH*) or mental health (*MHEALTH*).

$$Z_{i,j} = \beta_0^Z + \beta_p^Z PHEALTH_{i,j} + \beta_m^Z MHEALTH_{i,j} + \gamma^Z X_{i,j} + \delta_j^Z + \varepsilon_{i,j}^Z \quad (1)$$

with $Z = EMPL, HOURS$, $X_{i,j}$ a list of controls and δ_j the country fixed effects.

The above model can be specified with (*PHEALTH*) and (*MHEALTH*) being (i) indices aggregating the many items in SHARE describing people's health, or (ii) vectors containing the full list of items underpinning these indices. In this paper, the model is estimated using OLS, 2SLS(IV) or Probit as employment (*EMPL*) is a binary labour outcome. The point is that, in a second step, we can use the model-predicted labour outcomes as linearly decomposable measures in both physical and mental health.

$$\widehat{Z}_{i,j} = \widehat{\beta}_0^Z + \widehat{\beta}_p^Z PHEALTH_{i,j} + \widehat{\beta}_m^Z MHEALTH_{i,j} + \widehat{\gamma}^Z X_{i,j} + \widehat{\delta}_j^Z \quad (2)$$

with $Z = EMPL, HOURS$

The, respectively, physical vs. mental health predicted parts are given by

$$\hat{Z}^{p}_{i,j} = \hat{\beta}^{Z}_{p} PHEALTH_{i,j} \tag{3}$$

$$\hat{Z}^{m}_{i,j} = \hat{\beta}^{Z}_{m} MHEALTH_{i,j} \tag{4}$$

with $Z = EMPL, HOURS$

And the parts to be attributed to the control variables and to the country fixed effects correspond to

$$\hat{Z}^{X}_{i,j} = \hat{\gamma}^{Z} X_{i,j} \tag{5}$$

$$\hat{Z}^{\delta}_{i,j} = \hat{\delta}^{Z}_{j} \tag{6}$$

with $Z = EMPL, HOURS$

Following Fields (2003) and Jusot et al. (2013), we propose quantifying the contribution of physical versus mental health to labour outcomes using the variance of the model-predicted labour outcomes $\sigma\left(\hat{Z}_{i,j}\right)$ as a reference. That variance is decomposable by sources. And the decomposition has certain properties.[6] Whatever the exact list of health variables, or estimation method used (OLS, IV, Probit) for estimating Equation (1), the decomposition of the model-explained variance is simply given by the covariance between each regressor (or group of regressors) and the labour market outcome of interest.

$$\sigma\left(\hat{Z}_{i,j}\right) = \operatorname{cov}\left(\hat{Z}_{i,j}, \hat{Z}^{p}_{i,j}\right) + \operatorname{cov}\left(\hat{Z}_{i,j}, \hat{Z}^{m}_{i,j}\right) + \operatorname{cov}\left(\hat{Z}_{i,j}, \hat{Z}^{X}_{i,j}\right) + \operatorname{cov}\left(\hat{Z}_{i,j}, \hat{Z}^{\delta_j}_{i,j}\right) \tag{7}$$

with $Z = EMPL, HOURS$

And the relative importance of mental versus physical health in predicting labour outcomes can be expressed as

$$ratio^{Z} = \operatorname{cov}\left(\hat{Z}_{i,j}, \hat{Z}^{m}_{i,j}\right) / \left(\operatorname{cov}\left(\hat{Z}_{i,j}, \hat{Z}^{m}_{i,j}\right) + \operatorname{cov}\left(\hat{Z}_{i,j}\right) \hat{Z}^{p}_{i,j}\right) \tag{8}$$

with $Z = EMPL, HOURS$

3 | DATA

To implement the above analysis, this paper uses microdata from waves 1, 2 and 4 to 7 of the SHARE survey covering the years 2004 to 2017 with 2-year intervals.[7] All retained individuals are aged 50–59 and lead to a total of 61,293 observations (individuals X waves; Table 1). Data limitations of different sorts (missing values for one of the key dimensions of our analysis...) explain that we retain only 21 out of the 29 participating countries.[8]

SHARE contains a rich set of items describing people's work (incl. their employment status and hours of work) but also their physical and mental health status. In SHARE, the numerous physical health items can be split in two broad categories: subjective (Table 2) and objective

TABLE 1 SHARE data. Respondents aged 50-59[a] by country and wave[b]

	(Waves)						
	1	**2**	**4**	**5**	**6**	**7[c]**	**Total**
AUT	207	245	1310	892	472	6	3132
BEL	742	1032	1734	1690	1609	33	6840
CHE	153	469	1170	761	514	13	3080
CZE	–	877	1363	1123	728	13	4104
DEU	437	746	254	1777	1132	11	4357
DNK	306	888	791	1345	1116	41	4487
ESP	351	576	857	1446	877	27	4134
EST	–	–	1679	1108	1183	–	3970
FRA	493	845	1617	1038	858	22	4873
GRC	468	1074	–	–	1158	108	2808
HRV	–	–	–	–	730	–	730
HUN	–	–	925	–	–	–	925
IRL	–	297	–	–	–	–	297
ISR	452	602	–	428	204	–	1686
ITA	390	747	759	1065	1165	28	4154
LUX	–	–	–	552	476	–	1028
NLD	550	884	688	1032	–	–	3154
POL	–	900	368	–	401	22	1691
PRT	–	–	586	–	315	–	901
SVN	–	–	843	749	865	–	2457
SWE	489	643	210	733	400	10	2485
Total	5038	10,825	15,154	15,739	14,203	334	61,293

[a]We exclude respondents younger than 50.

[b]Wave 1 [2004], Wave 2 [2007], Wave 4 [2011], Wave 5 [2013], Wave 6 [2015], Wave 7 [2017]. Wave 3 [2009] only contains life histories and is not used here.

[c]In wave 7 the questions on mental health were only asked to first-time participants (they are thus missing for the majority of SHARE respondents). The priority for wave 7 was to collect life history data.

Source: SHARE 2004–2017.

(Table 3). Most physical health items in SHARE are self-reported/subjective (Table 2) but many also explicitly refer to conditions diagnosed by health professionals (heart attack, hypertension, cholesterol, stroke, diabetes, lung disease, cancer) or measured by the SHARE interviewers like the maximum grip strength of respondents (see two columns before last of Table 3).

In SHARE mental ill-health essentially means depression/suicidality: melancholy, diminished interest, sleep disorders or suicidal thoughts. The detailed list of items used to assess mental health is reported in Table 4. It logically covers the above-listed dimensions of respondents' mood or feelings. They represent depressive symptoms that, once taken together, give a fair idea of people's mental health. The 12 items are those used to build the EURO-D scale which has been validated in earlier cross-European studies of depression prevalence (Guerra et al., 2015; Prince et al., 1999).

TABLE 2 Physical health (subjective) items and indices[f]: individuals aged 50–59. Country averages

	General Health[a]	Long-term illness[b]	Limited in activities[c]	# Limitations (daily living)[d]	Limitations (instrumental)[e]	Subjective health index[f]
AUT	2.71	0.40	2.52	0.07	0.13	−0.41
BEL	2.78	0.40	2.53	0.12	0.16	−0.37
CHE	2.44	0.30	2.69	0.04	0.07	−0.65
CZE	3.07	0.43	2.45	0.08	0.13	−0.21
DEU	2.98	0.52	2.47	0.08	0.10	−0.23
DNK	2.31	0.44	2.63	0.07	0.10	−0.63
ESP	2.92	0.36	2.76	0.06	0.09	−0.42
EST	3.50	0.59	2.40	0.15	0.17	0.09
FRA	2.88	0.34	2.61	0.09	0.11	−0.39
GRC	2.44	0.22	2.84	0.03	0.06	−0.73
HRV	2.98	0.48	2.53	0.08	0.08	−0.27
HUN	3.44	0.60	2.38	0.15	0.27	0.09
IRL	2.18	0.30	2.77	0.12	0.10	−0.78
ISR	2.71	0.41	2.68	0.07	0.23	−0.45
ITA	2.82	0.28	2.73	0.05	0.07	−0.48
LUX	2.76	0.41	2.54	0.07	0.09	−0.40
NLD	2.72	0.43	2.38	0.06	0.13	−0.36
POL	3.42	0.53	2.44	0.15	0.14	0.02
PRT	3.42	0.44	2.51	0.16	0.16	−0.04
SVN	2.98	0.39	2.55	0.11	0.10	−0.30
SWE	2.42	0.46	2.56	0.07	0.11	−0.54

[a]1(good)-5(bad), European scale.

[b]Yes (1) No (0). Recoded.

[c]Limited in activities because of health [3(no)-1 (severely) scale].

[d]Number of limitations with activities of daily living (ADL) (0–6 scale). ADL comprises 1. bathing, 2. dressing, 3. eating, 4. getting into/out of bed, 5. using the toilet and 6. walking across a room. ADLs measurements estimate essential faculties needed for survival while instrumental activities of daily living while (iADL) – see below – are described as important competencies required for living independently in a community.

[e]Number of limitations with instrumental activities of daily living (iADL) (0–9 scale). iADLs comprises 1. Eating, such as cutting up your food 2. Using a map to figure out how to get around in a strange place 3. Preparing a hot meal 4. Shopping for groceries 5. Making telephone calls 6. Taking medications 7. Doing work around the house or garden 8. Managing money, such as paying bills and keeping track of expenses 9. Leaving the house independently and accessing transportation services.

[f]First principal component of a–e items (the higher, the worse is people's perceived health). Principal component analysis is carried with all countries pooled. Displayed values correspond to the predicted score values divided by standard deviation.

Source: SHARE 2004–2017.

Hereafter, we will make use of the multiple items describing physical and mental health but also of indices. These are computed as the first principal components of the separate items listed in Tables 2–4. The computed index is always reported in the last column.

Table A1 in the Appendix describes the control variables that together with country and wave/year fixed effects form $X_{i,j}$ in Equation (1); namely the respondent highest educational attainment, the fact that she/he is single and has a (first-generation) immigration background. Finally,

TABLE 3 Physical health (Objective, doctor-diagnosed conditions or surveyor measurements) items and index[c] +overall physical health index[d]: individuals aged 50–59. Country averages

	`Heart attack	Hypertens.	Cholest.	Stroke	Diab.	Lung disease	Cancer	Ulcer	Park.	Catar.	Hip	Other frac.	Alzh. frac.	Arthritis senil.	Mob. limit.[a]	Max. Grip[b]	Objective health index[c]	Overall phys. health index[d]
AUT	0.05	0.28	0.15	0.02	0.08	0.04	0.02	0.04	0.001	0.01	0.01	0.37	0.19	0.07	0.88	38.46	−0.46	−0.41
BEL	0.04	0.25	0.24	0.02	0.07	0.05	0.03	0.06	0.001	0.01	0.01	0.32	0.15	0.06	1.01	38.59	−0.38	−0.35
CHE	0.03	0.18	0.10	0.01	0.04	0.03	0.03	0.02	0.000	0.01	0.00	0.50	0.13	0.04	0.44	38.52	−0.76	−0.70
CZE	0.06	0.35	0.17	0.02	0.08	0.05	0.03	0.05	0.002	0.02	0.01	0.33	0.18	0.07	0.93	37.85	−0.35	−0.27
DEU	0.05	0.30	0.14	0.02	0.07	0.06	0.05	0.03	0.004	0.02	0.00	0.33	0.19	0.08	0.92	39.18	−0.43	−0.29
DNK	0.05	0.22	0.16	0.02	0.04	0.05	0.03	0.03	0.001	0.02	0.01	0.38	0.19	0.06	0.62	40.72	−0.57	−0.56
ESP	0.03	0.22	0.22	0.01	0.08	0.04	0.02	0.03	0.001	0.02	0.01	0.39	0.18	0.04	0.74	33.63	−0.45	−0.46
EST	0.09	0.32	0.16	0.02	0.07	0.06	0.03	0.08	0.002	0.02	0.01	0.32	0.15	0.08	1.22	38.31	−0.31	−0.09
FRA	0.04	0.20	0.16	0.01	0.07	0.03	0.03	0.03	0.002	0.02	0.01	0.39	0.14	0.04	0.89	36.87	−0.51	−0.44
GRC	0.04	0.19	0.18	0.01	0.06	0.02	0.02	0.05	0.001	0.01	0.01	0.47	0.11	0.01	0.73	35.57	−0.59	−0.68
HRV	0.08	0.32	0.18	0.02	0.07	0.03	0.04	0.05	0.000	0.01	0.00	0.37	0.15	0.05	1.19	37.93	−0.37	−0.30
HUN	0.13	0.44	0.21	0.05	0.12	0.07	0.04	0.10	0.001	0.02	0.03	0.23	0.18	0.07	1.70	36.43	0.01	0.09
IRL	0.03	0.18	0.23	0.01	0.05	0.01	0.04	0.06	0.000	0.00	0.02	0.43	0.08	0.02	0.68	36.65	−0.57	−0.65
ISR	0.06	0.28	0.30	0.01	0.16	0.02	0.03	0.03	0.002	0.02	0.00	0.38	0.15	0.04	0.87	31.79	−0.30	−0.37
ITA	0.03	0.25	0.16	0.01	0.05	0.03	0.02	0.03	0.001	0.01	0.00	0.43	0.14	0.03	0.69	35.91	−0.56	−0.55
LUX	0.04	0.25	0.26	0.01	0.07	0.05	0.06	0.05	0.002	0.02	0.01	0.27	0.15	0.13	0.98	37.07	−0.33	−0.35
NLD	0.04	0.20	0.13	0.02	0.06	0.06	0.03	0.02	0.001	0.01	0.00	0.42	0.19	0.04	0.77	39.00	−0.58	−0.42
POL	0.09	0.32	0.17	0.02	0.07	0.03	0.02	0.07	0.001	0.02	0.01	0.30	0.22	0.06	1.29	36.77	−0.28	−0.12
PRT	0.05	0.35	0.35	0.03	0.12	0.06	0.04	0.06	0.002	0.02	0.01	0.23	0.19	0.06	1.54	32.61	−0.03	−0.04
SVN	0.05	0.30	0.19	0.02	0.08	0.03	0.03	0.06	0.002	0.02	0.01	0.38	0.14	0.07	1.10	38.65	−0.42	−0.35
SWE	0.04	0.23	0.11	0.02	0.06	0.03	0.03	0.02	0.003	0.02	0.01	0.41	0.22	0.05	0.65	39.30	−0.60	−0.52

[a]Mobility, arm function and fine motor limitations (0–10 sale). This variable is based on items: limitation with 1. walking 100 m, 2. sitting two hours 3. getting up from chair 4. climbing several flights of stairs 5. climbing one flight of stairs 6. stooping, kneeling, crouching 7 reaching or extending arms above shoulder 8. pulling or pushing large objects 9. lifting or carrying weights over 5 kilos 10. picking up a small coin from a table.

[b]0–100 (measured by interviewer).

[c]First principal component of all items (the higher, the worse is people's health). Principal component analysis is carried with all countries pooled. Displayed values correspond to the predicted score values divided by standard deviation.

[d]First principal component of all Tables 2 and 3 items (the higher, the worse is people's health). Principal component analysis is carried with all countries pooled. Displayed values correspond to the predicted score values divided by standard deviation.

Source: SHARE 2004–2017.

TABLE 4 Mental health items and indices[b]: individuals aged 50–59. Country averages

	Depression[a]	Pessimism[a]	Suicidality[a]	Guilt[a]	Sleep[a] (lack of)	Interest[a] (lack of)	Irritability[a]	Appetite[a] (lack of)	Fatigue[a]	Concentration[a] (lack of)	Enjoyment[a] (lack of)	Tearfulness[a]	Mental health index[b]
AUT	0.34	0.07	0.04	0.06	0.28	0.04	0.24	0.06	0.21	0.10	0.14	0.23	−0.28
BEL	0.41	0.10	0.09	0.11	0.37	0.07	0.31	0.09	0.34	0.20	0.08	0.35	0.04
CHE	0.43	0.06	0.05	0.06	0.29	0.04	0.31	0.05	0.26	0.10	0.05	0.24	−0.21
CZE	0.41	0.15	0.08	0.08	0.32	0.06	0.27	0.06	0.29	0.11	0.05	0.21	−0.15
DEU	0.46	0.05	0.05	0.06	0.37	0.06	0.32	0.05	0.30	0.13	0.10	0.25	−0.11
DNK	0.33	0.03	0.03	0.12	0.33	0.06	0.27	0.05	0.32	0.11	0.05	0.20	−0.24
ESP	0.32	0.16	0.06	0.06	0.28	0.10	0.24	0.06	0.31	0.14	0.09	0.25	−0.15
EST	0.50	0.19	0.05	0.16	0.41	0.08	0.42	0.06	0.46	0.09	0.10	0.22	0.11
FRA	0.49	0.17	0.11	0.12	0.39	0.08	0.39	0.08	0.34	0.18	0.09	0.28	0.13
GRC	0.30	0.15	0.03	0.07	0.18	0.12	0.27	0.08	0.24	0.14	0.12	0.26	−0.20
HRV	0.40	0.13	0.05	0.06	0.32	0.07	0.37	0.07	0.35	0.12	0.07	0.24	−0.08
HUN	0.44	0.21	0.12	0.16	0.37	0.09	0.39	0.11	0.46	0.18	0.15	0.31	0.23
IRL	0.30	0.11	0.02	0.10	0.28	0.03	0.25	0.08	0.25	0.11	0.05	0.21	−0.28
ISR	0.30	0.12	0.04	0.11	0.28	0.11	0.27	0.07	0.22	0.16	0.10	0.25	−0.18
ITA	0.36	0.12	0.04	0.10	0.26	0.11	0.44	0.07	0.30	0.19	0.18	0.24	−0.03
LUX	0.47	0.09	0.05	0.13	0.35	0.06	0.36	0.07	0.30	0.16	0.10	0.27	−0.02
NLD	0.31	0.05	0.04	0.10	0.29	0.07	0.17	0.04	0.27	0.19	0.09	0.31	−0.21
POL	0.54	0.34	0.10	0.14	0.40	0.10	0.45	0.09	0.37	0.16	0.24	0.23	0.29
PRT	0.52	0.42	0.08	0.08	0.39	0.11	0.36	0.11	0.27	0.27	0.21	0.36	0.30
SVN	0.36	0.25	0.04	0.09	0.32	0.05	0.29	0.05	0.25	0.09	0.07	0.18	−0.19
SWE	0.35	0.04	0.03	0.09	0.33	0.05	0.22	0.05	0.34	0.12	0.10	0.27	−0.19

[a]No(0), yes(1).

[b]First principal component of all items (the higher, the worse is people's health). Principal component analysis is carried with all countries pooled. Displayed values correspond to the predicted score values divided by standard deviation.

Source: SHARE 2004–2017.

summary statistics about our two labour outcome variables (employment and hours) are also available in the Appendix (Table A2).

4 | RESULTS

4.1 | Main results

The principal results of interest are those on the relative contribution of physical versus mental health to labour outcomes. Here, we will not extensively comment on the intermediate OLS or Probit estimations of Equation (1). Simply, coefficient estimates generally show that ill-health (physical or mental) negatively correlates with employment and, to a lesser extent, hours. The tables exposing these regression results are available in the Appendix (Table A5, A6). In Table 5 we report on the results of the variance decomposition announced by Equation (7). The underlying coefficients are from the OLS-estimated Equation (1) where health regressors consist of health indices.[9] More precisely, Table 5 reports the covariance shares $\text{cov}\left(\hat{Z}_{i,j}, \hat{Z}^{p}_{i,j}\right)$;$\text{cov}\left(\hat{Z}_{i,j}, \hat{Z}^{m}_{i,j}\right)$, corresponding to Equation (7) that quantify the contribution of the different dimensions of health. Several things are immediately visible.

First and foremost, we see that, for both men and women aged 50–59, the contribution of physical health dominates that of mental health. This is true for the extensive margins of work (*EMPL*). On average for men aged 50–59, physical health (*PHEALTH*) captures 49.42%-points of the employment variance, whereas mental health (*MHEALTH*) explains only 10.32%-points of the model-explained variance. At the bottom of Table 5, this translates into a ratio of mental health to total health of 0.17, meaning that only 17% of the total contribution of health to employment can be attributed to mental health. Note that that ratio is significantly different than 0 at a 0.001% threshold. Overall, these ratios range from 0.10 to 0.21 underlining the limited contribution of mental health to employment. And those obtained when focusing on the respondents age 50–54 are very similar to those obtained with the larger age band.

Second, considering the intensive margin (*HOURS*), we see that the explanatory power of health (physical + mental) is intrinsically more limited than for employment. While health (physical + mental) accounts for 32–69% of the employment rate variance, the corresponding percentages for *HOURS* are only 6–11%.[10] What is more, and in echo with the above results on the dominance of physical health, we find almost no statistically significant contribution of mental health to the number of hours worked. In short, it is only for physical health that we find a contribution to the variance of *HOURS*; and it is of smaller magnitude than the equivalent contribution to the variance of *EMPL*.

A third interesting result is the gender asymmetry in these effects. The overall contribution of health (i.e. physical + mental) to *EMPL* or *HOURS* is systematically lower amongst female respondents. This result accords with those of Blundell et al. (2021). While health explains 31.5%-points of the employment variance of women aged 50–59, it explains a bit more than 59%-points for men. As to *HOURS* for men aged 50–59, physical health explains 12%-points of the variance, while only 6.68%-points for women. Physical health explains 28.24%-points of the variance of *EMPL* among women aged 50–59, while the corresponding value for men is 49.42%-points. The contrast is even stronger for mental health, for which the female/male values are, respectively, 3.31%-points and 10.32%-points. Finally, the ratios of mental health to total health contributions reported at the bottom of Table 5 also manifest that women's mental health plays a lesser role

TABLE 5 Variance decomposition of labour outcomes: shares to be attributed to physical vs. mental health [OLS estimation of Equation (1) using health indices[a]]

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
Share Physical [a]	49.42***	28.24***	54.84***	35.58***	12.83***	6.68***	7.58*	5.74***
	(1.896)	(1.353)	(1.816)	(2.377)	(2.574)	(0.800)	(3.364)	(1.610)
Share mental [b]	10.32***	3.31***	14.48***	4.79***	−0.98**	−0.00	−0.45	0.15
	(1.252)	(0.643)	(1.379)	(0.983)	(0.342)	(0.318)	(0.474)	(0.394)
Diff. [a]-[b]	39.10***	24.94***	40.37***	30.78***	13.82***	6.68***	8.03*	5.59**
	(2.695)	(1.891)	(3.034)	(3.076)	(2.688)	(0.916)	(3.498)	(1.767)
Ratio [b]/[a]+[b]	0.17***	0.10***	0.21***	0.12***	−0.08**	−0.00	−0.06	0.03
	(0.021)	(0.022)	(0.021)	(0.027)	(0.028)	(0.039)	(0.086)	(0.082)
N	25,873	35,420	9,919	14,779	25,873	35,420	9,919	14,779

Standard errors in parentheses. Reported standard errors have been bootstrapped (1000 replications).

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

[a]Last columns of Tables 2–4.

Source: SHARE 2004–2017.

for *EMPL* (0.10 vs. 0.17). There is no equivalent result for *HOURS* as the contribution or mental health to *HOURS* is nil (or even negative) for both men and women.

4.2 | Robustness analysis

As a robustness check of the above results, we conduct four analyses. The first one simply consists of replicating the regression and variance decomposition using the data on the SHARE respondents aged 50–54. Why? To assess the bias that may be caused by alternative exit routes from the labour market, for example, early retirement, generous disability regimes. The presence of these may for instance amplify the relationship between ill-health and the likelihood of non-employment. But, logically, respondents aged 50–54 are less likely to benefit from easy access to these exit routes. And if it is causing a bias, then the latter should be less important amongst individuals aged 50–54 than those forming the 50–59 age band. The point is that, when focusing on respondents aged 50–54, our key results remain unchanged. As we have already seen in Table 5, estimates for individuals aged 50–54 are very similar to those obtained for those aged 50 to 59.

The second robustness check consists of estimating Equation (1) using the detailed list of health items underpinning the health indices used above (i.e. long-term illness, limitations in daily activities, heart attack, cholesterol, diabetes, depression described in Tables 2–4). The details regression results are available in the Appendix (Table A6). Those for the variance decomposition are reported in Table 6. They are qualitatively very similar to the ones exposed in Table 5. We still get that physical health dominates mental health in accounting for participation to employment and the number of hours worked, be it for the 50–59 years old or for those aged 50–54. We verify that dominance for men and women. We also keep finding gender differences although to a lesser extent. Overall health (physical + mental) is more predictive of labour outcomes for men than women. And the relative contribution of mental health to employment participation remains smaller for women. One difference with Table 5 is that mental health plays a slightly larger role in explaining *HOURS*, with shares ranging for 1.42–7.5%-points.[11]

Third, in the Appendix (Table A3), the reader will find our results when dropping the item general health from our physical health index (i.e. the first item described in Table 2). The general health question (also called self-reported health) might confound physical and mental health. It is, thus, worth checking whether our estimates of the importance of physical health in explaining labour outcomes is reduced when excluding that item, and symmetrically that of mental health is on the rise. The answer is no. Results remain very similar to those reported above in Table 5.

Fourth, also in the Appendix (Table A5) we report on our last robustness check. It consists of re-estimating Equation (1), for employment (*EMPL*) only, but using Probit instead of OLS.[12] This is in principle more adequate given the binary nature of responses about employment and also the fact that, at its core, our variance decomposition analysis rests on predicted values.[13] But again, resorting to Probit-estimated coefficients does not seem to make much of a difference.

4.3 | Attenuation, justification biases, reverse causality

Most observers would rightly stress that all the results presented so far in the paper rest exclusively on observed health. What is the risk of bias? Blundell et al. (2021) contains an excellent review of potential biases when estimating the relationship between health and work. Hereafter,

TABLE 6 Robustness check – Variance decomposition of labour outcomes: shares to be attributed to physical vs. mental health [OLS estimation of Equation (1) using detailed list of health items[a]]

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
Share Physical [a]	55.66***	29.20***	63.14***	37.86***	31.93***	13.12***	24.51**	13.00***
	(1.854)	(1.342)	(1.512)	(1.680)	(3.174)	(1.430)	(4.513)	(2.172)
Share mental [b]	10.13***	4.49***	13.17***	6.87***	2.94	1.41*	7.50**	1.76
	(1.071)	(0.636)	(1.444)	(1.035)	(1.503)	(0.704)	(3.055)	(1.265)
Diff. [a]-[b]	45.53***	24.71***	49.97***	31.00***	28.98***	11.70***	17.01*	11.25***
	(2.631)	(1.742)	(2.826)	(2.298)	(3.723)	(1.707)	(5.535)	(2.780)
Ratio [b]/[a]+[b]	0.15***	0.13***	0.17***	0.15***	0.08	0.10**	0.23**	0.12
	(0.017)	(0.020)	(0.019)	(0.023)	(0.037)	(0.040)	(0.069)	(0.076)
N	25,873	35,420	9,919	14,779	25,873	35,420	9,919	14,779

Standard errors in parentheses. Reported standard errors and p-values have been boostrapped (1000 replications).

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

aDescribed in Tables 2, 3, 4.

Source: SHARE 2004–2017

we will focus on those affecting coefficients estimated using self-reported health items; namely the attenuation bias and the justification bias (i.e. a particular form of reverse causality).

Baker et al. (2004) consider self-reported measures of health of the sort we get in SHARE as noisy measures of a latent (unobserved) health stock H.[14] If *PHEALTH* and *MHEALTH* in Equation (1) essentially consist of self-reported items, they can deviate from the actual health stock. Abandoning temporarily the distinction between mental and physical health, we formally have

$$HEALTH_{i,j} = H_{i,j} + \tau_{i,j} \tag{9}$$

In that expression the deviation term $\tau_{i,j}$ could amount to a randomly distributed reporting/measurement error, creating a wedge between the estimated coefficient and the true one $\tilde{\beta}^Z$. The term $VAR(\tau)$ on the denominator of the fraction in Equation (10) captures the attenuation bias. We see that noise, that is larger $VAR(\tau)$, pushes the OLS-Probit-estimated β^Z towards zero.

$$\beta^Z = \frac{\tilde{\beta}^Z VAR(H)}{VAR(H) + VAR(\tau)} \tag{10}$$

This said, given our focus on the relative contribution of mental versus physical health, with SHARE data the real risk is to have more of that attenuation bias for mental than physical health. In SHARE, there is a limited number of items describing people's mental health. Conversely, SHARE abounds in items documenting physical health, meaning that for the latter the attenuation bias is potentially less important. To assess that risk of asymmetry, we re-estimate the shares of variance to be attributed to physical versus mental health with alternative reduced sets of physical health variables as regressors. More specifically, we drop from the list of regressors all the objective, doctor-diagnosed conditions or surveyor measurements listed in Table 3. The re-estimation of Equation (1) is likely to deliver a lower bound of the contribution of physical health to *EMPL* and *HOURS* that is comparable to what we view as a lower bound estimate of the contribution of mental health. Results are reported in Table 7. They are very similar to those reported above (Tables 5, 6). In particular, the share of variance to be attributed to physical health does not shrink: it was 49.42% for men aged 50–59 in the baseline analysis. It is now 48.93%. The share of mental health was 10.32% and now 10.33%. We, thus, conclude that the risk of asymmetric attenuation biases in our results is limited. Note also that we still find, with this re-estimation, that physical health matters more than mental health. At the bottom of Table 7, for employment (*EMPL*), the ratio quantifying the importance of mental health ranges from 12 to 21%, still stressing its limited contribution relative to physical health. And we keep finding a quasi-non-existent contribution of mental health to *HOURS*. We also keep finding that women's health (physical or mental) is a weaker predictor of labour outcomes, and that hours are generally less impacted by health than employment.

But, as stressed by Blundell et al. (2021), it is unlikely that τ_i in Equation (9) just amounts to noise (i.e. measurement error), implying that attenuation bias is not our only concern. If it is more than noise, Equation (10) could become

$$\beta^Z = \frac{\tilde{\beta}^Z VAR(H) + COV(\varepsilon, \tau)}{VAR(H) + VAR(\tau)} \tag{11}$$

TABLE 7 Assessment of attenuation bias – Variance decomposition of labour outcomes: shares to be attributed to physical vs. mental health [OLS estimation of Equation (1) using a restricted list of physical health items[a]]

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
Share physical [a]	48.92***	26.39***	55.49***	34.18***	16.52***	6.28***	10.51**	5.99***
	(1.928)	(1.195)	(1.955)	(2.317)	(3.059)	(0.990)	(3.547)	(1.576)
Share mental [b]	10.33***	3.51***	14.54***	5.13***	0.00	0.04	0.00	0.15
	(1.258)	(0.663)	(1.552)	(1.050)	(0.000)	(0.172)	(0.039)	(0.254)
Diff. [a]-[b]	38.60***	22.87***	40.95***	29.06***	16.52***	6.24***	10.51**	5.84***
	(2.729)	(1.776)	(3.376)	(3.068)	(3.059)	(0.978)	(3.545)	(1.668)
Ratio [b]/[a]+[b]	0.17***	0.12***	0.21***	0.13***	0.00	0.01	0.00	0.02
	(0.021)	(0.024)	(0.023)	(0.029)	(0.000)	(0.020)	(0.003)	(0.043)
N	25,873	35,420	9,919	14,779	25,873	35,420	9,919	14,779

Bootstrapped standard errors and *p*-values, with 1000 replications.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

aOnly those presented in Table 2.

Source: SHARE 2004–2017.

And $COV(\varepsilon, \tau)$ on the numerator – where ε is the residual of Equation (1) – is different than zero. What is more, it is likely that $COV(\varepsilon, \tau) > 0$ due to reverse causality. The latter problem is well-known from people who study empirically the relation between work and health. Here, reverse causality means that (part of) the observed labour outcomes (i.e. *WORK* and *HOURS*) is determining the level of observed mental or physical health. And that could be the case if there is justification bias (Baker et al., 2004). This happens when survey respondents report values of *PHEALTH* and *MHEALTH* (and thus of τ_i) that are driven by their labour-market status. The concern is that un- or under-employed individuals report a lower level of health to justify their absence or lack of employment. And as Equation (11) shows, this potentially translates into an OLS-Probit estimated β^Z that is larger than the coefficient of interest $\tilde{\beta}^Z$, thus causing an exaggeration bias. So far, the literature remains inconclusive about the importance of the justification bias. O'Donnell et al. (2015) suggest it is important (and dominates the attenuation bias mentioned above). However, Stern (1989) and Dwyer and Mitchell (1999) and Vandenberghe (2020) do not find that the justification bias prevails.

A first point that can be made is that what matters in this paper is the relative importance of physical versus mental health. *Ceteris paribus*, not taking into account the justification bias creates a risk of overestimating the specific contribution of each of them in terms of labour outcome but not necessarily of their relative importance. If the magnitude of the justification bias is more or less the same for both mental and physical health, then there is a good chance our estimates of their relative contribution at the bottom of Tables 5, 6 or 7 might be correct.[15]

But, we think it is possible to go further. Our approach hereafter consists of using instrumental variables (IV) to address the risk of reverse causality/justification bias. Following Ettner et al. (1997) and Mete and Schultz (2007), we propose using initial, inherited health and childhood circumstances as instruments. With SHARE it is possible to instrument respondents' later-life health with their initial (i.e. pre-labour market entry) health endowment. In SHARE, respondents report their health status from birth until the age of 15. SHARE also contains proxies of the more inherited health endowment; namely the death status of the parents. To construct this death status, we consider whether parents are currently alive, and if they have died we consider whether they prematurely died (i.e. they died younger than the median age at death in the considered country) or not. This variable can be considered as a proxy of the genetic background of the respondent under the assumption of inter-generational transmission of health (trannoy2010). Finally, SHARE contains information on exposure to stressful childhood circumstances: stressful events, financial hardship or even hunger episodes. These cannot be considered as direct components of the health endowment but research abounds to suggest that they causally influence later-life health (van den Berg et al., 2016).

Results are on display in Table 8. The bottom of the table contains the results of the tests for weak instruments or under-identification, as well as those for overidentification. We strongly reject the null of no statistically significant relationship between the instruments (childhood circumstances and health endowment) and the 50–59 health indices. This demonstrates that childhood circumstances and health issues (both physical and mental) and parental death status are strong predictors of health status at a much more advanced stage of life, in line with what Ettner et al. (1997) observed for the United States. The bottom of Table 8 also displays the results of the Sargan test. This is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid, that is, uncorrelated with the error term. Except for men aged 50–59 and for hours, we find high *p*-values, which support the validity of the instruments. All in all, these two sets of results indicate that our instruments are likely to satisfy the IV assumptions (Angrist et al., 1996). We validate the assumption that our instruments are good predictors of

TABLE 8 Assessment of justification/reverse causality bias – Variance decomposition of labour outcomes: shares to be attributed to physical vs. mental health [IV estimation[a] of Equation (1)]

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
Share physical [a]	84.88***	61.61***	61.08*	52.15***	32.77	48.25	−1.20	49.14***
	(9.958)	(6.983)	(26.629)	(14.696)	(22.639)	(13.717)	(10.236)	(13.104)
Share mental [b]	−0.63	−2.83	25.03	2.05	40.46	11.45	60.38**	28.09*
	(5.605)	(2.005)	(24.610)	(10.539)	(20.180)	(8.988)	(18.732)	(12.590)
Diff. [a]-[b]	85.51***	64.44***	36.05	50.10*	−7.69	36.81	−61.58	21.05
	(15.319)	(6.765)	(51.041)	(24.397)	(38.564)	(10.728)	(23.857)	(22.039)
Ratio [b]/[a]+[b]	−0.01	−0.05	0.29	0.04	0.55	0.19	1.02**	0.36
	(0.068)	(0.032)	(0.294)	(0.195)	(0.298)	(0.189)	(0.230)	(0.195)
	Underidentification[b]							
Anderson LM statistic	58.10	81.21	38.40	56.36	52.36	40.18	43.49	29.23
Anderson p-val	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0021
	Overidentification[c]							
Sargan statistics	18.07	8.61	14.58	11.44	24.41	12.14	13.27	8.11
Sargan p-val	0.0538	0.5698	0.1480	0.3242	0.0066	0.2759	0.2091	0.6184
N	10,915	15,368	4,386	6,651	8,341	9,609	3,671	4,662

Bootstrapped standard errors and *p*-values, with 1000 replications.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

[a]Instrumental variables are: childhood health, parental death status (mother and father), exposure to hunger/stress/financial deprivation during childhood.

[b]The underidentification test is an LM test of whether the equation is identified, that is, that the excluded instruments are 'relevant', meaning correlated with the endogenous regressors. A rejection of the null (low *p*-values) indicates that the model is identified.

[c]The Sargan-Hansen test is a test of overidentifying restrictions. The joint null hypothesis is that the instruments are valid instruments, that is, uncorrelated with the error term. A rejection (low p-values) casts doubt on the validity of the instruments.

Source: SHARE 2004–2017.

both mental and physical health at the age of 50–59. We also find it plausible that respondents who suffered from poor health during childhood had parents who died prematurely or where exposed to stressful circumstances are affected in their older work lives primarily through their health. Also, by controlling for other potentially important mediators (such as educational attainment, marital or immigration status), we minimize the influence of unobservable childhood experiences through which a direct effect of the instruments on the old labour outcomes (*EMPL*, *HOURS*) might operate.

Turning to the upper part of Table 8, the more substantive results tend to confirm the asymmetric role of physical (*PHEALTH*) vs. mental health (*MHEALTH*). First, even more than before, we find with IV that physical health's contribution to employment outweighs that of mental health. With IV, physical ill-health (*PHEALTH*) remains the only dimension of health that is negatively impacting employment and hours. We also find health has not statistically significant impact on hours. And the gender asymmetry remains, with employment being more determined by health for men.

4.4 | Country heterogeneity

Any estimated contribution of physical and mental health could depend on the conditions affecting the final labour market equilibrium. And the latter might vary a lot across countries depending on many factors. Employment rates past 50 vary a lot; something that our SHARE data clearly shows (Table A2). On the labour supply side, the employment rate for older individuals depends on the generosity of early retirement pathways. More on the demand side, it depends on the willingness of employers to hire or keep older workers, or on how they are enticed/helped to accommodate people with mental and physical limitations. More generally labour market institutions could affect the resulting equilibrium allowing (or not) people with a mental or physical disability to easily change job within or across employers. At the very least the large heterogeneity across European countries could lead to much contrasted results between the 21 countries that we have pooled so far.

A fully fledged investigation of the role of institutions is beyond the scope of this research. But, at the very least, we can provide some evidence on country heterogeneity. To do so, we replicate the estimation of our variance decomposition analysis country by country. To avoid doing the analysis on sometimes very small sample sizes, we only consider the largest age band 50–59, and we pool men and women. Table 9 contains the key results. What we can say it that, for all countries with no exception, for employment, the contribution of physical health outweighs that of mental health. We also verify that hours are much less affected by health than employment. And when they are affected – for instance in the case of Denmark (DNK), Spain (ESP) and Estonia (EST) – it is only by physical health. Mental health almost never emerges as a statistically significant contributor to hours. In short, the country-by-country analyses replicate the results we have so far reported by pooling the 21 countries.[16]

This said, Table 9 displays quite important differences across countries. Our estimates of the relative contribution of mental health to employment (3rd row of Table 9) range from 0% in Luxembourg (LUX) to 41% in Italy (ITA). Can these differences be related to some well-established country-level features? The short answer seems to be no. Figure 1 plots our estimates of the relative importance of mental health in explaining employment against (i) the overall 50–59 employment rate and (ii) the GDP per head (expressed in 2017 US $). Both plots are supportive of an absence of relationship.

TABLE 9 Country-by-country analysis – Variance decomposition of labour outcomes: share to attributed to mental health. Respondents age 50–59. Male and Female confounded

	AUT	BEL	CHE	CZE	DEU	DNK	ESP	EST	FRA
Employment									
Share Physical [a]	36.68***	43.10***	44.43***	58.70***	56.66***	70.48***	26.01***	59.59***	51.74***
	(2.738)	(1.724)	(5.874)	(2.181)	(5.698)	(3.065)	(5.003)	(1.958)	(2.889)
Share mental [b]	6.84***	4.74***	12.53***	7.22***	6.73*	8.07***	15.11***	11.18***	2.82
	(1.284)	(1.152)	(3.310)	(1.155)	(3.488)	(1.698)	(3.598)	(1.902)	(1.733)
Ratio [b]/ [a]+[b]	0.1573***	0.0991***	0.2199***	0.1096***	0.1062*	0.1027***	0.3674***	0.1579***	0.0516
	(0.032)	(0.022)	(0.065)	(0.017)	(0.054)	(0.021)	(0.094)	(0.025)	(0.031)
Hours									
Share Physical [a]	0.58	9.77***	3.13*	0.94	2.48	28.17***	26.70**	31.69***	5.40***
	(0.413)	(2.636)	(1.462)	(2.820)	(1.859)	(4.427)	(9.465)	(5.912)	(1.564)
Share mental [b]	0.20	−1.45*	0.32	−0.54	0.04	0.87	5.57	−0.97	−0.90
	(2.267)	(0.670)	(0.702)	(3.447)	(1.298)	(1.211)	(6.190)	(3.039)	(0.613)
Ratio [b]/ [a]+[b]	0.2541	−0.1742	0.0925	−1.3435	0.0150	0.0301	0.1726	−0.0316	−0.1999
	(1.251)	(0.141)	(0.387)	(0.513)	(0.538)	(0.048)	(0.192)	(0.099)	(0.252)
N	3132	6840	3080	4104	4357	4487	4134	3970	4873

Bootstrapped standard errors and p-values, with 1000 replications.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Source: SHARE 2004–2017.

5 | SUMMARY AND CONCLUDING REMARKS

The paper aimed at contributing to the literature on barriers to old employment, by exploring not just the role of physical health, but also that of mental health in explaining work. By work we mean the propensity to stay in paid employment (the extensive margin of work) but also the number of hours worked (the intensive margin). The focus here is on people aged 50–59, and as part of a robustness check those aged 50–54. The choice of these age bands is justified by our willingness to identify the relationship between health and work when individuals have limited access to early or part-time retirement or equivalent benefits. Also, the paper considers 21, mostly European countries[17] that differ quite significantly in many respects (GDP per capita, retirement and other welfare institutions...), but in doing so uses comparable fully harmonized microdata on health and work, amassed via the SHARE survey.

The results of the paper are essentially fivefold.

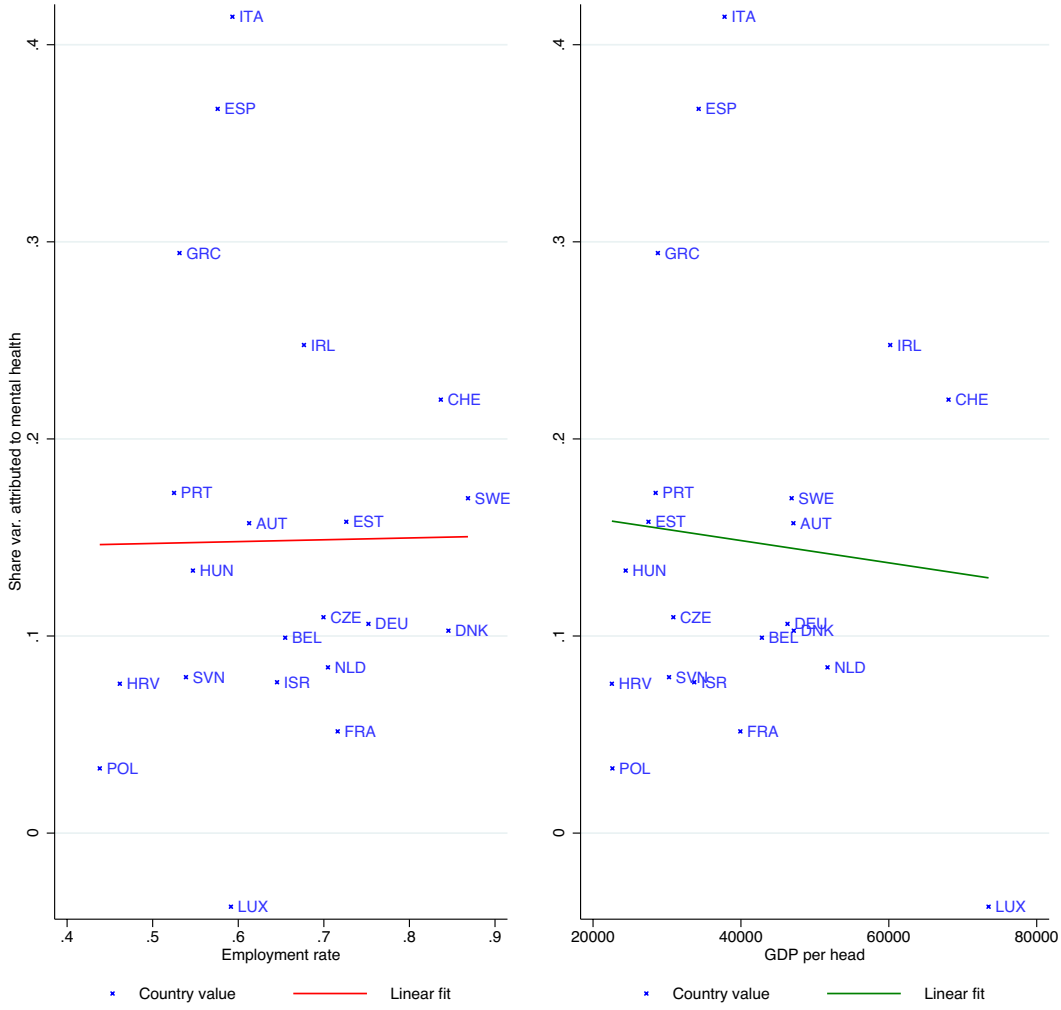
First, there is solid evidence that the health of people aged 50–59 is a strong predictor of their labour outcomes. This result is relatively unsurprising and aligns with those already published by many economists (French and Jones, 2017; Wise, 2017). Regression results indicate that ill health (physical and, to a lesser extent, mental) negatively correlates with employment and hours. And

GRC	HRV	HUN	IRL	ISR	ITA	LUX	NLD	POL	PRT	SVN	SWE
7.75***	36.88***	58.32***	26.89**	45.03***	7.72**	22.04***	45.98***	37.31***	39.10***	14.81***	65.39***
(1.787)	(6.323)	(6.844)	(9.411)	(4.719)	(2.826)	(6.398)	(2.421)	(7.417)	(8.585)	(1.718)	(4.873)
3.23*	3.02	8.96	8.85	3.73	5.46***	0.00	4.22	1.27	8.16	1.27	13.39**
(1.458)	(3.071)	(4.140)	(5.659)	(2.257)	(1.157)	(0.092)	(2.121)	(1.512)	(5.568)	(1.039)	(4.674)
0.2943**	0.0758	0.1332	0.2476	0.0766	0.4142***	0.0000	0.0841*	0.0328	0.1726	0.0791	0.1699**
(0.104)	(0.088)	(0.067)	(0.211)	(0.043)	(0.099)	(0.003)	(0.042)	(0.046)	(0.118)	(0.056)	(0.059)
4.23	1.97	8.96	13.45	10.70*	7.81	12.75*	2.66*	0.11	0.33	44.16***	32.31***
(2.802)	(6.953)	(8.351)	(8.400)	(5.453)	(5.452)	(5.253)	(1.223)	(3.482)	(1.518)	(6.830)	(5.765)
−0.07	2.57	−1.50	−1.48	1.03	2.36	−0.00	0.83	−0.14	0.35	0.95	−1.25
(1.206)	(3.478)	(6.076)	(4.635)	(2.331)	(2.573)	(0.940)	(0.582)	(3.651)	(1.434)	(3.977)	(1.433)
−0.0162	0.5658	−0.2008	−0.1238	0.0876	0.2323	−0.0002	0.2380	5.6980	0.5111	0.0210	−0.0401
(0.230)	(0.381)	(0.504)	(0.328)	(0.211)	(0.384)	(0.101)	(0.139)	(1.104)	(0.447)	(0.094)	(0.045)
2808	730	925	297	1686	4154	1028	3154	1691	901	2457	2485

our variance decomposition exercises suggest that up to 60% of the variance accounted for by our regression models can be attributed to (physical + mental) health.

Second, our paper distinguishes the extensive and intensive margins of work (i.e. employment and hours). We find that the impact of health on hours is also negative, but its contribution to the variance is much smaller, and not always statistically significant, particularly when it comes to mental health. This suggests, at least in Europe in the early 2000s, that older workers suffering from ill-health rarely adjust work at the intensive margin but rather stop working altogether.

Third, gender could matter when it comes to the health-work relationship. And it is for men that the relationship appears to be the strongest. In comparison with women, their physical and mental health explain a greater part of the variance of employment and hours. There is little dedicated economic research on gender differences as to the health/work relationship.[18] Pacheco et al. (2014) highlight gender divides, with their health-limiting variable[19] turning out to be a noticeably stronger predictor for males, compared to females. Also, Blundell et al. (2021), using British and US data, mention that they find a larger impact of health on labour outcome for men, but they do not elaborate on possible causes. We would cautiously posit that the weaker effect of health on women's labour outcome has its root in their lower attachment to paid employment, in particular, the fact that their employment rate is much lower due to lower participation in the labour force, or a more pronounced propensity to retire early.[20]



Source: SHARE 2004–2017, Penn World Table 10.0

FIGURE 1 Share of 50–59 empl. variance attributable to mental health and (i) 50–59 overall employment rate (ii) Country-level GDP per capita [in 2017 US$]

Fourth, and foremost, for both males and females aged 50–59, the impact of physical health dominates – in fact, it is at least double – that of mental health. That result holds for the intensive and the extensive margins of work. In spite of all that has been written and documented recently about mental problems – their rising prevalence (Knapp and Wong, 2020) and their cost for communities[21] or highly detrimental impact on people's private or professional life (Layard et al., 2014) – it seems that older people's participation to paid work remains primarily driven by physical health. And this seems to be the case across 21 countries that differ quite significantly in terms of their overall wealth (GDP per head of Switzerland or Luxembourg is more than triple that of Poland, and significantly larger than that of Belgium). Could it be that mental health problems are intrinsically less of a barrier to elderly employment? Or is it that they remain largely hidden, under-diagnosed or simply accepted at a legitimate cause of (total or partial) absence from work among elderly people?

Fifth, our country-by-country analysis replicates to a large extent the results reported above. For all 21 countries with no exception, when it comes to employment, the contribution of physical health outweighs that of mental health. And for most of them, hours are also much less related to (physical or mental) health. What is more, we find no evidence that the relative contribution of mental health depends on the countries' (extremely variable) old employment rate or GDP per capita. More research is needed to understand cross-country heterogeneity, but the first evidence assembled in this paper points to country-level institutions' limited capacity to predict how late-life physical and health relate to work.

Finally, it is important to stress that the data, methods and results presented in this paper suffer limitations and call for additional research. As mentioned in the data section, the mental health variables in SHARE mostly measure depression/suicidality. This is already a lot compared to what was available a few years ago, but one may wonder what would be the outcome of our analysis using a broader definition of mental health, with – paralleling what we have for physical health – systematic information about specific conditions (schizophrenia, severe depression, severe bipolar disorders). Dropping some physical health items underpinning our health index, as we do as part of our robustness checks, is already (we believe) a credible way to restore some balance between the two dimensions of health. But, the best would be to have more items describing mental health.

As to the methodology, this study splits mental and physical health into clear and separable/additive dimensions. Thus the paper falls short of exploring the consequences for older work of what health experts call comorbidity. It is indeed well-established that poor mental health can be strongly related to (and possibly caused by) physical ill-health, particularly among elderly individuals.[22] Sartorious (2013) explains that 'Comorbidity does not mean the simple addition of two diseases that independently follow their usual trajectories. The simultaneous presence of two or more diseases will worsen the prognosis'. In economic terms, this hints at the possibility of (production) complementarity[23] between physical and mental health in determining old people's work.

ENDNOTES

[1] Our reading of the works of Layard (2013) is that it contains a lot of evidence about the negative impact of poor mental health on well-being, but much less about its impact on work/labour outcomes *per se*.

[2] On the relationship between health and hours, a relatively recent OECD survey (OECD and Union, 2016) only mentions Pelkowski and Berger (2004) and Moran et al. (2011). Both conclude to a negative impact of physical health on hours.

[3] We use the Survey of Health, Ageing and Retirement in Europe (SHARE) Börsch-Supan et al. (2013) (more on this below) which only contains respondents older than 50.

[4] The term 'decomposition' has been used in this sense in many early studies in the literature on inequality decomposition by factor components (e.g. Shorrocks, 1982).

[5] Börsch-Supan et al. (2013).

[6] Symmetry, independence of the level of disaggregation, consistent decomposition and population symmetry.

[7] Wave 3 contains life histories only, and is of no used here.

[8] Austria- AUT, Belgium- BEL, Switzerland- CHE, Czech Rep.- CZE, Denmark- DNK, Spain- ESP, Estonia -EST, France- FRA, Greece- GRC, Croatia-HRV Hungary-HUN, Ireland-IRL, Israel-ISR, Italy-ITA, Luxembourg-LUX, the Netherlands-NLD, Poland- POL, Portugal-PRT, Slovenia-SVN, Spain, Sweden-SWE.

[9] First principal components reported in the last columns of Tables 2–4.

[10] We obtain these numbers by adding the first two lines in Table 5.

[11] Note, however, that these positive numbers are not necessarily statistically significant.

[12] Note that using Probit does alter the idea of linearly decomposable variance exposed in eq. (7). Simply what is decomposed is the latent variable underlying *EMPL* responses in the data.

[13] And is it well known OLS applied to binary outcomes (i.e. linear probability models) does no guarantee predicted values falling between 0 and 1.

[14] This stock can be considered as the true measure of health influencing work.

[15] This is known in the treatment/programme evaluation literature as the *ignorability* assumption (Fortin et al., 2011).

[16] And relying on country fixed effects to capture all relevant country-level heterogeneity.

[17] Austria- AUT, Belgium- BEL, Switzerland- CHE, Czech Rep.- CZE, Denmark- DNK, Spain- ESP, Estonia -EST, France- FRA, Greece- GRC, Croatia-HRV Hungary-HUN, Ireland-IRL, Israel-ISR, Italy-ITA, Luxembourg-LUX, the Netherlands-NLD, Poland- POL, Portugal-PRT, Slovenia-SVN, Spain, Sweden-SWE.

[18] There is the work of Mullahy and Sindelar (1991), but it is only on alcoholism. It shows that the (negative) effect of alcoholism on employment is larger for women.

[19] Pacheco et al. (2014) use the following question: 'During the past four weeks, how much of the time were you limited in the kind of work or other regular daily activities you do as a result of your physical health'? Categorical: 1 = none of the time; 2 = little of the time; 3 = some of the time; 4 = most of the time; 5 = all of the time.

[20] For the individuals who have never been in employment, ill-health past the age of 50 is, by definition, unlikely to affect the likelihood of employment. This is due to (long-term) non-employment being an absorbing state.

[21] In 2011, the World Economic Forum projected that, by 2030, mental ill-health will account for more than half of the global economic burden attributable to non-communicable diseases, at US$6 trillion (Bloom et al., 2012).

[22] Pacheco et al. (2014**)** add a mental/physical (ill-)health interaction term to their employment probit model and find a negative statistically significant coefficient, stressing that it is not only separate impacts of physical and mental health issues on employment propensity that are important, but also their combined effect.

[23] For an illustration of the use of the notion of production complementarity in health economics see Abramovsky et al. (2019).

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How to cite this article: Vandenberghe, V. (2021) Work beyond the age of 50. What role for mental versus physical health? *Labour*, 00, 1–37. https://doi.org/10.1111/labr.12205

APPENDIX 1

TABLE A1 Control variables: individuals aged 50–59. Country averages

	Education[a]	Single	Immigrant [first gen.]
AUT	3.36	0.28	0.08
BEL	3.30	0.22	0.12
CHE	3.36	0.19	0.19
CZE	2.77	0.20	0.04
DEU	3.60	0.17	0.11
DNK	3.85	0.16	0.04
ESP	2.27	0.15	0.08
EST	3.60	0.25	0.18
FRA	3.07	0.22	0.12
GRC	2.89	0.17	0.03
HRV	2.76	0.15	0.19
HUN	3.14	0.20	0.01
IRL	3.67	0.23	0.08
ISR	3.25	0.13	0.39
ITA	2.41	0.14	0.02
LUX	2.89	0.15	0.42
NLD	3.19	0.15	0.07
POL	2.88	0.20	0.01
PRT	1.92	0.14	0.05
SVN	3.14	0.16	0.13
SWE	3.57	0.20	0.10

[a]ISCED1997 classification of educational attainment [0:no degree 6: tertiary long].

Source: SHARE 2004–2017.

TABLE A2 Labour market outcomes: individuals aged 50–59. Country average

	Male		Female	
	Employment rate	**Number of hours worked (weekly)**	**Employment rate**	**Number of hours worked (weekly)**
AUT	0.68	44.89	0.56	33.98
BEL	0.72	42.86	0.60	32.13
CHE	0.90	46.34	0.79	30.57
CZE	0.76	44.77	0.66	41.68
DEU	0.80	43.65	0.72	32.38
DNK	0.88	41.86	0.82	36.20
ESP	0.70	42.14	0.49	36.76
EST	0.70	42.72	0.74	40.28
FRA	0.75	41.44	0.69	35.09
GRC	0.77	44.16	0.37	37.61
HRV	0.55	43.15	0.40	40.52
HUN	0.60	41.70	0.51	41.25
IRL	0.83	44.46	0.55	32.06
ISR	0.73	45.86	0.59	35.41
ITA	0.76	40.98	0.48	34.56
LUX	0.67	43.61	0.53	31.87
NLD	0.82	41.28	0.62	26.96
POL	0.52	45.26	0.38	39.62
PRT	0.58	26.96	0.49	23.15
SVN	0.59	42.43	0.50	39.47
SWE	0.89	44.09	0.85	38.59

Source: SHARE 2004–2017.

TABLE A3 Robustness check – Variance decomposition of labour outcomes: shares to be attributed to physical vs. mental health [OLS estimation of Equation (1) dropping general health[a]]

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
Share physical [a]	48.92***	26.39***	55.49***	34.18***	16.52***	6.28***	10.51**	5.99***
	(1.928)	(1.195)	(1.955)	(2.317)	(3.059)	(0.990)	(3.547)	(1.576)
Share mental [b]	10.33***	3.51***	14.54***	5.13***	−1.27***	0.04	−0.74	0.15
	(1.258)	(0.663)	(1.552)	(1.050)	(0.336)	(0.314)	(0.459)	(0.367)
Diff. [a]-[b]	38.60***	22.87***	40.95***	29.06***	17.79***	6.24***	11.24**	5.84***
	(2.729)	(1.776)	(3.376)	(3.068)	(3.232)	(1.092)	(3.733)	(1.700)
Ratio [b]/[a]+[b]	0.17***	0.12***	0.21***	0.13***	−0.08***	0.01	−0.08	0.02
	(0.021)	(0.024)	(0.023)	(0.029)	(0.021)	(0.040)	(0.051)	(0.065)
N	25,873	35,420	9919	14,779	25,873	35,420	9919	14,779

Bootstrapped standard errors and *p*-values, with 1000 replications.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

aFirst item in Table 2.

Source: SHARE 2004–2017.

TABLE A4 Robustness check – Variance decomposition of employment: shares to be attributed to physical vs. mental health [based on Probit estimation of Equation (1) using health indices[a]]

	50–59		50–54	
	M	**F**	**M**	**F**
Share physical [a]	44.99***	29.19***	50.01***	35.01***
	(1.950)	(1.392)	(1.789)	(2.275)
Share mental [b]	8.81***	3.17***	11.87***	4.33***
	(1.144)	(0.624)	(1.454)	(0.972)
Diff. [a]-[b]	36.18***	26.01***	38.14***	30.68***
	(2.547)	(1.904)	(2.854)	(2.976)
Ratio [b]/[a]+[b]	0.16***	0.10***	0.19***	0.11***
	(0.021)	(0.021)	(0.023)	(0.027)
N	25,873	35,420	9919	14,779

Bootstrapped standard errors and *p*-values, with 1000 replications.

[a]Last columns of Tables 2–4.

Source: SHARE 2004–2017.

TABLE A5 Detailed results of regression analysis of labour outcomes. OLS estimation of Equation (1) using health indices

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
Physcial ill-health index	−0.1526***	−0.1292***	−0.1508***	−0.1347***	−1.1671***	−1.4226***	−0.8912***	−1.2753***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Poor mental health index	−0.0480***	−0.0219***	−0.0511***	−0.0233***	0.2420	0.0007	0.0962	−0.0480
	(0.000)	(0.000)	(0.000)	(0.000)	(0.067)	(0.994)	(0.633)	(0.744)
Age 51	0.0020	0.0144	0.0107	0.0211	−0.8325	−0.4487	−1.0297	−0.4420
	(0.928)	(0.322)	(0.585)	(0.137)	(0.277)	(0.369)	(0.186)	(0.377)
Age 52	−0.0171	−0.0021	−0.0086	0.0048	−1.0002	0.3840	−1.2220	0.3854
	(0.427)	(0.885)	(0.660)	(0.732)	(0.192)	(0.440)	(0.116)	(0.439)
Age 53	−0.0171	−0.0102	−0.0040	−0.0030	−0.7199	0.1201	−0.9853	0.1723
	(0.422)	(0.473)	(0.837)	(0.829)	(0.342)	(0.807)	(0.201)	(0.727)
Age 54	−0.0223	−0.0131	−0.0112	−0.0045	−0.6420	0.0892	−0.8876	0.1044
	(0.294)	(0.356)	(0.561)	(0.746)	(0.395)	(0.856)	(0.248)	(0.832)
Age 55	−0.0330	−0.0479***			−0.4403	−0.3198		
	(0.118)	(0.001)			(0.559)	(0.516)		
Age 56	−0.0644**	−0.0751***			−0.9481	−0.4396		
	(0.002)	(0.000)			(0.209)	(0.372)		
Age 57	−0.0859***	−0.0928***			−0.8773	−0.3516		
	(0.000)	(0.000)			(0.245)	(0.477)		
Age 58	−0.1414***	−0.1460***			−0.8663	−0.8328		
	(0.000)	(0.000)			(0.252)	(0.097)		

(Continues)

TABLE A5 (Continued)

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
Age 59	−0.1647***	−0.1979***			−1.2224	−1.1236*		
	(0.000)	(0.000)			(0.108)	(0.027)		
Wave 2	0.0496***	0.0599***	0.0404**	0.0455**	−0.2248	−0.4085	0.2882	−1.5442**
	(0.000)	(0.000)	(0.003)	(0.001)	(0.551)	(0.306)	(0.596)	(0.004)
Wave 4	0.0530***	0.1143***	0.0324*	0.0879***	−0.5166	−0.2497	−0.1310	−1.4206**
	(0.000)	(0.000)	(0.018)	(0.000)	(0.173)	(0.524)	(0.812)	(0.008)
Wave 5	0.0713***	0.1384***	0.0251	0.1014***	−0.1431	0.3676	0.6323	−0.5410
	(0.000)	(0.000)	(0.055)	(0.000)	(0.695)	(0.331)	(0.231)	(0.291)
Wave 6	0.0769***	0.1523***	0.0336*	0.0989***	0.6062	0.6745	1.1707*	−0.8604
	(0.000)	(0.000)	(0.016)	(0.000)	(0.109)	(0.083)	(0.037)	(0.107)
Wave 7	0.1548*	0.2022***	0.3067	0.1262*	−2.4381	0.5774	−1.7700	−0.1158
	(0.045)	(0.000)	(0.075)	(0.033)	(0.384)	(0.559)	(0.777)	(0.957)
1. Isced	−0.0013	0.0006	0.0129	−0.0481	0.5821	1.0035	0.0184	2.3706*
	(0.945)	(0.975)	(0.657)	(0.082)	(0.481)	(0.233)	(0.989)	(0.045)
2. Isced	0.0475*	0.0540**	0.0515	0.0193	0.3195	0.3360	0.5888	2.1177
	(0.012)	(0.003)	(0.059)	(0.468)	(0.684)	(0.677)	(0.621)	(0.056)
3. Isced	0.1052***	0.1657***	0.1145***	0.1293***	−0.0235	1.0569	−0.1533	3.1023**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.976)	(0.181)	(0.895)	(0.004)
4. Isced	0.1406***	0.2663***	0.1406***	0.2311***	0.8074	0.9090	0.1806	2.8862*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.351)	(0.289)	(0.891)	(0.016)
5. Isced	0.1651***	0.2853***	0.1546***	0.2403***	0.7621	3.0683***	0.7343	4.7682***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.326)	(0.000)	(0.532)	(0.000)

(Continues)

TABLE A5 (Continued)

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
6. Isced	0.2736***	0.3056***	0.2102***	0.2618***	3.9509***	8.0938***	3.2985	10.6911***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.053)	(0.000)
Single	−0.0925***	0.0427***	−0.1152***	0.0326***	−1.1556***	1.9078***	−1.0523**	2.0734***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	(0.000)
Immigrant	−0.0483***	−0.0163*	−0.0640***	−0.0464***	−1.3561***	0.4547	−1.6576***	−0.0703
	(0.000)	(0.034)	(0.000)	(0.000)	(0.000)	(0.106)	(0.001)	(0.865)
12. Germany	0.1158***	0.1454***	0.0553**	0.0560**	−1.3093*	−1.2190*	−1.2694	−1.2449
	(0.000)	(0.000)	(0.007)	(0.005)	(0.014)	(0.013)	(0.129)	(0.077)
13. Sweden	0.1941***	0.2950***	0.1200***	0.1806***	−1.0979	4.7422***	−0.3289	4.0722***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.065)	(0.000)	(0.737)	(0.000)
14. Netherlands	0.1349***	0.1163***	0.1039***	0.0684**	−3.6699***	−6.3623***	−3.1046***	−6.0562***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
15. Spain	0.0488***	0.0152	0.0050	−0.0584**	−2.8855***	3.3069***	−2.2030*	2.9122***
	(0.001)	(0.263)	(0.818)	(0.005)	(0.000)	(0.000)	(0.015)	(0.000)
16. Italy	0.0798***	−0.0137	0.0807***	−0.0703***	−4.2672***	1.0815*	−4.6850***	0.6168
	(0.000)	(0.309)	(0.000)	(0.001)	(0.000)	(0.040)	(0.000)	(0.411)
17. France	0.0745***	0.1641***	0.0818***	0.0956***	−3.5895***	1.3612**	−3.0962***	0.8617
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.000)	(0.216)
18. Denmark	0.1360***	0.1979***	0.0687***	0.1076***	−3.3944***	1.8651***	−2.1999**	1.5269*
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.006)	(0.026)
19. Greece	0.0451**	−0.1738***	0.0185	−0.2314***	−1.4862*	3.5210***	−0.8296	2.4364**
	(0.005)	(0.000)	(0.431)	(0.000)	(0.016)	(0.000)	(0.379)	(0.006)

(Continues)

TABLE A5 (Continued)

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
20. Switzerland	0.1748***	0.1883***	0.1053***	0.0905***	1.3903*	−3.0841***	2.2622*	−3.3302***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.013)	(0.000)	(0.012)	(0.000)
23. Belgium	0.0564***	0.0583***	0.0688***	0.0236	−2.1659***	−1.8592***	−1.2742	−1.8424**
	(0.000)	(0.000)	(0.000)	(0.206)	(0.000)	(0.000)	(0.098)	(0.005)
25. Israel	0.0978***	0.0878***	0.0091	0.0007	1.1267	1.5427*	0.7549	1.0548
	(0.000)	(0.000)	(0.747)	(0.979)	(0.119)	(0.017)	(0.523)	(0.286)
28. Czech Rep.	0.1178***	0.1671***	0.0297	0.1443***	−0.0041	8.5274***	−0.2154	7.7891***
	(0.000)	(0.000)	(0.176)	(0.000)	(0.994)	(0.000)	(0.811)	(0.000)
29. Poland	−0.0853***	−0.0794***	−0.0871**	−0.0332	0.4511	6.4923***	0.2047	7.5408***
	(0.000)	(0.000)	(0.002)	(0.228)	(0.567)	(0.000)	(0.870)	(0.000)
30. Ireland	0.1052**	−0.0076	0.0774	−0.0713	−0.7811	−1.9830	2.7400	−0.8722
	(0.003)	(0.830)	(0.130)	(0.188)	(0.542)	(0.144)	(0.168)	(0.664)
31. Luxembourg	0.0211	−0.0024	0.1391***	0.0274	−1.4027	−2.2798**	1.0575	−2.1165
	(0.329)	(0.908)	(0.000)	(0.404)	(0.098)	(0.005)	(0.428)	(0.071)
32. Hungary	−0.0138	0.0579**	−0.1085**	0.0435	−2.6289**	8.5380***	−2.8136	6.1587***
	(0.539)	(0.007)	(0.001)	(0.199)	(0.004)	(0.000)	(0.067)	(0.000)
33. Portugal	0.0037	0.1057***	0.0320	0.0594	−18.0164***	−9.6342***	−20.9442***	−13.7468***
	(0.877)	(0.000)	(0.422)	(0.078)	(0.000)	(0.000)	(0.000)	(0.000)
34. Slovenia	−0.0800***	−0.0502***	−0.0193	0.0178	−2.4613***	5.5649***	−1.0849	5.1484***
	(0.000)	(0.001)	(0.435)	(0.459)	(0.000)	(0.000)	(0.290)	(0.000)
35. Estonia	0.0772***	0.1725***	0.0277	0.0846***	−1.9254***	6.6177***	−0.3870	6.8128***
	(0.000)	(0.000)	(0.195)	(0.000)	(0.001)	(0.000)	(0.663)	(0.000)

(Continues)

TABLE A5 (Continued)

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
47. Croatia	−0.1261***	−0.1137***	−0.2132***	−0.0933**	−2.3562*	6.4263***	−2.0822	7.7339***
	(0.000)	(0.000)	(0.000)	(0.010)	(0.030)	(0.000)	(0.256)	(0.000)
Constant	0.5107***	0.2851***	0.5599***	0.4039***	45.0955***	31.0381***	44.5118***	30.6552***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	25,873	35,420	9,919	14,779	25,873	35,420	9,919	14,779

Standard errors in parentheses.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Source: SHARE 2004–2017.

TABLE A6 Detailed results of regression analysis of labour outcomes. OLS estimation of Equation (1) using detailed health items

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
Long-term illness[a]	0.006***	0.006***	0.006*	0.009***	0.160**	0.123*	0.236*	0.103
	(0.000)	(0.000)	(0.013)	(0.000)	(0.008)	(0.026)	(0.014)	(0.204)
Limited in act. by health[b]	0.101***	0.078***	0.100***	0.070***	0.865***	0.578**	0.443	0.821**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.177)	(0.002)
#limit. with activities[c]	0.028***	0.013*	0.037***	0.010	−0.515	0.550	−1.151	1.580**
	(0.000)	(0.034)	(0.001)	(0.295)	(0.216)	(0.098)	(0.084)	(0.002)
#limit. with instrum. activities[d]	−0.043***	−0.062***	−0.058***	−0.076***	−0.916*	−1.145***	−0.419	−1.332**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.026)	(0.000)	(0.535)	(0.004)
Heart attack	−0.044***	−0.063***	−0.054***	−0.095***	−0.686	0.937	0.186	1.570
	(0.000)	(0.000)	(0.000)	(0.000)	(0.108)	(0.093)	(0.794)	(0.079)
Hypertension	−0.004	−0.004	0.006	−0.005	−0.049	0.231	−0.350	0.069
	(0.565)	(0.535)	(0.553)	(0.583)	(0.843)	(0.319)	(0.380)	(0.846)
Cholesterol	−0.001	0.002	−0.016	−0.001	0.093	−0.541*	0.455	−0.487
	(0.831)	(0.768)	(0.110)	(0.904)	(0.722)	(0.037)	(0.281)	(0.231)
Stroke	−0.109***	−0.094***	−0.105***	−0.105**	−0.426	−1.818	1.158	−1.755
	(0.000)	(0.000)	(0.000)	(0.001)	(0.628)	(0.061)	(0.427)	(0.234)
Diabetes	−0.042***	−0.064***	−0.051***	−0.092***	0.157	−0.798	0.384	−0.700
	(0.000)	(0.000)	(0.001)	(0.000)	(0.682)	(0.068)	(0.567)	(0.333)
Lung disease	−0.068***	−0.013	−0.081***	−0.016	0.556	−0.456	2.148*	−0.142
	(0.000)	(0.266)	(0.000)	(0.390)	(0.333)	(0.338)	(0.026)	(0.847)
Cancer	−0.066***	−0.073***	−0.076**	−0.067***	1.698*	−1.320**	1.970	−2.133**

(Continues)

TABLE A6 (Continued)

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
	(0.000)	(0.000)	(0.005)	(0.000)	(0.017)	(0.008)	(0.114)	(0.003)
Ulcer	−0.009	0.002	−0.031	−0.001	0.725	1.123*	1.004	1.403*
	(0.444)	(0.878)	(0.059)	(0.942)	(0.137)	(0.022)	(0.183)	(0.044)
Parkinson	−0.091	−0.015	0.010	−0.131	−0.455	0.176	−2.497	3.439
	(0.112)	(0.827)	(0.910)	(0.339)	(0.870)	(0.954)	(0.550)	(0.626)
Cataract	−0.022	−0.018	−0.057	0.011	−0.677	0.224	0.753	0.376
	(0.273)	(0.320)	(0.062)	(0.740)	(0.411)	(0.769)	(0.591)	(0.771)
Hip frac.	−0.049*	−0.058*	−0.006	−0.075	−0.880	−1.463	−1.388	−0.178
	(0.042)	(0.043)	(0.859)	(0.112)	(0.425)	(0.266)	(0.372)	(0.931)
Other frac.	−0.011	0.003	−0.030**	−0.012	−0.566*	0.014	−0.363	−0.221
	(0.115)	(0.604)	(0.002)	(0.212)	(0.034)	(0.954)	(0.380)	(0.534)
Alzheimer	−0.036***	−0.015*	−0.057***	−0.027**	−0.300	−0.507*	−0.210	−0.649
	(0.000)	(0.020)	(0.000)	(0.008)	(0.335)	(0.050)	(0.672)	(0.090)
Mobility limit	−0.035***	−0.016***	−0.038***	−0.017***	−0.225	−0.145	−0.187	−0.126
	(0.000)	(0.000)	(0.000)	(0.000)	(0.053)	(0.064)	(0.332)	(0.284)
Max grip strength	0.003***	0.002***	0.003***	0.002***	0.099***	0.124***	0.093***	0.110***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Depression	−0.016**	−0.014*	−0.027**	−0.012	0.186	−0.423*	0.100	−0.430
	(0.006)	(0.014)	(0.001)	(0.154)	(0.416)	(0.033)	(0.776)	(0.138)
Pessimism	−0.065***	−0.034***	−0.055***	−0.048***	−0.727*	−0.535	−1.365**	−0.645
	(0.000)	(0.000)	(0.000)	(0.000)	(0.017)	(0.069)	(0.004)	(0.135)
Suicidality	−0.067***	−0.043***	−0.067***	−0.043**	0.326	0.217	−0.490	−0.015

(Continues)

TABLE A6 (Continued)

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
	(0.000)	(0.000)	(0.000)	(0.004)	(0.568)	(0.602)	(0.574)	(0.981)
Guilt	−0.008	−0.020**	0.008	−0.032**	−0.936*	−0.469	−1.091	−0.274
	(0.399)	(0.008)	(0.537)	(0.005)	(0.015)	(0.100)	(0.060)	(0.511)
Sleep (lack of)	−0.012*	0.000	−0.021*	0.005	0.026	0.029	0.179	−0.240
	(0.048)	(0.999)	(0.018)	(0.524)	(0.910)	(0.879)	(0.627)	(0.384)
Interest (lack of)	−0.030**	−0.004	−0.029*	−0.036**	0.830	−0.482	1.639*	−0.074
	(0.003)	(0.694)	(0.046)	(0.007)	(0.056)	(0.186)	(0.014)	(0.890)
Irritability	0.004	0.027***	0.003	0.032***	0.572**	0.855***	0.071	0.726*
	(0.502)	(0.000)	(0.744)	(0.000)	(0.009)	(0.000)	(0.831)	(0.011)
Appetite (lack of)	−0.047***	−0.031***	−0.066***	−0.030*	1.553**	0.589	2.182**	0.904
	(0.000)	(0.001)	(0.000)	(0.026)	(0.002)	(0.117)	(0.004)	(0.097)
Fatigue	0.009	0.016**	0.020*	0.018*	−0.025	0.141	0.091	0.066
	(0.156)	(0.003)	(0.022)	(0.026)	(0.917)	(0.482)	(0.802)	(0.820)
Concentration (lack of)	−0.010	−0.017*	−0.010	−0.016	0.098	0.095	−0.059	−0.054
	(0.158)	(0.011)	(0.323)	(0.109)	(0.741)	(0.723)	(0.896)	(0.890)
Enjoyment (lack of)	−0.030***	−0.016*	−0.037**	−0.019	−0.372	1.142***	−0.694	1.294**
	(0.000)	(0.040)	(0.002)	(0.102)	(0.264)	(0.000)	(0.176)	(0.004)
Tearfulness	−0.022**	−0.030***	−0.020	−0.023**	−0.257	−0.490*	−0.261	−0.530
	(0.005)	(0.000)	(0.073)	(0.004)	(0.412)	(0.013)	(0.587)	(0.063)

(Continues)

TABLE A6 (Continued)

	Employment				Hours			
	50–59		50–54		50–59		50–54	
	M	F	M	F	M	F	M	F
Controls	Age, country, Education (ISCED 0–6), Single, Immigrant (first gen.)							
N	25,873	35,420	9919	14,779	25,873	35,420	9919	14,779

Standard errors in parentheses.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

[a]Yes (1) No (5). Non recoded.

[b]Limited in activities because of health [3(no)-1(severely) scale].

[c]Number of limitations with activities of daily living (0–6 scale).

[d]Number of imitations with instrumental activities of daily living (0–9 scale).

Source: SHARE 2004–2017.