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SSM - Population Health

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

Article

Work status, retirement, and depression in older adults: An analysis of six countries based on the Study on Global Ageing and Adult Health (SAGE)

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ARTICLE INFO

Keywords:

Older adults
Depression
Work
Retirement
Social determinants of health

ABSTRACT

The aim of the present study was to analyse the association between the occurrence of a major depressive episode among older adults and work status in low- and medium-income countries. A cross-sectional study was conducted with people 60 years of age and older from the six countries (Mexico, India, China, Russian Federation, Ghana and South Africa) included in the Study on Global Ageing and Adult Health (SAGE) and who participated in its first wave (2009–2010). The occurrence of a major depressive episode (MDE) over the previous 12 months was determined based on an adaptation of the ICD-10 diagnostic criteria. The association between current work status and the presence of an MDE was estimated using binary logistic regression models with country-level fixed effects, and interaction terms between the country and work status. Results showed the odds of presenting an MDE were lower for older adults who were retired with a pension than for those who were currently working, although this protective association was observed only for men in China (OR = 0.23; CI 95%: 0.08–0.70) and Ghana (OR = 0.25; CI 95%: 0.07–0.95) and for women in India (OR = 0.05; CI 95%: 0.01–0.51) and South Africa (OR = 0.19; CI 95%: 0.04–0.97). For women, being a homemaker also showed a protective association in South Africa (OR = 0.09; CI 95%: 0.01–0.66) and Mexico (OR = 0.32; CI 95%: 0.14–0.76). In the case of being retired without a pension, no significant association was found in any country. The previous indicates that retirement with pension has a protective association with MDE only for men in China and Ghana and women in India and South Africa. The heterogeneity of this association reflects cultural and socioeconomic differences between the analysed countries.

Introduction

Depressive disorders are the most prevalent mental illness among older adults (Meeks, Vahia, Lavretsky, Kulkarni, & Jeste, 2011) and represented the eighth cause of years lived with disability (YLD) for this age group worldwide in 2013 (Global Burden of Disease Study 2013 Collaborators, 2015). The estimated prevalence of depressive disorders varies widely by country (Meeks et al., 2011), but in a recent meta-analysis its global prevalence was estimated in 7.2% (CI 95%: 4.4–10.6%) for major depressive disorders, and 17.1% (CI 95%: 9.7–26.1%) for all depressive disorders, including those subsyndromal (Djernes, 2006). Furthermore, an incidence of 0.12 to 14.1 cases per 100 person-years has been estimated for this age group (Büchtemann,

Luppa, Bramesfeld, & Riedel-Heller, 2012).

Depression in older adults is a group of disorders that involves multiple individual and contextual determinant factors that are closely interrelated (Cole & Dendukuri, 2003; Fernández-Niño, Manrique-Espinoza, Bojorquez-Chapela, & Salinas-Rodríguez, 2014; Kim, 2008; Rodda, Walker, & Carter, 2011). The individual-level factors include genetic determinants; multimorbidity; disability; personality traits, such as neuroticism; psychological distress; and low educational level. On the other hand, the contextual-level factors include inadequate social support; decrease of social networks, and neighbourhood socioeconomic deprivation (Cole & Dendukuri, 2003; Fisher & Baum, 2010; Fiske, Wetherell, & Gatz, 2009; Jang et al., 2009; Kim & Moen, 2001b; Lorant et al., 2003; Rodda et al., 2011).

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<https://doi.org/10.1016/j.ssmph.2018.07.008>

Received 8 May 2018; Received in revised form 25 July 2018; Accepted 30 July 2018

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Recently, work status has been also identified as an important factor associated with depression among older adults (Rodda et al., 2011). However, this is an complex epidemiological association that depends on the particular social context. Despite the fact that the etiological pathways through which work status could affect the mental health of older adults have not been entirely clarified, income has been proposed as a mediator in this relationship (Jang et al., 2009). The financial stress from losing or resigning a job is one of the most common stressful events for older adults, especially when there is no social support to compensate for this financial change (Lue, Chen, & Wu, 2010; Mendes de Leon, Rapp, & Kasl, 1994; Roy & Chaudhuri, 2008).

However, financial stress is not the only explanation for the relationship between work status and depression in older adults. In fact, other explanatory pathways have been suggested for the effect of retirement, or the job loss (compared to remain working), on the health of older adults, such as: changes in social networks, social isolation, decreased self-esteem, and a poor perception of usefulness and empowerment (Abe, Fujise, Fukunaga, Nakagawa, & Ikeda, 2012; Paul & Moser, 2009; Shi et al., 2014). According to Jahoda's proposal, the poor perception of usefulness, along with time structuring and fostering activity, can be regarded as latent consequences of loss of work, which links work status and individual's well-being (Jahoda, 1981).

Despite the beneficial effects of working, it is also worth noting that job characteristics play an important role when deciding whether to remain in the workforce or to retire, since they relate to financial, physical and psychological well-being (Wang & Shi, 2014). Thus, retirement might be relatively more beneficial for mental health in the context of a stressful job with high workloads or demands (physical or psychological) (Westerlund et al., 2009). Similarly, jobs with organizational and work policies that offer valuable benefits, such as pension and health insurance, might also encourage retirement, which can have a positive impact on mental health if retirement is perceived as voluntary or statutory (van der Heide, van Rijn, Robroek, Burdorf, & Proper, 2013).

In addition, the studies of the relationship between work status and depression needs to be done from a gender perspective in older adults. This not only because the frequency of depression is higher in women (American Psychiatric Association, 2014; Fiske et al., 2009), but also because employment is a "qualitatively different experience" for both sexes (Kim & Moen, 2001a). The work history might be different between men and women, since women usually have a lower participation in the work force, tend to have a more interrupted work history, and are more prone to having worse job conditions compared to men (Cho, Margolis, Newhouse, & Robalino, 2012; Instituto Nacional de las Mujeres, 2007; Kim & Moen, 2001a). This way, employment represents a more central role for men while women have to cope simultaneously with work and family responsibilities (Kim & Moen, 2001a).

Most of the research conducted on the relationship between work status and depression in older adults comes from high-income countries (Abe et al., 2012; Jang et al., 2009; Lue et al., 2010; Mendes de Leon et al., 1994; Paul and Moser, 2009; van der Heide et al., 2013; Westerlund et al., 2010). Work conditions, however, are different from those countries compared to low-and-middle income countries, where labour market face major challenges, such as a low female participation in the workforce (Cho et al., 2012). Additionally, there is an increasing job informality, which is related to poverty and expose workers to abuse, exploitation and income fluctuations, since they are not protected by work regulations; moreover, informal jobs are not covered by social security systems, which grant the access to pensions (Cho et al., 2012). This way, the results obtained in previous research in high-income countries might not be completely applicable in the context of low-and-middle income countries.

Based on the above, it is reasonable to postulate that the relationship between work status psychological well-being in older adults varies according to the particular socioeconomic and cultural contexts of each society. For that matter, a previous study described that this

particular association is more evident in places with economic underdevelopment and weak protection systems against unemployment (Paul & Moser, 2009). In addition, differences in the cultural valuation of older adults, especially in terms of working at older ages, have also to be considered. The study of this relationship in different settings might therefore help to understand possible contextual heterogeneity.

The main objective of the present study was to explore the individual and social variability in the association between work status and depression in older adults, based on information from six countries having different socioeconomic and cultural conditions: China, Ghana, India, Mexico, Russia, and South Africa.

Materials and methods

Design

A secondary analysis was performed of a cross-sectional study known as the SAGE study (the World Health Organization [WHO] Study on Global Ageing and Adult Health). Analysed data was from the first wave of the study, conducted between 2007 and 2009 in China, Ghana, India, Mexico, Russia, and South Africa (Kowal et al., 2012).

Overall Characteristics of the Original Design of SAGE and Representativeness: SAGE was designed as a multi-national survey of medium- and low-income countries. It consists of two overall components: 1) a longitudinal cohort study and 2) a sequential panel study corresponding to different time periods in each country. It is nationally representative of the population of adults 50 years of age and older in each participating country. More information about the design of SAGE is available in previous publications (Kowal et al., 2012).

Sample, sampling procedure, and data collection

The study sample in each country was selected using a probabilistic, multi-stage sampling method, with response rates of 93% for China; 83% for Russia; 68% for India; 81% for Ghana, 53% for Mexico; and 74% for South Africa (Kowal et al., 2012). The SAGE study was carried out with in-person interviews at the household and individual levels using questionnaires and tests that were standardized for all of the countries and previously submitted to pilot tests (Kowal et al., 2012). For the analysis of the present study, only adults 60 years and older from the six countries and who participated in wave 1 were included.

Operationalization of variables

Outcome variable: The variable "depression" was defined as the presence of a "major depressive episode (MDE) over the previous 12 months." This was based on an adaptation of diagnostic criteria for "major depressive episode" from the ICD-10 classification of mental and behavioural disorders (World Health Organization, 1992). This adaptation has been previously used with both SAGE and the World Mental Health Survey (WHO WMH-CIDI) (Arokiasamy et al., 2015). A total of 18 items were included which asked about the presence of each depressive symptom over the previous 12 months, with dichotomous responses (present versus absent). In order to define the presence of the outcome, the algorithm proposed by Arokiasamy, P. et al. was used to generate two sets of variables: set A and set B (Arokiasamy et al., 2015). Set A contained 6 items grouped into 3 domains: 1) depressive affect, with a minimum duration of two weeks and an intensity at which symptoms are present nearly every day, most of the day; 2) anhedonia (loss of interest or pleasure in activities), including decreased libido; and 3) tiredness or loss of energy. Set B contained 12 items which were grouped into 7 domains (with 1 or 2 items each) corresponding to symptoms that were secondary to the episode: 1) negative thoughts of hopelessness, low self-esteem, or unworthiness; 2) psychomotor anxiety/agitation; 3) suicidal ideas or attempts; 4) slow thinking process or loss of concentration; 5) physical slowness; 6) changes in sleep

patterns; and 7) loss of appetite. Each of the domains received values of 0 or 1, where the value 1 was assigned when the response to the question, or to at least one of the questions when the domain contained two items, was affirmative. This way, the interviewee was considered to have a “major depressive episode (MDE) over the previous 12 months” if his score was ≥ 2 and ≥ 4 in sets A and B, respectively (Arokiasamy et al., 2015).

Independent variables

Main exposure variable: current work status, which was determined according to four items. First, participants were asked if they had worked “at some time in their life” (“work” understood as salaried employment on a farm or in a family business, sales, independent services, or one’s own business; domestic work was not included in this definition). If they answered no, they were asked why they had not worked. In addition, those who had worked at some time in their life were asked if they had worked “at least two of the past seven days,” and if they answered no, they were asked why they had not worked. This allowed classifying subjects into six groups according to work status: 1) homemaker or domestic work (this included current homemakers and those who had been homemakers all of their lives); 2) never worked for a reason other than being a homemaker; 3) currently employed; 4) retired without a pension; 5) retired with a pension; and 6) not working due to disability (made reference to those with a current disability or one they had all of their lives).

Covariates: these included those that the literature has identified as significant predictors of depression in older adults and that could act as potential confounders (Cole & Dendukuri, 2003; Fernández-Niño et al., 2014; Fisher & Baum, 2010; Fiske et al., 2009; Jang et al., 2009; Kim, 2008; Rodda et al., 2011).

Sociodemographic: these included sex; age, categorized as 60–69 years old, 70–79 years old, and 80 years or older; marital status, dichotomized as having or not a stable partner (married or cohabiting vs. widowed, divorced/separated or never married); education (none, incomplete or complete elementary school, incomplete or complete secondary school, technical school or equivalent, and university or graduate school); belonging to a religious minority (defined by the self-report of belonging to a religious group that represented under 20% of the population in the country); and lastly, self-report of having some type of health care service (yes = 1 and no = 0).

Health Conditions: comprised physical disability, multimorbidity, and accidents/injuries. Physical disability (yes = 1 and no = 0) was considered as being severely or extremely limited in at least one of 18 basic activities evaluated over the previous 30 days using an approach based on WHODAS 2.0 (Arokiasamy et al., 2015; Üstün et al., 2010). The presence of multimorbidity was determined according to self-reports of having a medical diagnosis of illnesses from a list of 8 primary chronic diseases (arthritis, cerebrovascular event, angina, diabetes, chronic obstructive pulmonary disease, asthma, hypertension, and cataracts). This variable was characterized as: none or only one morbidity, two morbidities, or three or more (the standard definition of multimorbidity) (Fernández-Niño & Bustos-Vázquez, 2016). Lastly, the history of accidents or physical injuries over the previous 12 months was dichotomized (yes = 1 and no = 0).

Social Networks: Four variables were included, each one representing a different socialization domain: 1) living alone; 2) participation in social religious activities, defined dichotomously as attending religious services at least once per month; 3) participation in non-religious social activities, defined dichotomously as being a member of at least one social organization other than a church; and 4) horizontal trust, defined as a positive perception of trusting others. All of the above variables were dichotomized (yes = 1 and no = 0) and included in the multivariable analysis as adjustment covariates.

Socioeconomic Household Conditions: This was defined as accumulated household wealth. This variable was constructed using a factor

analysis with a tetrachoric correlation matrix containing 20 items, each of which related to the ownership (yes or no) of various material goods. A continuous variable was then obtained based on the prediction of the first factor extracted. The factor generated explained 46% of the joint variance of the items. This variable was categorized by tertiles in each country, where the least wealth corresponded to the first tertile and the greatest wealth to the third.

Statistical Analysis. Exploratory/Descriptive: Each of the qualitative variables was summarized using proportions with their respective 95% confidence intervals. The quantitative variables were described with measures of central tendency (mean or median) and dispersion (range, interquartile range, and standard deviation). Chi-square and Mann-Whitney U tests were used for the bivariate analysis. Additionally, for the response variable, the standardized prevalence was estimated using the direct method with the world population standard (Ahmad et al., 2001).

Multiple Regression Analysis with Variability per Country: binary logistic regression models with country-level fixed effects were constructed (Hosmer & Lemeshow, 2004) and stratified by sex. The models used “work status” as the main independent variable and were adjusted for all the described covariates. Additionally, to explore the heterogeneity of the association between work and MDE in each country, interaction terms were performed between the indicator variable for the country and work status (McClelland & Judd, 1993). Multiplicative terms between the exposure and sex, age, occupational status, average unemployment duration, marital status and belonging to a religious minority were explored and discarded since they did not provide additional information; the variables for the interaction terms were selected based on a previous research (Paul & Moser, 2009). To account for sampling design, sampling weights were used for results estimation; finally, all models’ assumptions were verified (Hosmer & Lemeshow, 2004). Analysis were performed with STATA 14 (Stata Corporation, College Station, TX, USA).

Ethics approval and consent to participate: The present study was a secondary analysis of data from wave 1 of the SAGE study. The original study was authorized by the World Health Organization’s (WHO) Ethics Committee. The ethics committees belonging to each institution in each country also performed a review. Written informed consent for administering the instruments was obtained from each participant. The information collected by wave 1 of the SAGE study is public data. Authorization from SAGE was obtained for the present analysis via the internet, and approval was obtained from the Research Ethics Committee of the Mexican National Institute of Public Health.

Results

General Characteristics of the Sample, Prevalence of Depression, and Work Status: the initial sample was composed of 9420 men (44.0%) and 11,990 women (56.0%) 60 years of age and older (median 69, interquartile range 64 to 75). Table 1 presents the main characteristics of men and women for each country participating in the SAGE study. In all of the countries, women were found to have higher MDE prevalences over the previous 12 months ($p < 0.01$), with India having the highest prevalence (18.82% and 15.05% for women and men, respectively), followed by Ghana (11.37% and 7.84%), Mexico (8.53% and 4.44%), Russia (6.57% and 3.80%), and South Africa (3.34 and 2.76%); China had the lowest prevalence for both men and women (1.95% and 1.17%). A prevalence of 7.72% (CI 95%: 6.86%–8.59%) was estimated for the total sample of women and 5.65% (CI 95%: 4.73%–6.57%) for the total sample of men.

With regard to work status, notable differences between men and women were found. In all of the participating countries, the proportion of male participants who were currently employed (working at the time of the interview) was always larger than that of female subjects ($p < 0.01$). This gender difference was greater in Mexico, followed by India, Russia, and South Africa, all of which had smaller proportions of

Table 1
 Characteristics of older adults 60 years of age and over, SAGE Study Wave 1, 2007–2009*.

	China		Ghana		India		Mexico		Russia		South Africa	
	M	W	M	W	M	W	M	W	M	W	M	W
n	3671	3854	1374	1469	2101	1870	736	1145	1122	1923	881	1264
Major Depressive Episode (previous 12 months)	1.17	1.95	7.84	11.37	15.05	18.82	4.44	8.53	3.80	6.57	2.76	3.34
Standardized Major Depressive Episode (previous 12 months)**	1.16	1.92	7.87	10.91	15.19	18.71	4.71	8.48	3.40	6.45	2.60	3.38
Work Status												
Currently Employed	39.29	28.68	67.25	55.32	50.02	14.38	42.67	10.01	19.72	12.01	23.96	11.15
Homemaker	1.51	9.54	0.95	1.85	1.01	38.55	2.39	69.35	0.02	2.57	11.82	14.57
Never Worked	5.25	7.17	1.32	1.49	3.71	20.93	20.29	9.88	0.07	0.34	7.10	9.76
Retired without a Pension	13.14	18.50	12.49	22.41	18.28	11.95	7.15	5.78	26.10	35.70	27.87	44.08
Retired with a Pension	36.98	31.56	7.86	1.73	10.28	0.48	12.74	1.29	47.54	43.65	13.52	13.21
Not Working due to Disability	3.82	4.55	10.13	17.20	16.70	13.71	14.76	3.69	6.55	5.73	15.73	7.24
Employment Level (only for those who worked at some time)												
Professionals and Senior Positions	10.76	9.03	6.65	3.06	10.65	4.53	10.01	7.03	24.56	34.68	11.53	13.36
Technicians, Sales, and Office Workers	15.99	12.22	7.99	3.60	17.65	11.98	17.99	21.54	2.72	31.69	16.93	27.74
Construction Workers, Artisans, Machine Operators, and Farm Workers	73.25	78.76	85.36	93.34	71.71	83.49	72.00	71.43	72.72	33.63	71.54	58.90
Sociodemographics												
Age												
60–69 years	57.76	53.39	45.41	46.20	55.27	53.06	51.85	47.08	52.20	41.69	64.01	58.89
70–79 years	33.91	36.54	37.52	38.80	36.35	34.98	30.97	37.00	35.20	41.60	23.81	30.90
80 > 79 years	8.34	10.06	17.06	15.00	8.38	11.96	17.17	15.92	12.60	16.70	12.18	10.21
No stable partner	13.63	31.09	18.00	75.80	12.69	58.07	19.69	56.26	22.48	67.82	20.56	68.24
Education												
Complete Elementary School	66.49	80.11	69.49	93.06	68.70	94.53	82.39	83.25	11.46	14.38	69.65	76.48
Complete or Incomplete Secondary School	26.87	17.06	25.62	5.79	24.96	4.49	10.58	9.53	72.77	73.67	23.34	20.40
College or Higher	6.64	2.83	4.89	1.14	6.33	0.98	7.03	7.23	15.77	11.95	7.01	3.11
No Health Insurance	8.89	11.08	55.99	57.66	96.41	97.52	27.82	28.60	0.00	0.46	76.97	82.95
Wealth Index	0.48(0.38)	0.47(0.38)	0.55(0.33)	0.53(0.31)	0.54(0.33)	0.53(0.34)	0.68(0.26)	0.68(0.28)	2.82(0.44)	2.88(0.44)	0.49(0.38)	0.34(0.36)
Health Conditions												
At Least One Limitation (Activities of Daily Living)	16.55	23.54	47.04	63.89	55.46	73.14	39.95	60.22	33.54	48.89	42.84	48.92
Multimorbidity												
No Pathology	46.24	39.60	67.65	58.85	53.99	54.29	40.68	28.16	29.24	15.70	48.82	40.75
One Chronic Pathology	31.18	32.99	23.06	25.87	26.81	28.79	42.00	39.25	27.22	23.96	28.90	29.79
Two or More Chronic Pathologies	22.58	27.41	9.29	15.28	19.21	16.92	17.32	32.59	43.55	60.35	22.28	29.47
Injury Over the Previous 12 Months	5.26	6.98	5.46	6.33	7.72	9.92	4.38	4.85	1.93	3.69	2.85	1.59
Social Networks												
Living Alone	9.13	16.78	7.60	10.99	2.70	6.48	3.01	5.09	17.93	44.19	9.78	15.91
Attending Church	1.77	4.57	80.13	79.86	31.07	19.03	39.73	49.29	12.45	14.99	75.68	79.69
Belonging to Social Groups	20.94	16.53	60.62	49.95	34.80	9.47	22.46	19.04	20.78	25.52	55.48	47.10
Trusting Others	98.07	98.27	81.17	76.92	85.15	70.61	82.70	83.91	81.26	77.52	79.43	74.02
Urban Strata	44.13	44.11	38.86	39.36	31.15	31.17	73.88	79.63	72.20	72.93	62.59	63.81

* Proportions (%) per column. (The % of a category is presented for dichotomous variables since the other one is the complement.) The mean (SD) is presented for continuous variables.

** Standardized prevalence using the world population standard from the World Health Organization. M = men, W = Women.

economically active female older adults than China and Ghana ($p < 0.05$). Ghana is especially noteworthy, where unlike the overall trend, 50% of female participants was currently working. In addition, in all of the countries the proportion of men who were retired with a pension was always larger than that of women, with a notable difference in Ghana, India, and Mexico ($p < 0.01$). Furthermore, these three countries, along with South Africa, had the smallest proportion of both men and women who were retired with a pension. Lastly, the proportion of women who were homemakers was particularly large in Mexico (69.35%), with India at a distant second (38.55%), followed by South Africa (14.57%) and China (9.54%). This proportion was very small in Ghana (1.85%) and Russia (2.57%). Less than 2% of men worked as domestic labourers, except for South Africa, which stands out with an 11%.

With regard to having worked at some time during their lives, notable differences were found between men and women in all countries, except in Russia and South Africa, with a tendency for women to have never worked in their lives ($p < 0.01$). Table 1 presents the other relevant covariates. Overall, the most significant differences between men and women that were found in the majority of the countries pertained to education, multimorbidity, physical limitations, attending church, and participating in social organizations ($p < 0.01$).

Multiple Regression Analysis with Variability by Country: Table 2 shows the results from the fixed-effect logistic regression models, stratified by sex. With “currently working” always as the reference category, being retired with a pension was found to have a protective effect on MDE for men in China (OR = 0.23; CI95%:0.08–0.70; $p = 0.01$) and Ghana (OR = 0.25; CI95%:0.07–0.95; $p = 0.04$) and for women in India (OR = 0.05; CI95%:0.01–0.51; $p = 0.01$) and South Africa (OR = 0.19; CI95%:0.04–0.97; $p = 0.05$). Additionally, being a homemaker was identified as a protective factor for MDE in South Africa (OR = 0.09; CI95%: 0.01–0.66; $p = 0.02$) and Mexico (OR = 0.32; CI95%:0.14–0.76; $p = 0.01$). Not working due to disability was a risk factor for both men (OR = 1.63; CI95%:1.06–2.50; $p = 0.03$) and women (OR = 1.71; CI95%:0.98–2.97; $p = 0.06$), and this was homogeneous among countries. Meanwhile, the other work categories that were analysed (retired without a pension and never worked) did not have a statistically significant association in any of the countries studied.

Discussion

In terms of this study’s most relevant findings, a protective association between being a homemaker and MDE was found for women, though only in Mexico and South Africa. Meanwhile, being retired with a pension showed a protective association in female from India and South Africa, as compared to currently working. For men, being retired with a pension was found to be associated with a lower prevalence of MDE only in China and Ghana.

In brief, our results are not consistent with the potential positive effects from working that have been found for older adults (Abe et al., 2012; Gallo et al., 2006; Imai et al., 2014; Noelke & Beckfield, 2014; Olliffe et al., 2013; Shi et al., 2014), or at least they did not identify them. On the contrary, our study found that being retired with a pension displayed a protective association compared to being a current worker, suggesting that there are potential mental benefits from retiring with a pension, which would be relatively greater on average than benefits from remain working (the reference category), at least for women in India and South Africa and for men in China and Ghana. In addition, the fact that the association between retiring with a pension and depression remains the same when adjusting for accumulated wealth suggests that this relationship has explanatory pathways other than SES, including social recognition, status, and emotional stability (Paul & Moser, 2009) related to successful retirement.

Considering previous studies, the findings herein contrast with other research that have found that retirement (compared to remain working) was associated with a higher risk of depression, so that the

Table 2
Logistic regression models for the presence of an MDE, by sex and country*.

	Men (n = 8345)			Women (n = 9803)				
	Odds Ratio	CI 95%	P > t	Odds Ratio	CI 95%	P > t		
Employment Status (Reference group: Currently working)								
Domestic Work (pooled for men)	0.63	0.20	1.95	0.42				
China				0.82	0.32	2.11	0.68	
Ghana				1.92	0.36	10.42	0.45	
India				1.43	0.83	2.46	0.19	
Mexico				0.32	0.14	0.76	0.01	
Russia				2.23	0.43	11.57	0.34	
South Africa				0.09	0.01	0.66	0.02	
Never Worked (pooled)	1.13	0.57	2.24	0.74	0.94	0.53	1.7	0.85
Retired without a Pension, by Country								
China	0.49	0.15	1.6	0.24	0.43	0.19	0.98	0.05
Ghana	0.65	0.26	1.63	0.36	1.30	0.75	2.25	0.36
India	0.72	0.42	1.21	0.22	0.75	0.37	1.53	0.43
Mexico	1.08	0.26	4.52	0.92	1.39	0.15	12.54	0.77
Russia	0.32	0.06	1.62	0.17	1.92	0.79	4.66	0.15
South Africa	0.10	0.01	0.99	0.05	0.53	0.11	2.62	0.44
Retired with a Pension, by Country								
China	0.23	0.08	0.70	0.01	1.60	0.73	3.53	0.24
Ghana	0.25	0.07	0.95	0.04	3.26	0.84	12.6	0.09
India	0.49	0.16	1.52	0.22	0.05	0.01	0.51	0.01
Mexico	Not estimable			0.39	0.04	3.50	0.40	
Russia	1.43	0.27	7.54	0.67	0.89	0.39	2.01	0.77
South Africa	0.89	0.09	8.82	0.92	0.19	0.04	0.97	0.05
Retired due to Disability (pooled)	1.63	1.06	2.5	0.03	1.71	0.98	2.97	0.06

* All of the models were adjusted by age, marital status, educational level, religious minority, health insurance, multimorbidity, disability in terms of activities of daily living, prior injury, household members, participation in social activities, trust in others, accumulated wealth, rural strata, and country effect.

timing (Buxton, Singleton, & Melzer, 2005), the duration (Olesen, Rod, Madsen, Bonde, & Rugulies, 2015) and the wilfulness (Mosca & Barrett, 2016) of retirement were key features that influenced the mental health of older adults. Contrarily, our results are similar to those presented in other investigations where a protective association between retirement (versus working) and depression has been reported (Mandal & Roe, 2008; Westerlund et al., 2010) or where at least there was not an increase of depressive symptoms given by partial (Szinovacz & Davey, 2004) and statutory retirement (Leinonen, Mäki, & Martikainen, 2017).

The heterogeneity found among the SAGE countries in the association between work status and MDE is consistent with the literature mentioned previously. The fact that the present study found a protective association of being retired with a pension only for men in China and Ghana and for women in India and South Africa suggests that each country has particular socioeconomic factors that explain the heterogeneous behaviour of this association. This way, despite of all SAGE-participant countries being low-and-middle income countries and having similar challenges regarding their labour markets, the magnitude of each of them varies according to the development of their economies and to the change in the population structure (Cho et al., 2012).

To exemplify the above, India, which is worth highlighting given

that its depression prevalence was the highest, is a middle-income country with a fast grow of income per capita and of labour productivity (Cho et al., 2012), although showed a high rate of several risk factors for depression in this research. This way, women had the highest prevalence of functional limitations among all countries; the largest proportion of them had the lowest educational level; and had also one of the highest frequencies of participants without a permanent partner. As for men, they had the second highest proportion of not working individuals due to disability; and the average wealth index was low for both men and women. Similar findings have been reported previously (National Institute of Mental Health and Neuro Sciences, 2016).

From a sociological perspective, it is important to consider that the impact of work on the mental health of older adults depends on the social meaning given to both work and retirement, as well as the social role of older adults in each society, and its own valuation of oneself and one's work. This is because certain sociocultural contexts and norms are likely to favour retirement, which promotes a greater positive view of retiring at the elderly age and a major social acceptance of it, so that older adults are more highly valued (Abe et al., 2012; Mendes de Leon et al., 1994; Paul & Moser, 2009; Roy & Chaudhuri, 2008; Shi et al., 2014). In general terms, these differences in associations can also be explained by the relative well-being from having a pension versus working, which in turn would depend on the social security and labour systems in each of the analysed countries, since they shape the meaning of "retirement" (Scherer, 2002). Therefore, these findings need to be interpreted according to the context of each country in the SAGE study (Roy & Chaudhuri, 2008).

However, these findings could also be explained by differences in operational definitions and in the specifications of types of retirement, making it difficult to compare studies. Nonetheless, the present study adheres to the growing body of literature that suggests retirement has a protective effect on mental health when it is voluntary or includes a pension, features that are not always specified, making it difficult to synthesize the evidence. Theoretically, some authors have proposed that retirement may increase depression, especially when: 1) it occurs sooner than expected, 2) it is perceived as forced, and 3) it is abrupt rather than gradual (Leinonen et al., 2017). Based on this theory, a "good retirement" (right timing, gradual, voluntary, and well paid) should not be related to depression. Unfortunately, since the present work lacks information about retirement conditions, this hypothesis cannot be empirically evaluated.

A possible explanatory mechanism for our results is the financial well-being of the elderly when retiring with a pension. It has been described that financial stability and income in retirement are closely related to psychological well-being and retirement adjustment, so that retirees that have economic support and stable incomes have a better psychological well-being during retirement and a better adjustment process (Kim & Moen, 2001a; Wang & Shi, 2014). In addition to economic benefits, retiring with a pension provides other emotional advantages that could explain the protective association found, including personal satisfaction, social status, personal autonomy, and retiring under adequate conditions. Also important to consider is that the impact of not working (or no longer working) could be explained by current job conditions and job satisfaction. That is, the job itself could have negative consequences and be depressogenic when working conditions are not optimal, or at least when the worker finds them unsatisfactory (Burgard, Elliott, Zivin, & House, 2013). This would be consistent with a relative benefit from retiring with a pension under these types of conditions.

With regard to homemakers, the protective association found in Mexico and South Africa could be explained by the social recognition and cultural value given to these women in these societies. In the particular case of South Africa, processes involving women's liberation have led to more empowerment over recent decades, although gender inequality still exists (Hertz, 2004). In Mexico, particularly in rural areas, gender roles significantly influence the experience of aging

(Lazarevich & Mora-carrasco, 2008; Treviño-Siller, Pelcastre-Villafuerte, & Márquez-Serrano, 2006). In spite of the possible subordinate conditions involved in being a homemaker for some women, this study's findings of the protective nature of this role may be related to satisfaction with fulfilling particularly rigid gender roles. As mentioned previously, nearly 70% of older adult women surveyed in Mexico are homemakers, the majority of which have been homemakers all of their lives. This suggests that breaking the domestic role could place greater social pressures on women who work, pressures that are not faced by those who work exclusively as homemakers, particularly for the generation of women in this study. Added to this is the symbolic capital that female domestic figures represent in Latin America, such as the roles of mother or grandmother, which are complementary to the role of homemaker (Maldonado-Saucedo, 2015) and which also provide mental health benefits. Unlike our study's findings, previous studies have found that homemakers in Mexico have more stress and different vulnerabilities over their lifetimes than women who work outside the home, since their situation would produce social isolation and subordination, and deprive them of work benefits (Lara and Salgado de Snyder, 2002).

This apparent inconsistency may have arisen because the categories "homemaker" and "working" are mutually exclusive in the SAGE study, while in reality they are not since many women perform both types of work. And since women's increased involvement in the labour market in Mexico has not yet been accompanied by a restructuring of family roles or by receiving more help at home, they would have twice as many responsibilities (a double workload) and more stress than the women who reported being homemakers in the SAGE study (who were exclusively homemakers) (Lazarevich & Mora-carrasco, 2008). This would explain the relative protective effect as compared to the women who worked outside the home.

The present study has several limitations. First, our results should be interpreted cautiously as the temporal ordering of the exposure and the outcome is difficult to establish given the cross-sectional nature of the study. In addition, because the relationship between work and depression is two-way, this study cannot determine which of the results could be explained by the "social selectivity hypothesis." That is, people who are prone to depression have more difficulties obtaining and keeping a job (Mastekaasa, 1996), while people with better cognitive and affective abilities, who are less prone to depression, may obtain a pension more successfully, which could partially explain our results.

In addition, the appropriate identification and analysis of potential mediating variables (such as physical disability, accidents/injuries, or participation in social organizations) would need to have longitudinal data in order to specify the models with all these variables organized over time. Although, some variables included in our analysis could be mediating variables, they could also be important confounders (or particularly for some subjects that we cannot identified), and consequently, we preferred not to exclude these variables in our final regression models.

However, we can mention that if we exclude these covariates of the regression models, the estimators for our main independent variable (work status) are almost the same. We think that this problem is an important limitation of our study derived from the cross-sectional design. The study of the time-dependent relationships between work status and depression, considering the potential mediating variables represents an important methodological challenge for new studies.

Finally, the analysis could not include some important characteristics of retirement that have been reported to be influential on the association with depression, such as timing, quality (partial vs. complete), duration, and wilfulness; and other factors that would have been interesting to evaluate, i.e. the amount of pension and whether it was enough to cover the individual's expenses. In consequence, an exploration of a potential differential association could not be explored.

Conclusions

In spite of its limitations, this study demonstrates that the association between work and depression differs according to socioeconomic and cultural contexts. In conclusion, although the epidemiological relationship between the possible impact of work status on depression in older adults is complex and its mechanisms have not yet been established, retiring with a pension appears to be a protective factor, which in some countries may be related to a good retirement rather than to the socioeconomic level. Being a homemaker was also found to have a protective effect, which should be interpreted based on the particular gender dynamics in each country.

Acknowledgments

This paper uses data from the WHO World Health Surveys / Multi-Country Survey Study (as appropriate) and from WHO's Study on Global Ageing and Adult Health (SAGE). SAGE is supported by the United States National Institute on Aging through Interagency Agreements OGH A 04034785; YA1323-08-CN-0020; Y1-AG-1005-0) and through research grants R01-AG034479 and R21-AG034263.

Declarations of interest

None.

Funding sources

None.

Ethics approval

This paper is a secondary analysis of data from the WHO's Study on Global Ageing and Adult Health (SAGE), which is public and available for research upon requesting through their website. A formal request was done and permission to use it was obtained. The primary study, SAGE, was approved by the World Health Organization's Ethics Committee and the ethics committees belonging to each institution in each country also performed a review. Written informed consent for administering the instruments was obtained from each participant. This public database does not contain information that allows personal identification of participants, so that their privacy is secure.

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