

# Sex differences in activity and health changes following COVID-19 in Europe—results from the SHARE COVID-19 survey

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While a female advantage in the overall survival from the coronavirus disease 2019 (COVID-19) has been demonstrated, potential sex differences in health changes are not investigated. In a sample of 21 395 men and 29 139 women aged 50+ from the SHARE COVID-19 survey, we investigated sex differences in social activities, self-rated health and mental health following the COVID-19 outbreak. We found considerable sex differences in all European regions with women experiencing larger negative changes across all social activities and health measures than men lending support for the male–female health-survival paradox.

## Introduction

The coronavirus disease 2019 (COVID-19) outbreak has led to severe economic and health uncertainties throughout the world. A wide range of measures to reduce social contacts was introduced, e.g. closure of schools and workplaces, restrictions in gatherings and even curfews.<sup>1</sup> However, such restrictions in social activities may come with a cost in both physical and mental health.<sup>2,3</sup>

The contradictory phenomenon that women report poorer health but live longer than men has been denoted the male–female health-survival paradox.<sup>4</sup> Regarding COVID-19, a female advantage in overall survival has been found,<sup>5</sup> while potential sex differences in health changes have not been investigated. This article examines the direction and magnitude of sex differences in social activities, self-rated health and mental health following the COVID-19 outbreak across European regions.

## Methods

### SHARE COVID-19 survey

SHARE, a large cross-European survey, was launched in 2004 and repeated biannually until the fieldwork for wave 8 was suspended in March 2020 due to the COVID-19 pandemic. To resume fieldwork, it was decided to shorten and redesign the questionnaire to reflect the COVID-19 situation and to switch to telephone interviews during June–July 2020.<sup>6</sup> Here, we include 50 534 Europeans aged 50 and older, who participated in the first SHARE COVID-19 survey.

### Health outcomes

Participants were asked whether they had ever left their home since the outbreak or whether they had experienced any mental health issues during the last month. If answering ‘yes’, they were further asked to compare their social activities, self-rated health and mental health with their activities/health before the outbreak. We compared participants reporting worsened health to those with unchanged and improved health. A description of the health variables can be found in Supplementary table S1.

## Covariates

Socio-demographic characteristics included sex, age at interview (categorical), European region (Northern, Western, Southern and Eastern Europe), highest obtained education [according to the International Standardized Classification of Education (ISCED) classified into low (ISCED groups 0–2), medium (ISCED groups 3–4) and high (ISCED groups 5–6)], marital status (married, divorced/separated/unmarried and widowed), limitations in activities of daily living (ADL) obtained from SHARE Wave 8 (no limitations vs. at least one limitation) and COVID-19 infections (positive COVID-19 test among respondent or respondent/close relatives hospitalized due to COVID-19).

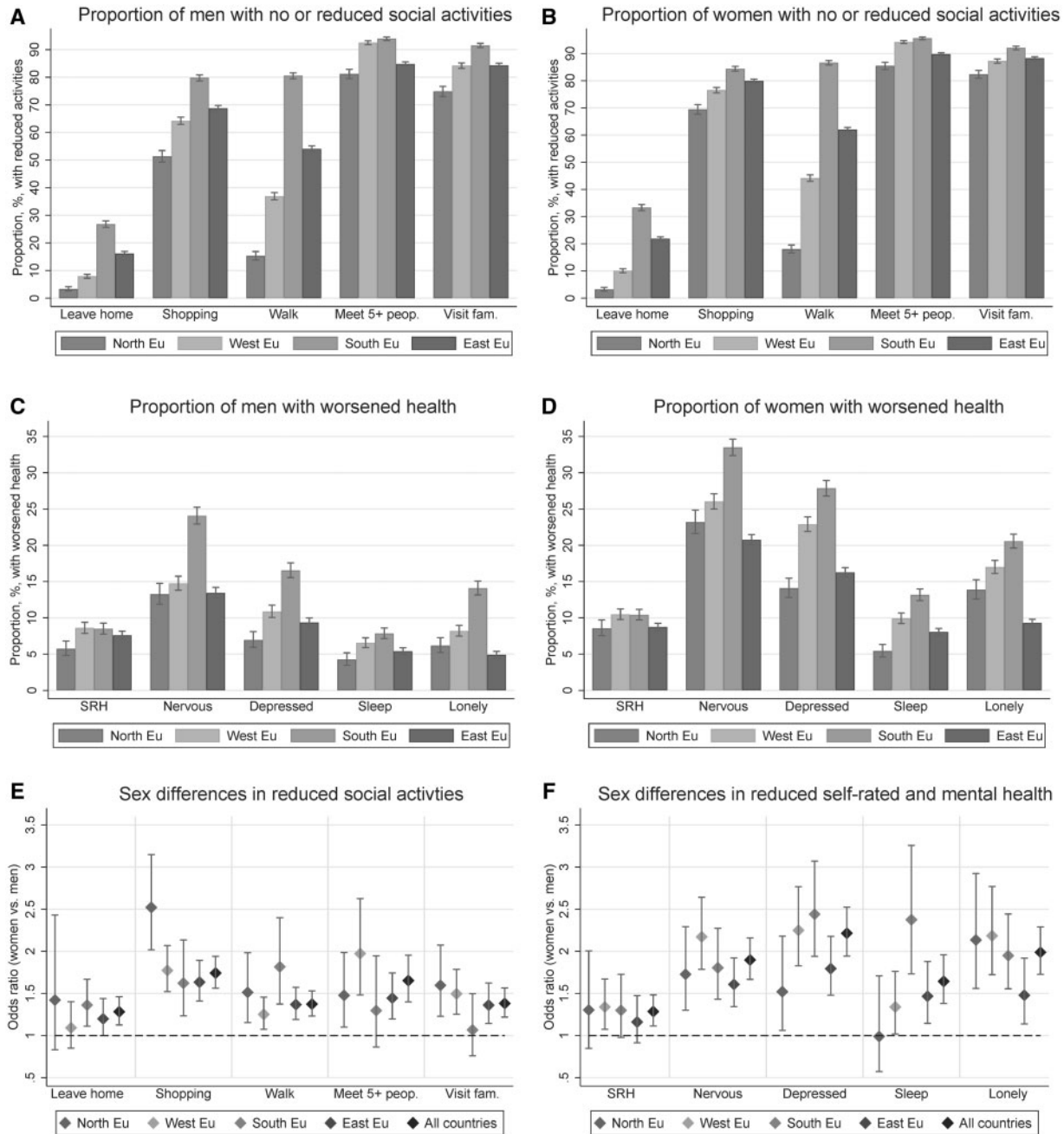
## Statistical analyses

Using logistic regression models estimating odds ratios (ORs) with 95% confidence intervals (95% CIs), we investigated sex differences in activities and health changes following COVID-19. The main analyses were adjusted for age at interview, education and marital status, and separately investigated by European regions. To investigate whether activity limitations at baseline was mediating the differences between men and women, we conducted a model further adjusting for ADL limitations before the outbreak. Also, a model was conducted further adjusting the main model for COVID-19 infections. In all models, we used the calibrated cross-sectional weights included in SHARE.

## Results

A total of 21 395 men (42.3%) and 29 139 women (57.7%) with a mean age of 70.6 years (SD = 9.2) were included in the study (Supplementary table S2). The proportion of participants in the four European regions with changes in activities and health outcomes since the outbreak is shown in figure 1A–D. With few exceptions, Southern European men and women had the largest reduction in all activities and health measures.

More women than men reduced their social activities across all measures. The largest sex difference was found in relation to reduced



**Figure 1** (A–D) Proportion of European men and women with reduced social activities and worsened health since the outbreak of COVID-19. (E, F) Sex differences in the change of social activities and worsened health since the outbreak of COVID-19 in Europe

activity for shopping (OR = 1.74, 95% CI 1.56–1.94), while the smallest sex difference was found for leaving home (OR = 1.28, 95% CI 1.13–1.46) (figure 1E). A similar pattern was found for the change in self-rated health (OR = 1.29, 95% CI 1.11–1.48) and the four mental health outcomes including feeling more nervous (OR = 1.90, 95% CI 1.67–2.16), feeling more depressed (OR = 2.21, 95% CI 1.94–2.52), having more sleep problems (OR = 1.64, 95% CI 1.38–1.96), and feeling more lonely (OR = 1.99, 95% CI 1.73–2.29) with women having higher odds for worsened health than men. Sex differences in the activities and health measures remained largely present in all regions; however, we found only few significant sex-by-region interactions, i.e. the difference in activities and health measures between men and women did not differ by European regions for most of the items (figure 1F). Adjusting for ADL and COVID-19 infection, respectively, did not change the results (results not shown).

## Discussion

This study based on the SHARE COVID-19 survey demonstrated sex differences in changes in self-reported health and social activities following COVID-19. Women experienced larger negative changes across all social activities and health measures than men, supporting the male–female health-survival paradox.<sup>4</sup> This paradox is likely due to multiple causes including fundamental biological differences between men and women, such as genetic factors, immune system responses, hormones and disease patterns.<sup>4</sup> Interestingly, it seems that the paradox is present also in relation to COVID-19. Evidence from Europe shows higher mortality from COVID-19 among men than among women in almost all age groups across all European regions.<sup>5</sup> This study demonstrated that women had larger negative health changes than men following COVID-19, which may support the notion that for women the level of social connectedness is most

strongly associated with health status,<sup>7</sup> whereas other studies support the notion that for men it is most strongly associated with mortality.<sup>8</sup> Thus, lack of social connectedness may be a potential mechanism underlying the male–female health–survival paradox. However, our findings need confirmation in studies with more direct measures on social connectedness.

This study showed large overall regional differences in the health and activity changes, but sex differences were overall similar between the European regions. Previous SHARE studies have demonstrated varying sex differences in health between European regions, for instance in cognitive function and grip strength<sup>9</sup> with the largest sex differences in Southern Europe. However, we did not find a similar pattern regarding COVID-19. While, inherent social and cultural factors generally may contribute to the cross-national health differences,<sup>10</sup> the COVID-19 lockdown had the same negative effect mainly on the health of women across European regions.

The strength of this study was a large number of participants from the SHARE COVID-19 Survey, giving us high power to detect sex-specific patterns in health changes across European regions. A limitation is that health and activities are self-reported, which may result in misclassifications, for instance, if men and women report differently, although Wheaton and Crimmins<sup>10</sup> suggest that sex differences in health generally cannot be explained by reporting differences. Another limitation may be the grouping of countries into European regions, which limits the interpretation of the regional differences, as variations exist in timing and restriction stringency, also within countries in the specific regions.

In conclusion, this study demonstrated sex differences in social activities, self-rated health and mental health following the COVID-19 outbreak, with women experiencing the largest negative changes across all social activities and health measures consistently across European regions. These results show that while lockdowns and social distancing are effective in the fight against COVID-19, such measures should be followed by initiatives to reduce loneliness and promote mental health and wellbeing, particularly among women.

## Supplementary data

Supplementary data are available at *EURPUB* online.

## Acknowledgment

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*Conflicts of interest:* None declared.

## Data availability

SHARE data are free of charge for scientific use globally <http://www.share-project.org/data-access.html>.

## Key points

- Following COVID-19 women experience larger negative changes across social activities and health compared with men.
- Sex differences were present across all items in all European regions with few exceptions.
- Knowledge of health discrepancies between men and women is crucial in order to achieve the important public health ambition of gender equality.

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