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Marital status, labour force activity and mortality: A study of the United States and 6 European countries

Karen van Hedel^a, Frank J van Lenthe^a, Mauricio Avendano^{b,c}, Matthias Bopp^d, Santiago Esnaola^e, Katalin Kovács^f, Pekka Martikainen^g, Enrique Regidor^h, and Johan P Mackenbach^a

^a Department of Public Health, Erasmus University Medical Center, Rotterdam, The Netherlands ^b LSE Health and Social Care, London School of Economics and Political Science, London, United Kingdom ^c Department of Social and Behavioral Sciences, Harvard School of Public Health, Boston, United States ^d Institute of Social and Preventive Medicine, University of Zurich, Zurich, Switzerland ^e Department of Public Health, Basque Government, Vitoria, Spain ^f Demographic Research Institute of the Central Statistical Office, Budapest, Hungary ^g Department of Social Research, University of Helsinki, Helsinki, Finland ^h Department of Preventive Medicine and Public Health, Universidad Complutense de Madrid, Madrid, Spain

Abstract

Aims—Labour force activity and marriage share some of the pathways through which they potentially influence health. In this paper, we examine whether marriage and labour force participation interact in the way they influence mortality in the United States and six European countries.

Methods—We used data from the US National Health Interview Survey linked to the National Death Index, and national mortality registry data for Austria, England/Wales, Finland, Hungary, Norway and Spain (Basque country) during 1999–2007 for men and women aged 30–59 at baseline. Poisson regression was used to estimate both additive (the relative excess risk due to interaction) and multiplicative interactions between marriage and labour force activity on mortality.

Results—Labour force inactivity was associated with higher mortality, but this association was stronger for unmarried than married individuals. Likewise, being unmarried was associated with higher mortality, but this association was stronger for inactive than for active individuals. To

Correspondence to: Frank J. van Lenthe, Department of Public Health, Erasmus University Medical Center, P.O. Box 2040, 3000 CA Rotterdam, The Netherlands, f.vanlenthe@erasmusmc.nl, phone: +31-10-7044220.

CONTRIBUTORS

Karen van Hedel, Frank van Lenthe, Mauricio Avendano and Johan Mackenbach had the original idea for the study, wrote and revised the paper. Karen van Hedel performed the analyses. Santiago Esnaola, Katalin Kovacs, Pekka Martikainen each prepared the data for one of the populations included in the study. All authors contributed to the interpretation of the results, commented on the first version of the paper, and approved the final version of the paper. Karen van Hedel is guarantor of the paper.

COMPETING INTERESTS

The authors declare to have no competing interests.

DATA SHARING STATEMENT

No additional unpublished data are available, because of data protection regulations.

illustrate, among US women out of the labour force, being unmarried was associated with a 3.98 (95% CI: 3.28-4.82) times higher risk of dying than being married, whereas the relative risk was 2.49 (95% CI: 2.10-2.94) for women active in the labour market. Although this interaction between marriage and labour force activity was only significant for women on a multiplicative scale, there was a significant additive interaction for both men and women. The pattern was similar across all countries.

Conclusions—Marriage attenuates the increased mortality risk associated with labour force inactivity, while labour force activity attenuates the mortality risk associated with being unmarried. Our study emphasizes the importance of public health and social policies that improve the health and well-being of men and women who are both unmarried and inactive.

Keywords

marital status; employment; mortality; comparative study

INTRODUCTION

Married persons and individuals active in the labour force enjoy better health and lower mortality than unmarried and inactive individuals.[1-6] Marriage offers a direct form of social and financial support[1,2,4] and it can reduce the risk of unhealthy behaviours such as poor diet or alcohol use. [1,2,7] Labour force activity could provide financial independence and the possibility to accumulate earnings and wealth[8]. It may also provide a source of social support, social recognition and self-esteem, and it could positively influence some health behaviours. [4,5,9] The fact that labour force activity and marriage share some of the pathways through which they potentially influence health raises the possibility that they interact in the way they influence health and mortality. For example, the lack of a partner's social support for a divorced man or woman may be partly compensated by the availability of social support derived from colleagues and friends at work. Similarly, the lack of financial security provided by own earnings from work could be compensated by the presence of a partner who is active in the labour market.

A substantial body of research has looked into whether combining employment, marriage and/or parenthood is associated with health.[10-12] Some of the theories on combining multiple roles may be useful to understand these relationships. The role accumulation hypothesis postulates that having multiple roles provides benefits for women, as employment provides financial independence and social support.[10,11] On the other hand, the multiple role hypothesis suggests that combining employment, marriage and parenthood may be harmful to women's health due to increased stress from competing demands. [10,11,13] Fulfilling the obligations of each role may lead to role overload and conflict, which may result in increased risk of disease and mortality.[14]

There are important gender differences in the distribution of multiple roles, as well as role expectations, between men and women, which may lead to different associations with health and mortality.[15,16] For example, role expectations imply that in many countries men are more often expected to be active in the labour market than women. As a result, being out of the labour force may lead to more stress and health deterioration for males than for females.

There may be also gender differences in the selection processes leading to marriage and employment: men out of the labour force may be a more selective group in terms of poor health and disability, while women may be out of the labour market more often out of choice, particularly women who are married.

The interaction between marriage and labour force activity may differ across countries with different social protection policies. For example, in the United States (US), unemployment insurance income benefits are substantially less generous than in the Scandinavian countries. [17] This is also reflected in the net replacement rates, which express the average of the net unemployment benefits; the net replacement rates are lowest in the United States and highest in Norway.[18] As a result, workers in the US might face more financial strain during unemployment than workers in Norway, particularly if they lack financial support of a partner. Similarly, income support programmes might help buffering against the negative effects of being a lone parent, particularly for men and women who are also out of the labour force.

In this study, we examine whether labour force activity and marriage interact in their association with mortality across the US and 6 European countries. For each country, we examine whether labour force activity modifies the association between marriage and mortality, and whether marital status modifies the association between labour force activity and mortality. We hypothesise that marriage attenuates the mortality risk associated with labour force inactivity, while labour force activity attenuates the mortality risk associated with being unmarried. Additionally we hypothesise that this buffering effect is stronger in countries where there are limited social protection programs for individuals out of the labour force, such as the United States and Hungary.

As pointed out by Knol & VanderWeele (2012), [19] interaction can occur on both an additive scale and a multiplicative scale, and it is not clear theoretically whether one should be more important than the other. Often, the additive scale is of more interest from a public health perspective, i.e., whether more cases occur when two exposures occur together, even if there is no multiplicative interaction. However, multiplicative interactions may be relevant if relationships between variables studied are believe to relate to each other in a multiplicative way, i.e., exposure of variable A might double or triple the risk if exposure B is present. In epidemiology, it is now recommended that both additive and multiplicative interactions are presented. In this study, we therefore examine both multiplicative and additive interactions between marriage and labour force activity.

METHODS

Data sources

Census data from 1999/2001 were linked to national mortality registries with a follow-up until 2002-2007 for six European countries: Austria, England & Wales, Finland, Hungary, Norway, and Spain (Basque country).[20] The data comprised entire populations except for England & Wales (1% representative sample of the population) and Finland (80% random sample of the population). The analyses were restricted to individuals aged 30 to 59 years at

baseline to minimise inclusion of individuals out of the labour force due to retirement. The analysis covered 196,276 deaths among more than 10 million European individuals.

For the US analysis, five waves covering the years 1999 to 2003 of the National Health Interview Survey (NHIS), a multipurpose health survey among the US civilian, non-institutionalised population, [21] were combined with a five year mortality follow-up from the National Death Index. The analyses included 14,069 deaths among 431,659 Americans aged 30-59 years at baseline. Large racial differences in mortality have been documented for the US, [22] as well as differences in the joint distribution of marital status and employment. To avoid our results for the US being driven by racial disparities, analyses are also shown separately for US Blacks and Whites. Unfortunately, data on mortality by race were not available for European countries, however, we expected racial disparities to be most dramatic for the US context.

Detailed information on the US and European data can be found in the supplemental materials (eTable S1).

Variables

We classified individuals into two broad groups based on their legal marital status: (a) married, including married but separated individuals (as they cannot be distinguished from married persons in the European data) and (b) unmarried, which is comprised of widowed, divorced and never-married individuals (taken together to account for small sample sizes of the categories widowed and divorced individuals). Individuals were considered to be active in the labour market if they were currently employed or currently experiencing an unemployment spell, while they were considered to be inactive if they were out of the labour market. The inactive category includes individuals who are homemakers, sick or disabled, retired and in education. However, our analyses are restricted to ages 30 to 59 years, and we therefore expect the fraction of individuals in this category as a result of long-term sickness, education or retirement, to be relatively small.

We controlled for education in all models as educational attainment is associated with mortality as well as marital status and labour force activity status. Education levels were grouped into three categories; lower secondary or less education (11 years of schooling, International Standard Classification of Education[23] (ISCED) levels 0-2), upper secondary education (12 to 15 years of schooling, ISCED levels 3-4), and tertiary or more education (16 years of schooling, ISCED levels 5-6).

Analysis

Mortality rates were derived from Poisson regression models stratified by gender and directly standardised to the US 2005 intercensal population. The separate, combined and stratified associations of marital status and labour force activity with mortality were estimated and presented as rate ratios (RRs) with 95% confidence intervals (CIs).

Following the recommendations by Knol & VanderWeele, [19] we present measures of interaction (and CIs) on the additive and multiplicative scale. Both measures are calculated using the combined RRs of marital status and labour force activity, taking married and

active persons as the reference category. The relative excess risk due to interaction (RERI), which is an interaction measure on the additive scale, represents the proportion of disease among those with both exposures that is attributable to their interaction[19,24]:

$$RERI = RR_{\text{unmarried, inactive}} - RR_{\text{married, inactive}} - RR_{\text{unmarried, active}} + 1.$$

An additive interaction is found when the RERI significantly differs from 0, and can be positive ($RERI > 0$, when unmarried individuals who are inactive in the labour market are worse off than would be expected based on the independent relative effects;

$RR_{\text{unmarried, inactive}} > RR_{\text{married, inactive}} + RR_{\text{unmarried, active}} - 1$) or negative ($RERI < 0$, when unmarried individuals who are inactive in the labour market are better off than would be expected; $RR_{\text{unmarried, inactive}} < RR_{\text{married, inactive}} + RR_{\text{unmarried, active}} - 1$).

A multiplicative interaction (MI) is estimated as follows:

$$MI = RR_{\text{unmarried, inactive}} / (RR_{\text{married, inactive}} \times RR_{\text{unmarried, active}}).$$

A multiplicative interaction is present when the MI is significantly different from 1, and can be positive ($MI > 1$, when unmarried individuals who are inactive in the labour market are worse off than would be expected; $RR_{\text{unmarried, inactive}} > (RR_{\text{married, inactive}} \times RR_{\text{unmarried, active}})$) or negative ($MI < 1$, when unmarried individuals who are inactive in the labour market are better off than would be expected; $RR_{\text{unmarried, inactive}} < (RR_{\text{married, inactive}} \times RR_{\text{unmarried, active}})$). Data were analysed using Stata version 12 (StataCorp, College Station, Texas, USA).

RESULTS

Marital status and labour force activity

The population distribution by marital status and labour force activity differed considerably between countries (Table 1 for men, Table 2 for women). The proportion of unmarried persons ranged from 29% (Hungary) to 54% (US blacks) for men and from 27% (Spain, Basque country) to 67% (US blacks) for women. The proportion of men inactive in the labour force was larger in the US (whites: 24%, and blacks: 26%) than in Europe, where it ranged from 9% (Austria and Spain, Basque country) to 14% (Norway), except for Hungary (24%). The percentage of women inactive in the labour force ranged between 14% (Finland) and 41% (Spain, Basque country).

Marital status, labour force activity and mortality

Mortality rates were generally higher for Americans than for Europeans; US mortality rates were exceeded only by those for Hungary and Finland (only for men). For men and women in all countries, mortality was higher among unmarried persons and persons inactive in the labour force (Tables 1 and 2). The rate ratios (RRs) of mortality comparing unmarried and married individuals ranged from 1.76 (US blacks, 95% confidence interval (CI) 1.41 to 2.21) to 2.66 (Finland, 95%CI 2.60 to 2.73) for men, and from 1.39 (US blacks, 95%CI 1.05 to 1.85) to 1.94 (Austria, 95%CI 1.81 to 2.08) for women. Overlapping CIs suggest that the

association between marital status and mortality did not differ across countries; the only significantly higher RR was found for Finnish men.

The RRs of mortality comparing inactive versus active labour force status ranged from 2.53 (Hungary, 95%CI 2.23 to 2.30) to 5.05 (US blacks, 95%CI 4.05 to 6.31) for men, and from 1.62 (Spain, Basque country, 95%CI 1.50 to 1.74) to 3.58 (US blacks, 95%CI 2.90 to 4.77) for women. Again, the CIs overlapped in all countries, suggesting that there were no cross-national differences in the association between labour force activity and mortality.

Marital status and labour force activity combined, and mortality

Table 3 shows that in all countries mortality was lowest for married men and women active in the labour force and highest for unmarried men and women inactive in the labour force. In most countries mortality was higher for married individuals inactive in the labour force than for unmarried individuals active in the labour force. However, the CIs for most groups in the different countries overlapped, suggesting that the associations of marital status, labour force activity and mortality were not significantly different across countries. Information on the differences in the joint distribution of marital status and labour force activity between the countries is provided in the supplemental materials (eTable S2).

The buffering of marital status and labour force activity

Labour force inactivity was associated with higher mortality for both married and unmarried men and women (Table 4). Labour force inactivity was more strongly associated with mortality among married men in Austria, Finland, Hungary, Spain (Basque country) and US black men, and among unmarried men in England & Wales, Norway and US white men. However, many RRs had overlapping CIs, indicating that they were not significantly different for married and unmarried men. Labour force inactivity was more strongly associated with mortality for unmarried women than for married women. Non-overlapping CIs were found in US (whites only), Austria, Finland, Norway, and Spain (Basque country). The magnitude of the RRs was similar for men and women.

Being unmarried was more strongly associated with mortality for men active in the labour force than for inactive men (Table 4). Most, but not all, RRs had overlapping CIs. For example, among Hungarian men who were active in the labour force, being unmarried was associated with a 2.67 (95%CI 2.61 to 2.73) times higher risk of dying than being married, whereas the same risk was 1.64 (95%CI 1.61 to 1.68) times for men who were not active in the labour force. Being unmarried was associated with a significantly higher risk of mortality for women in all countries except for US black women. This association was stronger for women inactive in the labour force than women active in the labour force, and they were significantly different from each other in the US, Austria, Finland, Norway and Spain (Basque country).

Results in Figure 1 summarise the findings of models assessing the additive and multiplicative interaction between marital status and labour force activity on mortality. The relative excess risk due to interaction (RERI) was in most cases statistically significant for men, except for Hungary and US blacks (Figure 1). The significant RERIs ranged from 1.29 (Spain, Basque country, 95%CI 0.69 to 1.88) to 2.87 (Norway, 95%CI 2.39 to 3.35). The

RERI was significant and positive for women in all countries; it was smallest in Hungary (RERI=1.38, 95%CI 1.00 to 1.76) and largest for US whites (RERI=3.49, 95%CI 2.08 to 4.90). These positive RERIs indicate that unmarried men and women who are inactive in the labour force were worse off than would be expected based on the independent relative effects of being unmarried or inactive alone. In other words, being inactive in the labour market is associated with higher mortality compared to being active, but this association is stronger for the unmarried than for those who are married. Likewise, being unmarried is associated with higher mortality, but this association is stronger for those inactive in the labour market.

For men, the multiplicative interaction (MI) was significant for Finland, Hungary, Norway and Spain (Basque country); it was below 1 for Finland (MI=0.79, 95%CI 0.71 to 0.87), Hungary (MI=0.59, 95% CI 0.49 to 0.69) and Spain (Basque country, MI=0.86, 95%CI 0.73 to 0.99), but above 1 for Norway (MI=1.37, 95%CI 1.20 to 1.55). Unmarried Finnish, Hungarian and Spanish (Basque country) men inactive in the labour market were actually better off than would be expected based on the independent relative effects of labour force inactivity and being unmarried. While, unmarried Norwegian men who are inactive in the labour force were worse off than would be expected. The MI was found to be non-significant for black American women, and women in England/Wales and Hungary. For women, the estimated MIs for the other countries were positive and ranged from 1.19 (Finland, 95%CI 1.05 to 1.34) to 1.58 (Spain, Basque country, 95%CI 1.22 to 1.93). These positive MIs indicate that unmarried women who are inactive in the labour force were worse off than would be expected based on the independent relative effects of being unmarried or inactive alone. In other words, being inactive in the labour market is associated with higher mortality compared to being active, but this association is stronger for the unmarried than for those who are married. Likewise, being unmarried is associated with higher mortality, but this association is stronger for those inactive in the labour market.

DISCUSSION

Summary of findings

Labour force inactivity was associated with higher mortality, but this association was stronger for unmarried than married individuals. Likewise, being unmarried was associated with higher mortality, but this association was stronger for inactive than for active individuals. Among women, significant interactions on the additive and multiplicative scale between marriage and labour force activity on mortality were found. For men, there was also evidence of an interaction on the additive scale, but not on the multiplicative scale. Similar results were observed across the US and most European countries.

Interpretation

Our results support the hypothesis that marriage attenuates the mortality risk associated with labour force inactivity, while labour force activity attenuates the mortality risk associated with being unmarried. We also find that the independent effects of labour force activity and marriage are stronger for men than for women. Yet, the interaction is found to be stronger

for women, suggesting that the mortality risk associated with the combined exposure is larger for women than for men.

The effect of combining work and marriage – or the lack of both – might be different for men and women due to the traditional division of roles in the household. Men are typically less involved in household work. [25] For working men, marriage may be a source of both emotional and instrumental support. Compared to men who are both married and employed, unmarried and inactive men may be at particular health disadvantage as they lack these sources of support from both work and marriage. By contrast, although women may also benefit from combining work and marriage, the combination of both roles may also bring additional stress due to the larger share of household responsibilities taken up by women as compared to men. As a result, while unmarried and inactive women may be worse off than their married and active counterparts, this difference may be larger for women than for men. For example, women are more likely to cook and carry out household work, which may benefit men's health. Women, in contrast, may derive less health benefits from marriage, given that men are less likely to be involved in household tasks. [25] Finally, gender differences in the selection mechanisms leading to marriage and employment may also partly explain the different results for men and women. Gender role expectations imply that men are more often expected to be active in the labour market, suggesting that the group of inactive men may be a more selective group of unhealthy men as compared to their female counterparts, for whom work inactivity might more often be a choice. Health selection effects would thus result in a stronger association between labour market inactivity and mortality for men than women.

The bidirectional causal mechanisms generating the associations between marital status, labour force activity and mortality need to be taken into account: poor health is likely to decrease the probability of marriage and labour force activity,[1,3,5,26] and at the same time, marriage and labour force activity may confer several benefits to health. A stronger health-related selection among men than women into marriage or the labour force could explain the higher risks of mortality for men.

Our results also indicate that these interactions do not play out differently across countries with different levels of generosity in social protection. While social safety nets are generally less generous in the United States and Hungary as compared to countries such as in Norway, Austria and Finland, interactions of marriage and labour force activity on mortality were very similar across these countries. This suggests that the mechanisms generating an interaction between marriage and labour force inactivity may not be the direct product of social policy but largely reflect generic effects of both marriage and labour force activity operating at the individual level regardless of the social policy context.

Methodological considerations

A major strength of this study was the inclusion of 6 European countries and the US. This allowed us to improve understanding of the underlying mechanisms by exploiting the potential variation generated by different social protection policies.

Several methodological problems however, need to be taken into account in drawing conclusions from this study. Firstly, our definition of marital status was broad. Legal marital status does not distinguish, for example, unmarried individuals who are cohabiting. However, cohabitating individuals have higher mortality than married individuals, but lower than unmarried individuals living alone.[27] Therefore, we are likely to have underestimated the risk of dying for unmarried persons. To the extent that cohabitation is more prevalent in some of the Nordic European countries[28], this may have influenced our cross-national comparisons.

Another limitation refers to the fact that the US NHIS does not include persons living in institutions, while the European samples cover their whole population (some exceptions, which can be found in eTable S1). However, the survival rates as observed in the NHIS mortality follow-up data closely resemble those of the general US population.[29] Because only a small proportion of the US population aged between 30 and 59 years is institutionalised (about 1%), the exclusion of persons living in institutions in the US sample is unlikely to alter the pattern observed for this country.

Thirdly, we collapsed employed and unemployed in the category “active in the labour force”. This is the typical approach to define labour market activity, however, it may be argued that unemployed individuals should be classified as inactive in the labour market, especially if they are in long-term unemployment. We explored the impact of this decision on our results by running supplementary models with an alternative definition that combines the unemployed category with the category of persons who are out of the labour force. This was possible for Italy, Spain, Sweden and Switzerland. These analyses, summarised in eTables S3-S7, suggest that differences in the classification have very limited impact on the estimates, which resemble those from our primary models. Moreover, a comparison of the results from both definitions based on the US data also showed that our findings are robust against deviations from the original definition (eTables S3-S7). Likewise, our definition of labour market inactivity was also broad; it combined homemakers with those still in education, the retired and those in work disability. Because we focus on ages 30 to 59, however, we expected most of the latter groups to be very small, with most of the inactive individuals corresponding to homemakers.

Cross-national differences in methods of data collection, baseline periods, follow-up periods and population covered might have affected our mortality estimates. In addition, other possibly interesting variables, such as prior health or type of employment contract, were not available in the data and could therefore not be included in our analysis. This implies that health-related selection cannot be discarded as one of the mechanisms explaining the associations we observe. Our study only included information on marital status and labour market activity at baseline. Individuals may get married or divorced, and they may lose their job or return to the labour force after baseline. We were not able to account for these changes, because labour force activity and marital status were only measured at a single point in time. In addition, we were not able to assess the impact of quality of work or relationship quality, which may be important moderations of the associations between marriage, work and mortality. Future studies with more detailed data on these variables should be carried out.

Implications and conclusions

The increased risk of dying for individuals who are unmarried and inactive in the labour force implies that adequate interventions and policies for this segment of the population may be needed. For example, in the United States, programmes such as the Earned Income Tax credit aim to improve the social and economic well-being of lone mothers who are out of the labour market by introducing financial incentives to work. These programmes have shown to bring benefits to health.[30] Yet, the development of such actions requires a deeper understanding of the underlying mechanisms, for example based on studies including potentially mediating factors, and studies circumventing the problem of health selection. Our results nevertheless support the hypothesis that marriage attenuates the mortality risk associated with labour force inactivity, while labour force activity attenuates the mortality risk associated with being married.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Measure of additive and multiplicative interaction for men and women aged 30-59 years in 7 countries

Table 1

Distribution, mortality rates and rate ratios of marital status and labour force activity for men aged 30-59 years in 7 countries

MEN	United States				Austria	England & Wales	Finland	Hungary	Norway	Spain
	all	whites	blacks							
percentages										
married	62%	65%	46%		66%	66%	57%	71%	58%	68%
unmarried	38%	35%	54%		34%	34%	43%	29%	42%	32%
active	77%	76%	74%		91%	87%	88%	76%	86%	91%
inactive	23%	24%	26%		9%	13%	12%	24%	14%	9%
mortality rates (95% CI)										
married	314 (293 to 335)	287 (264 to 310)	568 (474 to 663)		285 (275 to 295)	225 (210 to 241)	261 (256 to 267)	691 (685 to 698)	223 (217 to 228)	263 (255 to 270)
unmarried	695 (643 to 746)	649 (589 to 708)	1,003 (839 to 1,166)		664 (639 to 689)	472 (438 to 506)	695 (685 to 706)	1,565 (1,549 to 1,582)	526 (515 to 538)	568 (548 to 589)
active	290 (271 to 309)	277 (256 to 299)	426 (357 to 495)		257 (249 to 266)	217 (203 to 230)	343 (338 to 348)	612 (605 to 618)	225 (221 to 230)	271 (263 to 278)
inactive	1,211 (1,103 to 1,319)	1,036 (917 to 1,154)	2,152 (1,798 to 2,505)		1,191 (1,136 to 1,245)	786 (722 to 851)	1,039 (1,017 to 1,061)	1,547 (1,531 to 1,563)	883 (860 to 905)	903 (863 to 942)
<i>total</i>	413 (393 to 434)	378 (356 to 399)	747 (657 to 837)		385 (376 to 395)	300 (285 to 314)	441 (435 to 446)	935 (929 to 942)	330 (324 to 335)	336 (328 to 343)
rate ratios (95% CI)										
unmarried vs married	2.21 (2.00 to 2.45)	2.26 (1.99 to 2.57)	1.76 (1.41 to 2.21)		2.33 (2.21 to 2.45)	2.09 (1.90 to 2.31)	2.66 (2.60 to 2.73)	2.26 (2.23 to 2.30)	2.36 (2.29 to 2.44)	2.17 (2.06 to 2.27)
inactive vs active	4.17 (3.70 to 4.70)	3.73 (3.20 to 4.35)	5.05 (4.05 to 6.31)		4.63 (4.36 to 4.91)	3.63 (3.27 to 4.02)	3.03 (2.95 to 3.10)	2.53 (2.49 to 2.57)	3.92 (3.79 to 4.05)	3.34 (3.17 to 3.51)

Mortality rates per 100,000 person-years and rate ratios are obtained from Poisson regression adjusted for age and education.

Source: Authors' analysis based on data from the National Health Interview Survey and Euro-GBD.

Table 2
Distribution, mortality rates and rate ratios of marital status and labour force activity for women aged 30–59 years in 7 countries

	United States				Austria	England & Wales	Finland	Hungary	Norway	Spain
	all	whites	blacks							
WOMEN										
percentages										
married	56%	60%	33%		68%	66%	61%	69%	62%	73%
unmarried	44%	40%	67%		32%	34%	39%	31%	38%	27%
active	61%	61%	66%		69%	71%	86%	63%	77%	59%
inactive	39%	39%	34%		31%	29%	14%	37%	23%	41%
mortality rates (95% CI)										
married	208 (190 to 226)	194 (173 to 214)	379 (300 to 458)		150 (143 to 157)	155 (143 to 168)	142 (138 to 146)	295 (290 to 299)	165 (161 to 170)	124 (118 to 129)
unmarried	385 (352 to 419)	364 (324 to 404)	528 (446 to 610)		292 (276 to 307)	259 (235 to 283)	271 (264 to 278)	498 (490 to 506)	301 (292 to 310)	211 (198 to 223)
active	172 (156 to 189)	155 (137 to 174)	271 (220 to 322)		118 (111 to 125)	122 (111 to 133)	140 (137 to 144)	198 (194 to 202)	140 (136 to 144)	112 (106 to 118)
inactive	497 (452 to 541)	468 (417 to 518)	971 (798 to 1,143)		301 (286 to 316)	344 (315 to 373)	480 (466 to 494)	580 (571 to 588)	411 (398 to 423)	181 (172 to 190)
<i>total</i>	267 (250 to 283)	242 (224 to 261)	469 (415 to 523)		192 (185 to 199)	188 (176 to 199)	192 (188 to 195)	361 (357 to 365)	211 (206 to 215)	144 (139 to 149)
rate ratios (95% CI)										
unmarried vs married	1.86 (1.64 to 2.10)	1.88 (1.61 to 2.19)	1.39 (1.05 to 1.85)		1.94 (1.81 to 2.08)	1.67 (1.48 to 1.89)	1.91 (1.84 to 1.98)	1.69 (1.65 to 1.73)	1.82 (1.75 to 1.90)	1.70 (1.58 to 1.83)
inactive vs active	2.88 (2.51 to 3.30)	3.01 (2.54 to 3.56)	3.58 (2.69 to 4.77)		2.56 (2.36 to 2.77)	2.82 (2.49 to 3.20)	3.42 (3.29 to 3.55)	2.92 (2.84 to 3.00)	2.94 (2.82 to 3.06)	1.62 (1.50 to 1.74)

Mortality rates per 100,000 person-years and rate ratios are obtained from Poisson regression adjusted for age and education.

Source: Authors' analysis based on data from the National Health Interview Survey and Euro-GBD.

Table 3

Mortality rates and rate ratios for the combined effect of marital status and labour force activity for men and women aged 30-59 years in 7 countries

	United States			Austria	England & Wales		Finland	Hungary	Norway	Spain
	all	whites	blacks							
MEN										
mortality rates (95% CI)										
married and active	243 (222 to 263)	228 (205 to 251)	355 (273 to 436)	197 (189 to 206)	182 (167 to 196)	216 (211 to 221)	433 (426 to 439)	187 (182 to 192)	221 (213 to 228)	
unmarried and active	446 (401 to 491)	448 (395 to 500)	548 (408 to 688)	432 (411 to 454)	307 (276 to 337)	545 (535 to 555)	1,185 (1,166 to 1,204)	309 (299 to 319)	439 (419 to 458)	
married and inactive	898 (782 to 1,014)	765 (640 to 890)	1,810 (1,350 to 2,271)	889 (834 to 943)	559 (490 to 629)	660 (635 to 685)	1,257 (1,240 to 1,274)	517 (492 to 542)	708 (665 to 752)	
unmarried and inactive	1,632 (1,450 to 1,814)	1,441 (1,232 to 1,651)	2,426 (1,928 to 2,924)	1,617 (1,522 to 1,711)	1,062 (952 to 1,172)	1,313 (1,281 to 1,345)	2,044 (2,015 to 2,073)	1,175 (1,141 to 1,210)	1,211 (1,136 to 1,285)	
total	413 (393 to 434)	378 (356 to 399)	747 (657 to 837)	385 (376 to 395)	300 (285 to 314)	441 (435 to 446)	935 (929 to 942)	330 (324 to 335)	336 (328 to 343)	
rate ratios (95% CI)										
married and active	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
unmarried and active	1.84 (1.61 to 2.09)	1.97 (1.69 to 2.29)	1.55 (1.08 to 2.22)	2.19 (2.05 to 2.34)	1.69 (1.48 to 1.92)	2.52 (2.45 to 2.59)	2.74 (2.68 to 2.80)	1.65 (1.58 to 1.73)	1.99 (1.88 to 2.10)	
married and inactive	3.70 (3.13 to 4.36)	3.36 (2.74 to 4.13)	5.11 (3.60 to 7.25)	4.50 (4.17 to 4.86)	3.08 (2.66 to 3.57)	3.05 (2.92 to 3.19)	2.91 (2.85 to 2.97)	2.77 (2.62 to 2.93)	3.21 (3.00 to 3.44)	
unmarried and inactive	6.72 (5.81 to 7.78)	6.33 (5.22 to 7.68)	6.84 (5.12 to 9.15)	8.19 (7.61 to 8.82)	5.85 (5.13 to 6.66)	6.07 (5.87 to 6.28)	4.72 (4.62 to 4.82)	6.29 (6.04 to 6.55)	5.49 (5.11 to 5.89)	
WOMEN										
mortality rates (95% CI)										
married and active	139 (122 to 156)	126 (107 to 145)	243 (167 to 318)	91 (84 to 99)	108 (95 to 120)	113 (109 to 116)	165 (161 to 170)	124 (119 to 128)	97 (90 to 104)	
unmarried and active	232 (201 to 263)	220 (183 to 258)	285 (215 to 354)	164 (150 to 178)	153 (131 to 175)	188 (182 to 194)	270 (262 to 278)	174 (166 to 182)	147 (134 to 159)	
married and inactive	359 (318 to 400)	352 (304 to 400)	731 (512 to 951)	228 (214 to 242)	271 (240 to 302)	333 (318 to 349)	472 (463 to 482)	295 (282 to 308)	149 (141 to 158)	
unmarried and inactive	872 (759 to 984)	887 (734 to 1,040)	1,146 (893 to 1,399)	566 (525 to 607)	500 (439 to 561)	663 (638 to 688)	806 (789 to 823)	596 (572 to 619)	356 (326 to 386)	
total	267 (250 to 283)	242 (224 to 261)	469 (415 to 523)	192 (185 to 199)	188 (176 to 199)	192 (188 to 195)	361 (357 to 365)	211 (206 to 215)	144 (139 to 149)	
rate ratios (95% CI)										

	United States		Austria	England & Wales	Finland	Hungary	Norway	Spain
	all	whites	blacks					
married and active	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
unmarried and active	1.67 (1.41 to 1.98)	1.74 (1.40 to 2.17)	1.17 (0.78 to 1.76)	1.42 (1.18 to 1.71)	1.66 (1.59 to 1.74)	1.63 (1.57 to 1.70)	1.41 (1.33 to 1.49)	1.51 (1.36 to 1.68)
married and inactive	2.58 (2.20 to 3.04)	2.79 (2.29 to 3.38)	3.01 (1.92 to 4.73)	2.52 (2.14 to 2.96)	2.95 (2.79 to 3.13)	2.86 (2.76 to 2.96)	2.38 (2.25 to 2.52)	1.54 (1.40 to 1.69)
unmarried and inactive	6.27 (5.21 to 7.55)	7.02 (5.53 to 8.90)	4.72 (3.12 to 7.14)	4.65 (3.93 to 5.50)	5.87 (5.59 to 6.17)	4.87 (4.71 to 5.05)	4.81 (4.55 to 5.08)	3.67 (3.28 to 4.10)

Mortality rates per 100,000 person-years and rate ratios are obtained from Poisson regression adjusted for age and education.

Source: Authors' analysis based on data from the National Health Interview Survey and Euro-GBD.

Table 4

Rate ratios of marital status within strata of labour force activity and rate ratios of labour force activity within strata of marital status for men and women aged 30-59 years in 7 countries

	United States			Austria	England & Wales	Finland	Hungary	Norway	Spain
	all	whites	blacks						
MEN									
marital status									
<i>married</i>									
inactive vs active	3.56 (3.00 to 4.21)	3.18 (2.58 to 3.91)	5.24 (3.53 to 7.77)	4.73 (4.35 to 5.14)	3.06 (2.63 to 3.55)	3.03 (2.90 to 3.17)	2.92 (2.86 to 2.99)	2.72 (2.57 to 2.88)	3.21 (2.99 to 3.44)
<i>unmarried</i>									
inactive vs active	3.80 (3.25 to 4.45)	3.42 (2.81 to 4.15)	4.43 (3.15 to 6.22)	3.56 (3.28 to 3.87)	3.48 (3.00 to 4.03)	2.41 (2.34 to 2.49)	1.72 (1.68 to 1.76)	3.85 (3.68 to 4.02)	2.75 (2.55 to 2.97)
labour force activity									
<i>active</i>									
unmarried vs married	1.86 (1.63 to 2.11)	1.97 (1.69 to 2.30)	1.53 (1.06 to 2.20)	2.21 (2.06 to 2.36)	1.73 (1.52 to 1.97)	2.52 (2.45 to 2.60)	2.67 (2.61 to 2.73)	1.71 (1.64 to 1.79)	2.02 (1.91 to 2.14)
<i>inactive</i>									
unmarried vs married	1.78 (1.52 to 2.10)	1.86 (1.51 to 2.30)	1.34 (0.99 to 1.83)	1.70 (1.57 to 1.85)	1.81 (1.54 to 2.12)	1.98 (1.90 to 2.07)	1.64 (1.61 to 1.68)	2.17 (2.05 to 2.30)	1.59 (1.46 to 1.74)
WOMEN									
marital status									
<i>married</i>									
inactive vs active	2.49 (2.10 to 2.94)	2.68 (2.19 to 3.28)	3.03 (1.92 to 4.79)	2.33 (2.09 to 2.60)	2.54 (2.15 to 2.99)	3.00 (2.84 to 3.18)	2.85 (2.75 to 2.95)	2.38 (2.24 to 2.52)	1.55 (1.41 to 1.71)
<i>unmarried</i>									
inactive vs active	3.98 (3.28 to 4.82)	4.31 (3.31 to 5.62)	4.00 (2.85 to 5.62)	3.93 (3.47 to 4.45)	3.21 (2.64 to 3.90)	3.47 (3.31 to 3.65)	3.00 (2.88 to 3.12)	3.43 (3.22 to 3.65)	2.45 (2.16 to 2.77)
labour force activity									
<i>active</i>									
unmarried vs married	1.64 (1.39 to 1.95)	1.73 (1.38 to 2.15)	1.16 (0.78 to 1.72)	1.80 (1.60 to 2.02)	1.44 (1.19 to 1.73)	1.65 (1.58 to 1.73)	1.60 (1.54 to 1.67)	1.42 (1.34 to 1.51)	1.50 (1.35 to 1.67)
<i>inactive</i>									
unmarried vs married	2.47 (2.10 to 2.91)	2.56 (2.06 to 3.17)	1.57 (1.07 to 2.30)	2.51 (2.30 to 2.75)	1.83 (1.56 to 2.16)	1.98 (1.86 to 2.10)	1.71 (1.66 to 1.75)	2.00 (1.89 to 2.12)	2.40 (2.17 to 2.66)

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Mortality rates per 100,000 person-years and rate ratios are obtained from Poisson regression adjusted for age and education.
Source: Authors' analysis based on data from the National Health Interview Survey and Euro-GBD.