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Original Contribution

Do Good Health and Material Circumstances Protect Older People From the Increased Risk of Death After Bereavement?

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An increased risk of death in persons who have suffered spousal bereavement has been described in many populations. The impact of modifying factors, such as chronic disease and material circumstances, is less well understood. The authors followed 171,120 couples 60 years of age or older in a United Kingdom primary care database between 2005 and 2010 for an average of 4 years. A total of 26,646 (15.5%) couples experienced bereavement, with mean follow up after bereavement of 2 years. In a model adjusted for age, sex, comorbid conditions at baseline, material deprivation based on area of residence, season, and smoking status, the hazard ratio for mortality in the first year after bereavement was 1.25 (95% confidence interval: 1.18, 1.33). Further adjustment for changes in comorbid conditions throughout follow up did not alter the hazard ratio for bereavement (hazard ratio = 1.27, 95% confidence interval: 1.19, 1.35). The association was strongest in individuals with no significant chronic comorbid conditions throughout follow up (hazard ratio = 1.50, 95% confidence interval: 1.28, 1.77) and in more affluent couples ($P = 0.035$). In the first year after bereavement, the association between bereavement and death is not primarily mediated through worsening or new onset of chronic disease. Good health and material circumstances do not protect individuals from increased mortality rates after bereavement.

aged; bereavement; comorbid conditions; mortality

Abbreviations: CI, confidence interval; THIN, The Health Improvement Network.

Death of a spouse or partner is a common major life event for older people (1). The adverse impact of bereavement on health has been long recognized, with an increased risk of death described in several populations (2). The increase in mortality has been most consistently described in the first year after bereavement, and a recent meta-analysis estimated a 41% increase in mortality in the first 6 months after bereavement in all age groups (3). The consistency of findings and robustness to adjustment suggest that the impact of bereavement is causal, but mechanisms and modifying factors are not well understood (2). In particular, it is not known whether good physical health and high socioeconomic status protect individuals from the adverse effects of bereavement, and neither is the relative contribution of acute events or worsening of chronic disease to excess mortality after bereavement known.

Most large studies on bereavement have relied on census databases or follow up of community surveys (4, 5). The recording of chronic disease in such sources is often limited or self-reported, and few studies have used validated morbidity measures, such as the Charlson Index (3–5). Larger studies with well-recorded comorbid conditions have limited their analyses to baseline comorbid conditions and have not considered whether those conditions mediate or modify the impact of bereavement on mortality (6). Two studies have explicitly examined the modifying influence of pre-existing health on the increased risk of death after bereavement (7, 8). They suggest, paradoxically, that good health before bereavement increases the adverse impact of bereavement rather than providing protection, but these findings are limited by sample size or limited information on comorbid conditions (7, 8). Analysis of causes of death in bereaved individuals provides some insights into whether worsening of pre-existing chronic disease or acute events contribute to excess mortality, but the evidence is unclear, with both sudden unexpected deaths and chronic conditions contributing to excess mortality (6).

In the present study, we used a large United Kingdom primary care database with detailed recording of comorbid conditions to examine the modifying and mediating impact of physical comorbid conditions and material socioeconomic circumstances on mortality in the first year after bereavement. Unlike existing studies on bereavement, we were uniquely able to take account of changes in comorbid conditions before and after bereavement.

Specifically, we tested whether adjustment for physician-recorded chronic comorbid conditions before and after bereavement attenuated the association between bereavement and mortality; such attenuation would suggest that increased mortality is mediated through worsening or new onset of chronic conditions rather than unexpected acute events. Furthermore, we tested whether individuals with good health and higher socioeconomic status were protected from increased risk of death after bereavement.

MATERIALS AND METHODS

Data source

The Health Improvement Network (THIN, Cegedim Strategic Data Medical Research UK) database is an established primary care database which collects anonymized data from United Kingdom general practices and includes a full record of diagnoses (9, 10) A feature of the THIN database is the family number, which allows practices to link patients who live in the same household or institution (11).

Subjects

We included 401 practices from the database who were participating in the THIN scheme between 2005 and 2008. We identified the first year during this period in which the practice contributed data (2005 = 278, 2006 = 35, 2007 = 32, 2008 = 56), and used a historical patient file from that year to identify household members registered on the index date. This allowed us to capture the household composition for a cohort of patients who were 60 years of age or older on an index date between 2005 and 2008 (n = 672,543).

We based our approach to identification of cohabiting couples on an analysis of national survey data. This showed that among those who were 60 years of age or older, couples of the opposite sex with an age difference of less than 10 years who live together in a household are almost invariably married or cohabiting (12). We developed an algorithm (Appendix Figure 1) that identified households that contained a person who was 60 years of age or older living and with another adult 50 years of age or older of opposite sex. We required that included couples had an age difference of 10 years or less and that no younger adult in the household be within 15 years of either of the couple.

The algorithm identified 316,569 patients aged 60 years or older (47% registered patients of this age) and 32,661 patients 50–59 years of age to form a total of 174,615 couples. From this group, we excluded any couple in which: 1) a patient had codes in their primary care record that indicated residence in a communal establishment before the index date, 2) a patient had inconsistent registration details between their current and historical registration files, or 3) both patients were 95 years of age or older. This resulted in 171,720 couples for analysis, 76.3% of whom were identified as living with no other household members.

Follow up

Couples were followed in the primary care record from the index date for their practice between 2005 and 2008 to their last practice data collection date up to September 2010. When one or both members of the couple deregistered from the participating general practice, both members of the couple were censored from the analysis at that point. The average follow up time was 208 weeks for women and 202 weeks for men.

Bereavement

The timing of bereavement was identified through the earliest record of death in the deceased partner's primary care record, based on either a specific Read code for death or a flag on their registration file that indicated death. Read codes are a standardized coded thesaurus of clinical terms that are used for recording in primary care information systems in the United Kingdom.

Bereavement was modelled as a time-dependent variable so that after bereavement, the status of the surviving partner was changed to bereaved and the impact of different periods after bereavement on mortality could be examined. We initially describe the influence of bereavement in each consecutive 90-day period (quarter) in the first 2 years after partner death and then focus on death in the first year after bereavement for our main hypotheses. We excluded 9 couples in which both patients were recorded as having died on the same day.

Predictors of mortality

Our main measure of comorbidity was the Charlson Index, a validated score that weights 17 chronic physical conditions with a score of 1–6 (13). The score is highly predictive of 1-year mortality and has been validated in primary care databases (14). We also examined the impact of additional comorbid conditions not included in the Charlson Index: coronary heart disease without a history of myocardial infarction, atrial fibrillation, and hypertension. Inclusion of these comorbid conditions did not change our findings with the Charlson Index alone and, for simplicity, analysis with these additional comorbid conditions are not presented.

Comorbid conditions were examined in 2 ways. Firstly, the Charlson Index score was analyzed as a fixed variable determined at the start of follow up. We then examined the

Table 1. Baseline Characteristics of Older Couples, United Kingdom, 2005–2008

	Women			Men		
	No. of Participants	%	Mean (SD)	No. of Participants	%	Mean (SD)
All	171,720			171,720		
Total follow up, weeks			208 (79)			202 (82)
Suffered a bereavement	17,514	10.2		9,132	5.3%	
Follow up after bereavement, weeks			112 (76)			108 (75)
Age at start of follow up, years						
50–59	26,188	15.3		6,014	3.5	
60–64	47,500	27.7		48,967	28.5	
65–69	36,788	21.4		39,862	23.2	
70–74	28,423	16.6		32,709	19.1	
75–79	18,995	11.1		23,624	13.8	
80–84	9,986	5.8		14,011	8.2	
85–89	3,236	1.9		5,320	3.1	
90–94	604	0.4		1,213	0.7	
Age			67.2 (7.8)			69.5 (7.6)
Smoking status at start						
Nonsmoker	97,846	57.0		60,576	35.3	
Ex-smoker	49,334	28.7		82,592	48.1	
Current (unknown)	2,959	1.7		5,727	3.3	
Current (0–9 cigarettes/day)	4,247	2.5		4,836	2.8	
Current (10–19 cigarettes/day)	7,561	4.4		6,098	3.6	
Current (≥20 cigarettes/day)	5.606	3.3		6,752	3.9	
No smoking status	4,167	2.4		5,139	3.0	
Baseline Charlson Index score						
0	108,077	62.9		91,237	53.1	
1	35,102	20.4		40,719	23.7	
2	18,726	10.9		22,840	13.3	
3	6,403	3.7		9,881	5.8	
4	1,951	1.1		4,020	2.3	
5	637	0.4		1,549	0.9	
≥6	824	0.5		1,474	0.9	

Abbreviation: SD, standard deviation.

effect of the Charlson Index score as a time-dependent variable updated weekly throughout follow up based on any new diagnoses recorded in the primary care record. We used a 1-week lag on the calculation to avoid any recorded causes of death in the medical record being used to predict death.

Our main measure of deprivation was the Townsend Index, a composite small-area ecological measure of deprivation, which was assigned to couples based on their postal code at start of follow up and summarized as quintiles based on national ranking (15). In brief, the Townsend score combines 4 measures of deprivation from the 2001 census (unemployment, access to a car, home ownership, and home overcrowding) for small geographic areas in the United Kingdom into a standardized score. We also examined the impact of the Index of Multiple Deprivation 2007, an alternate small-area measure of deprivation that was available in England only and included a wider range of measures of deprivation (16).

Season was included as a time-dependent predictor of mortality, with the period December to March defined as winter, in line with standard United Kingdom definitions for examination of seasonal mortality (17). Other fixed predictors were age, sex, smoking status and quantity of cigarettes smoked (last recorded before index date), United Kingdom region, and the presence of a younger member of the household. Missing data for smoking status and Townsend score were included in the models as a separate category.

Table 2. Predictors of Mortality in Older Couples Adjusted for Age, Sex, and Region, United Kingdom, 2005–2010

	Total No. of Participants	No. of Deaths	%	Hazard Ratio	95% Confidence Interval
Sex					
Women	171,720	10,402	6.1	1.00	
Men	171,720	18,757	10.9	1.53	1.49, 1.56
Age, years					
50–59	32,202	624	1.9	0.71	0.66, 0.77
60–64	96,467	3,093	3.2	1.00	
65–69	76,650	4,146	5.4	1.65	1.57, 1.72
70–74	61,132	5,416	8.9	2.74	2.62, 2.86
75–79	42,619	6,440	15.1	4.90	5.71, 5.11
80–84	23,997	5,582	23.3	8.18	7.84, 8.53
85–89	8,556	2,952	34.5	14.05	13.31, 14.83
90–94	1,817	888	48.9	24.82	22.96, 26.84
Household status					
Couple living alone	262,168	24,551	9.4	1.00	
Couple living with a younger person	81,272	4,608	5.7	1.08	1.04, 1.12
Region					
North	168,152	15,164	9.0	1.15	1.11, 1.20
South	175,288	13,995	8.0	1.00	
Townsend Index quintile					
1 (least deprivation)	111,379	7,685	6.9	1.00	
2	89,873	7,195	8.0	1.12	1.08, 1.15
3	65,141	5,957	9.1	1.24	1.19, 1.30
4	45,053	4,884	10.8	1.42	1.37, 1.48
5 (most deprivation)	21,644	2,748	12.7	1.62	1.54, 1.70
Smoking status					
Nonsmoker	158,422	9,525	6.0	1.00	
Ex-smoker	131,926	14,244	10.8	1.57	1.52, 1.62
Current (unknown)	8,686	852	9.8	1.44	1.34, 1.55
Current (0–9 cigarettes/day)	9,083	982	10.8	1.98	1.84, 2.13
Current (10–19 cigarettes/day)	13,659	1,472	10.8	2.46	2.32, 2.60
Current (≥20 cigarettes/day)	12,358	1,380	11.2	2.99	2.83, 3.16

Table continues

Analysis

A Cox proportional hazards model for mortality was developed for all couples using PROC PHREG in SAS, version 9.2 (SAS Institute, Inc., Cary, North Carolina). The initial model examined the impact of all predictors, including bereavement, adjusted for age, sex, and region. Bereavement status was entered as time-dependent variable with nonbereaved couples as the baseline group and bereavement status defined in categories based on time since bereavement.

A fully adjusted baseline model included all predictors and Charlson Index score at beginning of follow up. A time-dependent comorbidity model included the weekly updated Charlson Index score in place of baseline Charlson Index score in the fully adjusted model. All hazard ratios were adjusted for clustering at practice level using the sandwich estimator to produce robust standard errors.

Effect modification was examined using stratified analysis, thus estimating the bereavement coefficients within strata and allowing us to a test for heterogeneity or trend in effects. All *P* values are 2-sided. This study was approved by the South-East National Health Service Research Ethics Committee.

RESULTS

Subject characteristics and bereavement

The characteristics of the couples included in the analysis are shown in Table 1. During follow up, 26,646

Table 2. Continued

	Total No. of Participants	No. of Deaths	%	Hazard Ratio	95% Confidence Interval
Charlson Index score					
0	199,314	8,390	4.2	1.00	
1	75,821	6,980	9.2	1.75	1.69, 1.81
2	41,556	6,309	15.2	2.72	2.62, 2.82
3	16,284	3,681	22.6	3.66	3.51, 3.81
4	5,971	1,806	30.3	4.68	4.42, 4.95
5	2,186	876	40.1	6.39	5.90, 6.92
≥6	2,298	1,117	48.6	9.36	8.56, 10.22
Winter (December–March)[a]				1.10	1.06, 1.15
Time-varying Charlson Index score					
0				1.00	
1				2.45	2.35, 2.56
2				5.58	5.33, 5.83
3				8.32	7.94, 8.72
4				11.37	10.75, 12.02
5				14.97	13.97, 16.04
≥6				35.83	33.45, 38.38

[a] Time-varying variable.

couples (15.5%) experienced bereavement. The mean follow up after bereavement was just over 2 years. Among patients who experienced bereavement at least 1 year before the end of their practice recording ($n = 21{,}017$), 942 died within a year (4.5%) and 1,086 (5.2%) deregistered from the practice. The rate of deregistration during the first year of follow up among nonbereaved couples was 2.3%.

Predictors of mortality

Age-, sex-, and region-adjusted hazard ratios for predictors of mortality are shown in Table 2. The Charlson Index score was a strong predictor of mortality, and the time-dependent Charlson Index score was notably stronger. The Townsend Index also strongly predicted mortality, and within England, the Index of Multiple Deprivation showed an almost identical impact (not shown). Similarly, smoking status and quantity predicted mortality. Living with a younger household member weakly predicted mortality.

Bereavement and adjustment for comorbid conditions

The age-, sex-, region-, and season-adjusted hazard ratios for death in the first 8 quarters after bereavement are shown in Figure 1. Mortality was highest in the first 90 days after bereavement, with the suggestion of a subsequent peak before the first anniversary of bereavement and attenuation in the second year. In the first year after bereavement, the hazard ratio for death was 1.29 (95% confidence interval (CI): 1.21, 1.37) (Table 3). Adjustment for all baseline predictors, including Charlson Index score, had little effect, with the hazard ratio in the first year being reduced to 1.25 (95% CI: 1.18, 1.33). Adjustment for changes in comorbid conditions throughout follow up did not attenuate the rise in mortality in the first year after bereavement (hazard ratio = 1.27 (95% CI: 1.19, 1.35).

Modification by age, sex, comorbid conditions, and deprivation

There was no evidence that the rise in mortality in the first year after bereavement differed between men and women ($P = 0.99$) or in those above and below the age of 75 years ($P = 0.56$) (Table 4). Stratification of analysis by Charlson Index score at baseline showed no evidence that the mortality increase after bereavement was more marked in subjects with pre-existing comorbid conditions (Table 4). Further stratification by baseline comorbid conditions and change in comorbid conditions during follow up suggested that subjects who had no recorded conditions during follow up experienced the largest relative rise in mortality after bereavement (hazard ratio = 1.50, 95% CI: 1.28, 1.77).

Stratification by Townsend score in the fully adjusted model, including time-dependent Charlson Index score, showed a larger effect of bereavement in the 2 most affluent groups. A test for linear trend was marginally significant ($P = 0.035$), and there was no evidence of a nonlinear relation

DISCUSSION

We have confirmed the increased risk of death after bereavement and demonstrated its independence of pre-existing

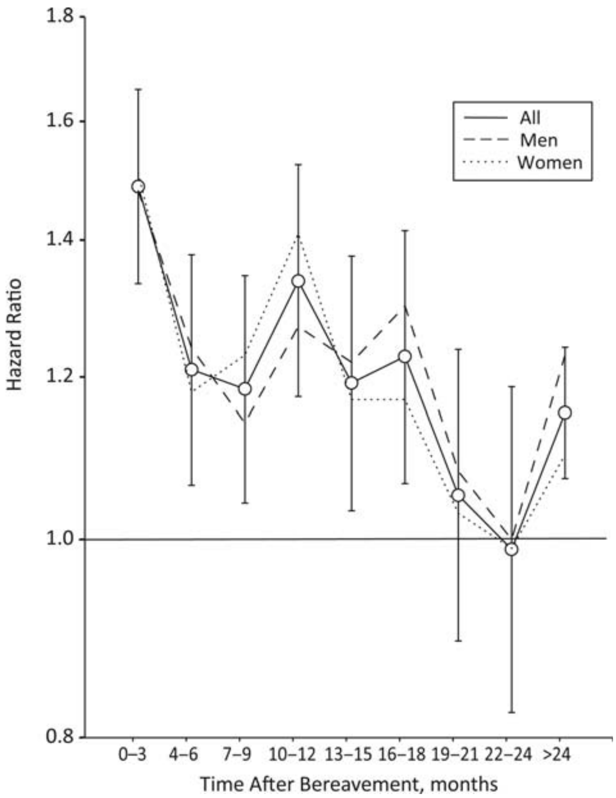

Figure 1. Quarterly log scale hazard ratios for death after bereavement in older couples, United Kingdom, 2005–2010. Hazard ratios were adjusted for age, sex, and region. Bars, 95% confidence interval.

physician-recorded chronic comorbid conditions and social status. Our analysis, which took into account changes in morbidity before and after bereavement, suggested that the rise in the mortality rate after bereavement is not primarily mediated through new or worsening chronic physical disease. Furthermore, there was no evidence that pre-existing or continuing good health or affluence protected individuals; paradoxically, good health and high social status may accentuate the rise in mortality after bereavement.

Table 3. Adjusted Hazard Ratios for Death in the First Year After Bereavement in Older Couples ($n = 343{,}440$), United Kingdom, 2005–2010

Adjustment	Hazard Ratio	95% Confidence Interval
Age, sex, and region	1.29	1.21, 1.37
Age, sex, region, smoking, Townsend Index quintile, and living alone	1.24	1.17, 1.32
Age, sex, region, Townsend Index quintile, living alone, and Charlson Index score (fixed)	1.25	1.18, 1.33
Age, sex, region, Townsend Index quintile, living alone, and Charlson Index score (time-dependent)	1.27	1.19, 1.35

Strengths and limitations

We were able to examine mortality after bereavement in a large sample of older people. Only census-based Finnish cohorts and cohorts based on US Medicare data have included a larger number of bereaved individuals (2, 3). The accrual of bereavement events over a relatively short time period reduced concerns about changes in baseline exposures between start of study and bereavement, in particular possible changes in marital status. Indeed, in our study, relocation of one partner with deregistration from their general practitioner would lead to exclusion of the couple.

A unique strength of our study is the ability to control for physician-recorded comorbid conditions both at baseline and during follow up using a validated mortality-prediction score. In our cohort, the Charlson Index score adjusted for age and sex accounted for more than 80% of the variation in mortality based on the area under the receiver operator curve for our baseline model. Such control for comorbid conditions has not been possible in larger studies on bereavement that have relied on self-reports or recording of comorbid conditions at baseline only.

A potential weakness is that we identified couples indirectly through a marker of cohabitation in the primary care record. We confirmed the validity of this approach by comparison with contemporary national representative household surveys in England, which confirmed that 99.4% of couples selected using our criteria identify themselves as married or cohabiting (12). In other words, very few couples would be misclassified in terms of the nature of their relationship, although couples with a large age difference between the partners or registered with different general practices or practices that choose not to use the household identifier consistently would be excluded from our analysis. These exclusions should not bias our cohabiting couples-only analysis.

Our measure of socioeconomic status was based on a small-area ecological measure of deprivation, the Townsend Index score, rather than individual measures, such as personal income or educational level. This measure, summarized in quintiles based on national ranking, strongly predicted death. Studies in the United Kingdom have demonstrated the acceptability of such measures as surrogates for individual measures of socioeconomic status, especially when, as in our study, attributed at the subelectoral ward level (18, 19). Furthermore, for older couples in the United Kingdom, area-based measures may be preferable because of changes in the meaning of individual measures of socioeconomic status with aging and the difficulty of measuring socioeconomic status meaningfully in older people, which has been well described (20). Specifically, individual measures, such as income or educational attainment, would have a very different meaning in terms of socioeconomic position for a 60-year-old couple before retirement and a 90-year-old woman.

Our finding that the rise in mortality after bereavement is attenuated in the second year confirms that this is not a selection effect due to shared environmental factors or the tendency to cohabit with individuals with similar health characteristics (8). Any such selection is unlikely to

Table 4. Adjusted Hazard Ratios for Death in the First Year After Bereavement in Older Couples, Stratified by Potential Effect Modifiers, United Kingdom, 2005–2010

	No. of Participants	Hazard Ratio[a]	95% Confidence Interval	P Value[b]
Sex				0.99
Women	171,720	1.26	1.16, 1.37	
Men	171,720	1.26	1.15, 1.38	
Age, years				0.56
50–74	266,451	1.23	1.07, 1.41	
≥75	76,989	1.25	1.17, 1.34	
Household status				0.25
Couples lives alone	262,168	1.25	1.17, 1.33	
Younger household member	81,272	1.41	1.16, 1.70	
Townsend Index quintile				0.035
1 (least deprived)	111,379	1.32	1.16, 1.50	
2	89,873	1.42	1.25, 1.61	
3	65,141	1.16	1.01, 1.33	
4	45,053	1.19	1.02, 1.39	
5 (most deprived)	21,644	1.21	0.98, 1.49	
Charlson Index score				0.85
Baseline				
0	199,314	1.27	1.13, 1.43	
1	75,821	1.19	1.06, 1.34	
2	41,566	1.29	1.13, 1.47	
3	16,284	1.28	1.08, 1.53	
4	5,971	1.34	1.07, 1.69	
5	2,186	1.28	0.89, 1.86	
≥6	2,298	0.99	0.66, 1.48	
Time-varying Charlson Index score				
0 throughout	164,005	1.50	1.28, 1.77	0.029
0 at baseline only[c]	35,309	1.12	0.95, 1.30	
>0 at baseline	144,126	1.24	1.15, 1.33	

[a] Hazard ratio estimates from a model adjusted for age, sex, household status, region, deprivation, Charlson Index score, smoking, and season, with a stratification factor excluded from the model.
[b] *P* values (2-sided) for heterogeneity except for Townsend Index quintile, which is test for trend.
[c] Charlson Index score increased during follow up.

attenuate so quickly. Specifically for our cohort, this means that our findings are unlikely to be explained by differential deregistration and loss to follow up of healthy individuals after bereavement.

Comparison with other studies

Further external validation of our methods is provided by our estimate of the rise in mortality after bereavement, which is consistent with both United Kingdom and other developed country studies using a range of data sources. A recent meta-analysis estimated a relative risk of death in the first 6 months after bereavement of 1.41, with attenuation of the effect over time (3). Our age- and sex-adjusted hazard ratio of 1.29 over the first year is also consistent with a recent United Kingdom survey-based study (5).

Our findings confirm that the association between bereavement and mortality is not confounded by pre-existing chronic disease. However, compared with studies that have reported both unadjusted and adjusted estimates, we found that adjustment for comorbid conditions and socioeconomic status did not attenuate the effect of bereavement, whereas other studies have reported some attenuation (5, 7). This difference from studies which use measures of self-reported health may reflect potential bias in self-reports.

Few studies have attempted to examine effect modification by socioeconomic status. A large census-based Finnish study found that the relative rise in mortality after bereavement did not differ by educational status or income, whereas an Israeli study found a greater rise in bereaved individuals with high educational attainment (21, 22). Similarly, a Scottish census-based study found a greater impact of bereavement in individuals with higher educational attainment (8). Interestingly, an early United Kingdom study suggested that the increased risk of death after bereavement was largest in higher social class groups but did not test this association statistically (23). Our findings are consistent with these findings.

We only found 2 studies that examined the mortality rise after bereavement by comorbid conditions or pre-existing health. Both studies relied on self-reported health measures (7, 8). A study in California, which included 4,747 bereaved individuals, found that the impact of bereavement was less marked in subjects with more self-reported health problems at baseline (7). A more recent study in Scotland, with 14,630 bereaved subjects, found the strongest association between bereavement and mortality in those without self-reported limited illness (8). To our knowledge, no study to date has attempted to take account of changes in comorbid conditions during follow up.

Implications

Our study provides a number of new and important insights into the health impact of bereavement. A key finding is that adjustment for comorbid conditions throughout follow up, both before and after bereavement, does not attenuate the rise in mortality after bereavement. This finding suggests that the early effects of bereavement are not primarily mediated through worsening or development of chronic disease. Studies on cause of death after bereavement have shown an increase across a range of conditions, including cardiovascular disease, cancer, accidents, suicide, and infectious causes, which suggests an impact on both acute health events and chronic disease (6, 21). However, examination of a single underlying cause of death may be subject to bias caused by death in patients with an existing chronic disease, such as cancer, being attributed to the chronic problem even if an acute event is responsible. Indeed, World Health Organization coding rules for underlying cause of death promote such attribution. Our findings tend to favor an explanation that, at least in the early period after bereavement, the increase in mortality is mediated through acute or short-term events, with all older people being vulnerable, irrespective of pre-existing comorbid conditions.

This interpretation is supported by our finding that pre-existing comorbid conditions do not modify the impact of bereavement on mortality. This finding is counterintuitive, as we expected good health to protect individuals from the stress of major life events. However, it is consistent with the limited studies on this question to date (7, 8). Furthermore, individuals who have good health throughout follow up experience the greatest relative impact of bereavement on mortality, which supports a hypothesis that much of the excess mortality of early bereavement is due to acute unexpected events. This interpretation is biologically plausible, as studies have identified increases in cardiovascular risk factors and reduced immunity after bereavement, and epidemiologic studies have highlighted the marked increase in rates of suicide and accidental deaths (24–26). Although accidents, suicide, and other violent deaths increase after bereavement, they cannot explain the majority of excess deaths. Existing studies describe a 2–3-fold increase in accidental and violent deaths in the year after bereavement (5, 24). As such deaths are uncommon in older people, accounting for 2% of deaths among those who were 60 years of age or older in the United Kingdom; even a 3-fold increase in such deaths would account for less than one fifth of excess deaths. The most plausible explanation for most excess mortality after bereavement is an increase in unexpected cardiac and respiratory deaths.

One caution in interpreting these findings is that we have focused on relative increases in mortality but, of course, individuals with high levels of comorbid conditions will have a much higher baseline mortality risk before bereavement. Thus, in absolute terms, those individuals are likely to experience the greatest burden of excess mortality after bereavement.

Our findings on effect modification by socioeconomic status are similarly counterintuitive, as we expected affluence to buffer the effects of major live events. The consistency of our findings with studies in other countries suggests that this is a real effect that is independent of cultural context. Our study has limited measures of social support and so we cannot exclude the possibility that higher social support compensates for poorer material circumstances. However, the presence of a younger household member was not protective. Again, it should be noted that the absolute effect of bereavement will be greater in lower socioeconomic groups with higher baseline mortality.

In conclusion, our findings suggest that the rise in mortality after bereavement acts as a leveller, affording no protection to the affluent or healthy, and is best explained by an increase in sudden unexpected deaths. For health and social services, this highlights the need to offer universal support to older people at the time of bereavement.

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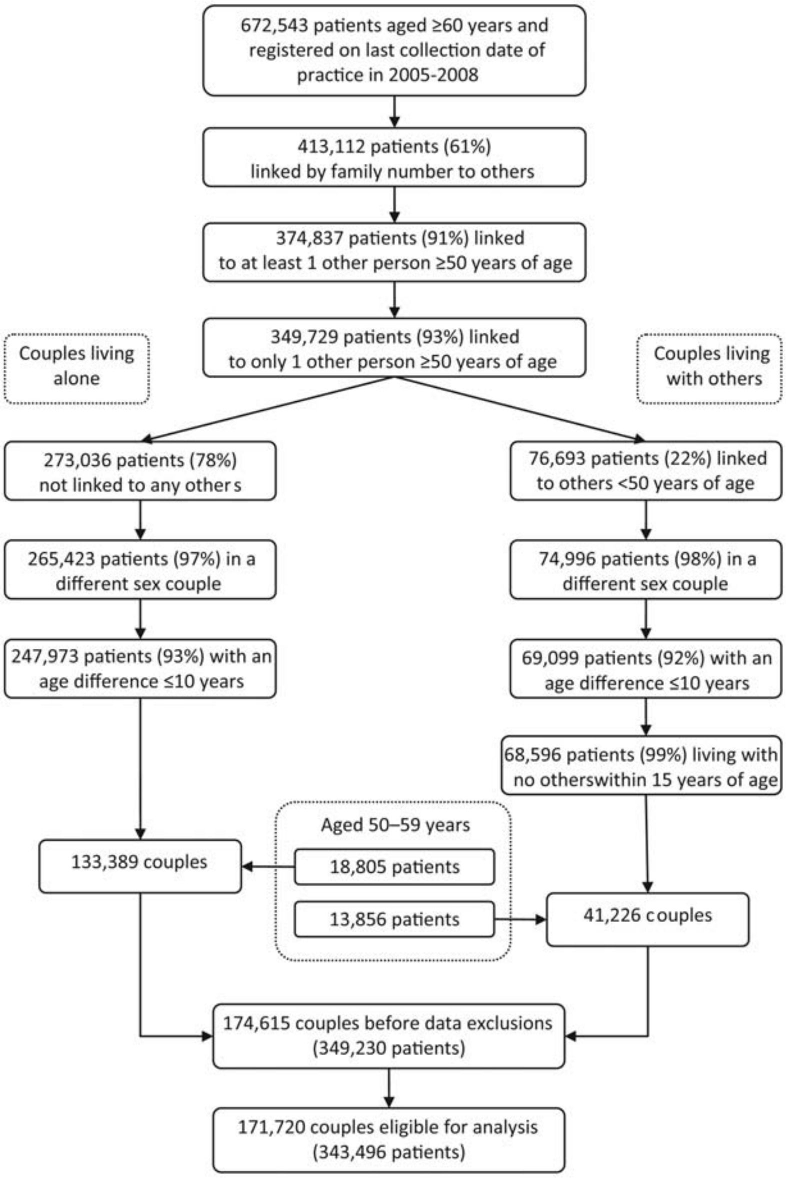
(Appendix follows)



Appendix Figure 1. Algorithm for identification of couples, United Kingdom, 2005–2010. Percentages refer to totals in the box above.