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Abstract: It is well documented that the disparities in mortality risk by socioeconomic status (SES) are greater among men than women. We also know that the excess mortality from widowhood (the widowhood effect) is greater among men. However, a different picture appears when examining these associations jointly. Based on Swedish register data, this study shows that widowhood weakens, and can even reverse, the gender differences in socioeconomic disparity in mortality. The overall findings also indicate that higher SES elevates the widowhood effect for men, but diminishes the effect for women and that the widowhood effect is stronger for women than men in the lowest SES categories. These results imply that men with higher SES are less able to manage life alone, perhaps due to previous household specialization. The disadvantage of widows in the lower SES-categories may reflect inequalities in the health care system and exposure to financial stress after spousal loss.

Keywords: Widowhood mortality, gender, socioeconomic status, coping strategies, social support

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Introduction

As an irreversible and uncontrollable transition, widowhood usually ushers in a period of massive changes as well as emotional distress and material impairments for the surviving spouse. Accordingly, the widowed experience a higher risk of dying than their married counterparts (Gove 1973; Johnson et al. 2000; Manzoli et al. 2007). There is, moreover, evidence that this difference in mortality risk between the married and the widowed has been increasing over the last decades (Hemström 2016). The most exposed to widowhood are women in older ages with a long marriage behind them (Statistics Sweden [SCB] 2019). In Sweden, which population is the base for this study, more than 40 percent of the women live in widowhood by age 80, which makes it the most common civil status for this group, while the corresponding number for men is 15 percent (Hemström 2016). To understand the mortality and health patterns of the old, especially older women, a broad knowledge about the consequences of widowhood is therefore important.

Various pathways lead to elevated mortality after the loss of a partner. In the literature, the combined effect of these pathways on mortality is often referred to as the widowhood effect. This effect is prevalent among the widowed in all parts of the world, regardless of age or gender (Moon et al. 2011). Other than the emotional consequences, harmful effects of widowhood may stem from social and behavioral factors such as loneliness, poor sleeping habits and alcohol abuse (Das 2012), as well as from material factors such as financial difficulties (Halleröd 2013). The strength of the widowhood effect, thus, seems to depend on individual characteristics like access to social and emotional support, propensity to engage in poor health behavior and ability to handle income loss as well as learning to perform new everyday tasks. Such traits tend to be stratified by socioeconomic status (SES) (Feinstein 1993). Research on widowhood mortality could therefore be a means to address certain aspects of social inequality, not least since social and behavioral factors may gain importance in difficult life situations.

In this paper, I examine how the size of the widowhood effect varies depending on the interaction between gender and SES, and whether widowhood makes the socioeconomic gradient in mortality stronger or weaker depending on gender. The aim is to explain widowhood mortality from an intersectional perspective, i.e. highlight how different factors interact in contributing to inequality in mortality. Several studies have established that the socioeconomic gradient in mortality is stronger for men than for women (Mustard & Etches 2003), but after spousal loss, this may no longer be the case. Previous research has shown the strength of the widowhood effect to vary depending on gender and SES (Moon et al. 2011).

However, the interaction between these factors has not received much attention even though the importance of the different mortality mechanisms seems to very by the combination of gender, SES and marital/widowhood status. For example, behavioral constraints based on gender may vary depending on SES (Pearse & Connell 2015); the association between SES and social resources differ depending on gender (Ajrouch et al. 2005); income level may have different importance for the material consequences of widowhood for men and women (Hemström 2016) and so on. Thus, examining the association between widowhood and mortality within different subpopulations is a means to explore the role of various mortality determinants as well as individuals' dependence on their spouses and the nature of partnerships.

Background

The widowhood effect

For most people, the event of a spouse's death means a disruption of one's closest relation, which causes grief and forces major adjustments in terms of everyday routines, social life and household finances. Such consequences are often difficult to face and widowhood is consequently associated with an elevated risk of dying (Elwert & Christakis 2006; Stroebe et al. 2007; Sullivan & Fenelon 2013; Williams 2004).

Many of the mechanisms between widowhood and elevated mortality risk are related to inability to adjust to the loss and the changes it entails. Among these, the most immediate one is perhaps failure to recover from the emotional shock that the loss may cause. This is, together with the subsequent depression, believed to drive the spike in mortality risk that occurs during the months following the spouse's death (Elwert & Christakis 2006). During this period, the surviving spouse's coping behavior becomes an important mortality risk determinant. Individuals respond to stressors like loss in various ways and many have problems recovering after the spouse's death (Wortman & Silver 1989). Such problems can arise from coping with the loss by avoiding emotions of grief, even though some distancing may be necessary to fend off secondary sources of stress (Stroebe & Schut 1999). Insistent use of coping strategies built around avoidance is associated with sustained depression and grief after spousal loss (Bonanno et al. 2004) as well as with poor health behavior (Ingledew et al. 1996). There is no consensus in the literature on how to categorize coping strategies, but besides avoidance, the two most frequently used labels are emotion focused- and problem focused coping (Parker & Endler 1992). The former does in this context refer to managing the grief and coming to terms with the loss while the latter is directed towards the practical

aspects the new life situation. Successful recovery from loss tend to require ability to move between different types of strategies (Stroebe & Schut 1999).

While grief appears to be the most important driver of the mortality risk during the first months of widowhood, the loss of social support may be the main mechanism for longer durations of bereavement (Martikainen & Valkonen 1996). Social support refers to emotional and instrumental commitment in social relations, and has been found to increase both the mental and physical health (Ross et al. 1990). For most widowed, the lost spouse has likely represented the most important source of social support, and the loss may be more shattering for those who rely heavier on their spouse for social support. The change of the social support patterns may also be more dramatic if the death of the spouse is unexpected, as it leaves less time to prepare for life as widowed and establish other sources of social support (Smith & Zick 1996).

Other mechanisms between widowhood and elevated mortality risk are related to loss of the benefits that come with marriage. These represent a number of protective qualities in terms of mortality risk. As stated above, marriage can be an assurance of emotional support with attendant effect on mental and physical health. Being married also tends to curb risk-taking behavior, promote a healthy life-style, provide a stronger private economy and to some extent complement professional health care (Brockmann & Klein 2004). Poor health behavior, consequently, has been found to be a more prominent health determinant among the widowed than among the married, especially when the loss has occurred after a shorter time of marriage (Dupre et al. 2009). Losing such benefits may affect the mortality risk not only through the absence of their positive effects, but by the struggle to adjust to a life without them.

The perhaps most concrete form of marital benefits is household specialization. Spouses may divide the housework between them so that each person focus more on certain tasks than does the other. Usually this implies that one spouse do more house work while the other specializes in market work (Becker 1981 pp. 30-53). Even though such a division may be more or less beneficial for each spouse, it can still make spouses less fit to live in widowhood as they may be left with either an inadequate income or inadequate skills in managing a household (Halleröd 2013).

A different explanation for the widowhood excess mortality than the pathways mentioned above may be the physical and emotional health cost of taking care of a dying spouse. There may be negative consequences for the caregiver’s health, especially if the period of illness is lengthy (Christakis & Allison 2006). However, this effect should be less prevalent in

societies with a relatively comprehensive public healthcare system such as the Nordic countries.

A contrasting idea that has been debated is that the widowhood effect is an artefact caused by selection (see Brockmann & Klein 2004; Espinosa & Evans 2008; Murray 2000). In this context, a selection effect implies that the same characteristics that expose individuals to widowhood also increase their own mortality risk. For example, individuals tend to marry within their own SES-group, and SES is related to mortality risk (Espinoza & Evans 2008). This means that those with low SES both are more likely to become widowed and at higher risk to die themselves. Thus, there would be a correlation between widowhood and mortality, but not necessarily any causality. However, even though these explanations have some validity, they have been shown to have limited importance for the association between widowhood and mortality (Christakis & Allison 2006; Elwert & Christakis 2008; Espinosa & Evans 2008; Boyle et al. 2011; Sullivan & Fenelon 2013).

Gender and the widowhood effect

Previous research has established that spousal loss means an increased mortality risk and that this association is stronger for men than for women (Martikainen & Valkonen 1996; Moon et al. 2011; Moon et al. 2013; Shor et al. 2012). In this section, I examine the gender difference in the widowhood effect in light of the mechanisms described in the previous section.

One explanation for the larger widowhood effect among men may be gender differences in coping strategies. Men are more likely to cope through avoidance while women tend to confront feelings of grief and seek out support (Carver et al. 1989), which as mentioned above may be particularly important during the initial time after loss. Stroebe et al. (2001) argue that women also benefit compared to men from being more prone to move between different types of coping behaviors.

The gender difference in coping behavior may have another explanation in that men and women tend to have different access to social support. Women are more likely to have close confidents in addition to their spouse than are men, which is a protective factor against the damaging effects of loss (Fivush & Buckner 2000). Women also tend to do the main work of maintaining couples' social circles (Gerstel 1988). The risk of loneliness therefore seems to be more impending for men after widowhood, which both could be stressor in itself and imply a lack of means to handle grief.

The tendency of women providing social support and managing couples' social life to a higher extent than men represents a way in which marriage is more beneficial for men than for women. The same pattern is evident in other aspects of marriage, and the loss of marriage

benefits is therefore believed to be a more severe stressor in widowhood for men than for women (Carr & Wortman 2006 pp. 97-101). Umberson (1992) describes an important example of this by highlighting the association between marriage, social control and health behavior for men and women. Among women the tendency to influence the behavior of significant others in order to keep them healthy is substantially stronger than among men. This is especially true within marriages. Knowledge about health-related issues tend to be lower among men than among women and men are more likely to engage in various poor health behaviors. This makes men both more dependent on health monitoring from others and less likely to monitor the health of their partner, even if the majority of women identify their partner as their primary source of health monitoring (Tucker & Anders 2001). Scholars estimate that as much as 50 percent of all mortality is associated with poor health behavior, or could be postponed by protective health behavior (Hamburg, Elliott, & Parron 1982). This contributes to marital status being a more important determinant of health and mortality for men than for women, and the transition out marriage, in this aspect, leading to a greater risk for men. This mechanism may be amplified by gender differences in coping abilities, which in turn are likely to be influenced by access to social support outside of marriage.

There are also instrumental forms of marriage benefits. For men these typically consist of household services, as men continue to contribute less to the housework than do women (Bianchi et al. 2000; Halleröd 2013; Lam et al. 2014). An uneven distribution of household tasks usually means that the surviving spouse must assume new tasks, which intensifies the stress and anxiety from the loss, especially for men (Umberson et al. 1992). It is, however, possible for individuals to experience improved self-esteem and confidence if they succeed in mastering new skills and managing life on their own (Carr 2004). For women, the main instrumental benefit of marriage tends to be financial, as women usually to earn less than do their spouses (Duvander et al. 2015). Accordingly, women are more exposed to stress from financial strain in widowhood than are men (Halleröd 2013).

SES, gender and widowhood

In this section, I discuss how the mechanisms between widowhood and elevated mortality vary in strength and prevalence depending on the combination of SES and gender. The two SES-components I apply here are education and income. These two measures capture different aspects of the SES-mortality relationship and are each connected to specific causal mechanisms (Geyer et al. 2006). In order to explore certain pathways between widowhood and mortality extensively, these measures can therefore not be used interchangeably. Geyer et

al. (2006) describe the essential differences in the ways through which different measures of SES determines health. Education is associated with awareness and ability to base actions on information. Income is associated with material resources that can be used for avoiding or managing demanding situations. Education can be argued to be the more central component of SES due to its robust effect on social position and temporal relation to other SES measures (Shavers 2007). In addition to personal development, education is also associated with social capital that may benefit health. This is manifested in larger networks providing social support (Mirowsky & Ross 2003, p. 128), and in a higher probability of finding a resourced partner (Qian & Preston 1993).

In the previous section, I listed five mechanisms through which becoming widowed influences the mortality differences between men and women. These were: (1) men's lower ability to cope with emotionally difficult situations; (2) men's lower access to social support after spousal loss; (3) women's higher propensity to monitor the health of both themselves and significant others; (4) men's lower tendency to perform housework; (5) women's higher risk of experiencing financial strains after widowhood. These mechanisms can all be argued to vary in significance depending on individuals' SES. The first three mechanisms appear to be related mainly to education, the fourth one to both education and income and the fifth one to income.

(1) Women as a group may experience a smaller widowhood effect because of gender differences in coping strategies but the different coping strategies are not consistently protective or harmful. Confrontational coping behavior is necessary to accommodate the loss, but may also impede adjustment and distract from coping with secondary stressors (Carver et al. 1989). There is evidence that such lack of attention to secondary stressors, together with rumination, curbs the advantage of women's coping behavior (Stroebe et al. 2001). Likewise, avoidance may be more or less harmful depending on the specific behavior, timing and duration of the use of the strategy (Ingledew et al. 1996). Stroebe & Schut (1999) argue that there are productive forms of avoidance and that distractions may serve a purpose in the recovery process after loss. Therefore, the most beneficial trait when it comes to dealing with loss may be to have a wide repertoire of coping skills, rather than leaning heavily on confrontational coping (Ingledew et al. 1996; Stroebe & Schut 1999; Stroebe et al. 2001). It is likely that education is a means to achieve such a reportoire of coping skills, and possible that it is more so for women than for men. Since education is associated with awareness and rationallity, it may be important, mainly, for developing problem-focused coping skills. Ackordingly, education has ben shown to increase the propencity to employ problem-focused

coping but not emotion-focused coping (Pearlin & Schooler 1978). Given women's generally lower propencity to use problem-focused coping, it therefore appears as the range of coping strategies would increase more from education for women than for men, and that highly educated women should have broader coping skills than have highly educated men. From this perspective, education, therefore, appears to increase the ability to handle loss more for women than for men.

(2) Men rely more heavily on their spouse for social support than do women, who tend to have other close confidents in addition to their spouse. This may lead to gender differences in both the perceived stress of the loss and the ability to adjust. In addition to gender, the number of close confidants have also been shown to vary with education. As mentioned earlier, those with higher education tend to have larger and more supportive social networks than others. The social support provided by these networks is believed to give access to a number of health promoting resources, such as affirmation of emotions and actions, information, advice and emotional support in the form of love and caring (Revenson & Lepore 2012). However, among older individuals, the strength of the association between SES and social support appears to differ between men and women. For older men, higher education correlates positively with the size of the social network, but not with the number of close friends, frequency of contact or other network characteristics that are important for the access to social support. For older women on the other hand, education have been found to have a positive correlation with both network size and proportion of close friends within the network (Ajrouch et al. 2005). Education does, therefore, appear to be a more important determinant of access to social support for women than for men and should, in this aspect, benefit women more than men in terms of widowhood mortality.

(3) Women's tendency to monitor health behavior could be argued to vary with educational level. Education has been shown to increase individuals' health literacy, which means that their ability to monitor others behavior should be elevated as well. McKinlay's (1973) finding that pushing others towards health norms or discussing health related issues is less common within working-class families than others supports this argument. Men with highly educated spouses may therefore enjoy greater marital benefits in the form of health monitoring. In this instrumental aspect, losing a spouse would therefore make more difference for the health of men of higher socioeconomic status, given homophily in terms of education. Zajacova (2006) finds that married men and women benefit to a similar level from education health wise, while after marriage dissolution (through divorce), the health returns of education are weaker for men. This may indicate that the health returns from education for men in deed are driven,

to some extent, by a higher likelihood of having a spouse who engage in health monitoring. (4) Men with higher income may enjoy greater material benefits from marriage than do others, for example in the form of household specialization. Given the historically gendered labor market with relatively low female participation, a high income for men likely produces large income differences within the households, at least in the older generations (Stevenson & Wolfers 2007). This leaves the women in such households in a weak bargaining position when it comes to distributing the household tasks, which might make the distribution of housework more uneven in these households than in others (Thébaud 2010). Widowed men whose income was considerably higher than that of their spouse have been found to have greater difficulties adjusting to spousal loss than others, likely because of insufficient skills in managing a household alone (Halleröd 2013). Women in households with a strongly gendered income distribution have been found more vulnerable than others after widowhood, which could be both a result of stress from adopting new responsibilities, e.g. regarding economy and maintenance, as well as of financial strains (ibid.). For men, stress from difficulties to deal everyday tasks should therefore counteract a portion of the protective effect of higher income, while income level should have a more clearly positive association with women's ability to manage life as widowed.

(5) For women, the death of the spouse often means a substantial decline in household income and an increased risk of poverty (Umberson et al. 1992). This problem is well recognized and several countries have attempted to address it, for example by granting bereavement benefits to the next-of-kin of the deceased (The European Union 2015). In Sweden, such benefits are represented by a Survivor's-pension (Efterlevandepension) (Pensionsmyndigheten [Swedish Retirement Agency] 2018) Despite of this, women in Europe experience a considerably higher risk to face old age poverty than do men, and this difference continues to increase (The European Commission 2015). Income could, in this aspect, be expected to have a greater significance for the widowhood effect for women, as widowhood to a higher extent is associated with poverty for women than for men. Among women, higher income also indicates a higher level of labor market participation. Engaging in paid work provides economic and social as well as psychological resources that continue to last after retirement. Such resources are useful for handling both grief and material strains (Pai & Barret 2007). Widows who have worked full-time are less vulnerable to psychological distress than are those who have been working part-time or been homemakers. Pai and Barret (2007) explain this by that having a full time paid work offers a sense of control over one's life, and higher self-esteem. Full time work can, however, be argued to matter equally, or

even more, for men's self-esteem but should be a less important cause of variance both in income and health for men as part time work is less common among men than among women (Statistics Sweden 2018).

Hypotheses

The purpose of this study is to investigate how the risk of dying varies depending on the combination of SES (education/income), civil status (married/widowed) and gender. It is well documented that the social mortality gradient is stronger for men than for women in marriage, but in widowhood, the opposite might instead be true. From the literature, education seems to decrease the risk of dying largely through its effect on behaviors and access to social support and this effect appears to be stronger for women than for men. This implies that level of education is a more important factor when dealing with emotionally difficult life situations like the loss of a partner, for women than for men. When it comes to income, the effect on the mortality risk seems to go mainly through access to material resources and the ability to adjust practically to life outside marriage. Here too, the mortality risk can be expected to vary more for women than for men as the differences in access to resources are more fundamental in the lower part of the income distribution. Based on this, the following hypotheses are formulated:

1) a) Widowhood amplifies the socioeconomic gradient in mortality for both women and men.
b) In marriage, the socioeconomic gradient in mortality is steeper for men than for women, in widowhood the socioeconomic gradient is steeper for women than for men.

From the literature presented above, it appears as women tend to be better equipped to deal with stressful life situations than are men. It therefore seems likely that the widowhood effect is less pronounced among women. Given the conclusions leading to the first hypothesis, it also seems likely that the size of widowhood effect is more strongly connected to SES for women than for men in the sense that it decreases more with increasing SES for women. The importance of SES for mortality is likely to increase in a life situation where the mortality risk is relatively high. This implies a steeper socioeconomic gradient in mortality for the widowed than for the married, which should lead to a smaller widowhood effect for those with higher SES than for those with lower. Since the mechanisms between SES and widowhood mortality risk appear to be stronger for women than for men, the difference in

mortality risk between the widowed and married should converge more sharply with increasing SES for women than for men. Based on this, the following hypotheses are formulated:

2 a) Women experience a smaller widowhood effect than do men.
b) Individuals with high SES experience a smaller widowhood effect than do individuals with lower SES.
c) The differences between those with low- and high SES in terms of the widowhood effect are larger for women than for men.

Method

Data

The data source for this paper is a collection of register data provided by Statistics Sweden through the "Sweden over Time – Activities and Relations"-project. The data covers the entire Swedish population. The register that contains the information on marital status, income and educational level is structured in yearly volumes (1990-2012) that can be linked to each other for longitudinal information about individuals during this period. For individuals who die or emigrate, the date of the respective event is reported. Information on cohabitation is not available. The study population includes everyone who is younger than 76 and married at the start of the observation period (3,198,879 individuals).Those who emigrate are censored the end of the month of the migration. Those who immigrate after age 18 are not included in the sample. The observation period begins at 1 January 1991 and ends at 31 December 2012.

Setup

To measure how the interaction between gender and SES affects widowhood mortality, I apply a parametric event-history model with age serving as the baseline hazard. The mortality risk is assumed to follow a Gompertz-distribution with the baseline hazard increasing exponentially over time, which is appropriate for mortality analysis of populations in ages 30-95. For ages below/above that span, this type of model tends to under-/ overestimate the mortality, respectively. In the first year of the observation period, about five percent of the individuals are younger 30 and in the final year, about one percent are older 95.
The relative risk of dying is estimated, given gender, SES and widowhood status. To compare how the association between SES and widowhood mortality differs between men and women,

I use three way-interactions including gender, time-varying covariates for education/income and a time varying covariate capturing the transition to widowhood. The interaction terms provide information of the relative hazard for each specific combination of variable categories compared to the baseline. This makes gender comparisons on how SES affects the mortality difference between the widowed and non-widowed possible.

Variables

The outcome variable is the hazard of dying. The predictors are gender, civil status, educational level and gender specific income quintile. Civil status is measured for each year during the study period. As stated earlier, the variable does not completely accurately capture the effect of widowhood, since those who become widowed and die the same year are incorrectly reported as married at the time of their death. Both the SES-variables are time-varying. The education variable measures individuals' highest completed level of education by each year 1991-2012. The levels of education are: "Primary" (nine years or less), "Secondary less than 3 years", "Secondary, 3 years", "Tertiary less than 3 years" and "Tertiary 3 years or more". The income quintiles are based on the yearly disposable individual income up until age 75, measured each year of the analysis period. This includes income from salary, pensions, social transfers, tax deductions, interests and allowances. Individuals older than 75 are assumed to remain at their last observed educational level/income quintile. Those who die a certain year are divided into quintiles for that year based on their disposable income from the year before.

Table 1 Distribution of person-years and failure rate by educational level, income quintile, marital status and gender

	Men		Women	
	Proportion of person-years	**Failure rate per 1000 person-years**	**Proportion of person-years**	**Failure rate per 1000 person-years**
Educational level				
Primary	0.360	26.315	0.354	20.766
Secondary less than 3 years	0.254	13.359	0.339	8.094
Secondary 3 years	0.151	14.527	0.073	5.189
Tertiary less than 3 years	0.099	9.391	0.110	4.280
Tertiary 3 years or more	0.136	9.555	0.124	4.185
Income quintiles				
Quintile 1	0.155	42.040	0.175	29.475
Quintile 2	0.199	24.673	0.208	14.699
Quintile 3	0.216	12.736	0.211	7.186
Quintile 4	0.217	7.822	0.202	4.574
Quintile 5	0.214	6.747	0.203	3.916
Marital status				
Married	0.881	15.625	0.808	7.705
Divorced	0.079	9.523	0.077	4.581
Widowed	0.040	68.607	0.114	42.643
Total number of person-years	154,381,700		167,918,300	

Table 1 shows the distribution of person-years and number of deaths per 1000 person-years for each category of the education-, income- and marital status variables by gender. The failure rate and amount of person-time appears be sufficiently high within each gender/marital status/SES-category to support an event-history model with a three-way interaction. The uneven distribution of person-years between the educational categories reflects the birth cohort distribution of the study population with a significant share born in the 1910's and 1920's.

Results

To address the hypotheses "widowhood amplifies the socioeconomic gradient in mortality for both women and men" and "in marriage, the socioeconomic gradient in mortality is steeper for men than for women, in widowhood the same gradient is steeper for women than for men" I use gradient coefficients. I obtain these by using the hazard ratio estimates from the three-way interactions shown in Table 2 as coordinates, or points in a scatter graph, and calculating a line of best fit from these points. Then, I let the slope of the lines represent the mortality gradient within the different gender/widowhood status/SES-combinations. The coefficients, thus, shows the decrease in the mortality hazard ratio from a one-step increase in

educational-/income category. I then compare the coefficients for the married and widowed men and women. All hazard ratio estimates are significant at the 99% level.

Table 2 Regression of relative mortality risk with three-way interactions, combinations estimates

	Men		Women	
	Model 1			
Education	**Married**	**Widowed**	**Married**	**Widowed**
p	1	1.119	0.614	0.711
s1	0.925	1.087	0.545	0.641
s2	0.900	1.080	0.545	0.621
t1	0.829	1.021	0.474	0.560
t2	0.787	1.001	0.455	0.561
Gradient	-0.052	-0.030	-0.039	-0.037
	Model 2			
Income quintiles	**Married**	**Widowed**	**Married**	**Widowed**
Q1	1	1.059	0.558	0.658
Q2	0.883	1.027	0.527	0.628
Q3	0.761	0.929	0.484	0.580
Q4	0.681	0.896	0.465	0.535
Q5	0.626	0.865	0.442	0.498
Gradient	-0.095	-0.052	-0.029	-0.041

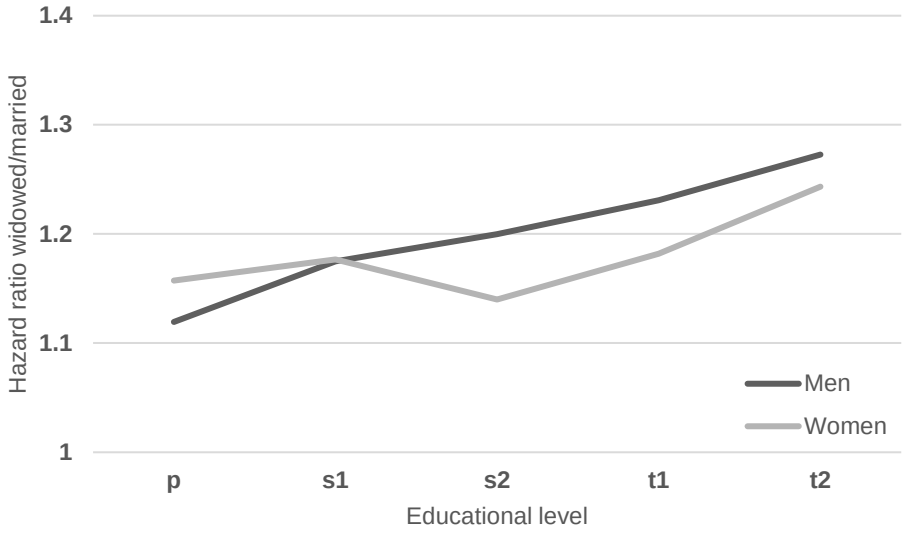
Table 2 shows the mortality hazard ratios from regressions with gender/widowhood status/SES interactions. In each regression, the effect of the other SES-measure is controlled for. In Model 1, the coefficient gradients show that the widowed have a higher mortality risk in each educational category. For men, the decrease in the mortality hazard ratio over the educational categories is larger among the married (-5.2%) than among the widowed (-3%). For women, there is no significant difference in the educational gradient in mortality between the widowed and the married. Model 2 shows that the widowed have a higher mortality risk than the married also in each income quintile. The decrease in mortality risk over the income quintiles is shown to be larger for the married men (-9.5%) than for the widowed men (-5.2%), and smaller for the married women (-2.9%) than for the widowed women (-4.1%). Hypothesis 1a "Widowhood amplifies the socioeconomic gradient in mortality for both women and men" does not find support here, although the income gradient in mortality appears to be amplified by widowhood for women.

Model 1 shows that while the educational gradient in mortality is steeper for men than for women in marriage, the opposite appears to be true in widowhood. Model 2 shows a steeper income gradient in mortality for men than for women both in marriage and in widowhood.

Hypothesis 1b “In marriage, the socioeconomic gradient in mortality is steeper for men than for women, in widowhood the same gradient is steeper for women than for men” is, thus, supported when it comes to educational level but not income.

To examine the widowhood effect, I divide the hazard ratio estimates of the widowed in the different gender/SES-categories with the estimates of the married in the corresponding categories. I then let the quotient represent the increase in mortality risk after becoming widowed, i.e. the widowhood effect. The widowhood effect can then be compared between women and men across the SES-categories to show whether SES affects the ability to handle loss differently for men and women. Figure 1 and 2 show the synthesized results of the interaction of gender, civil status and education/income presented in the tables above. All differences are significant at the 99 % level.

Figure 1 Widowhood effect over educational categories for men and women



Note: p= primary, s1=secondary education (less than 3 years), s2=secondary education (3 years), t1=tertiary education (less than 3 years), t2=tertiary education (3 years or more)

Figure 2 Widowhood effect over income quintiles for men and women

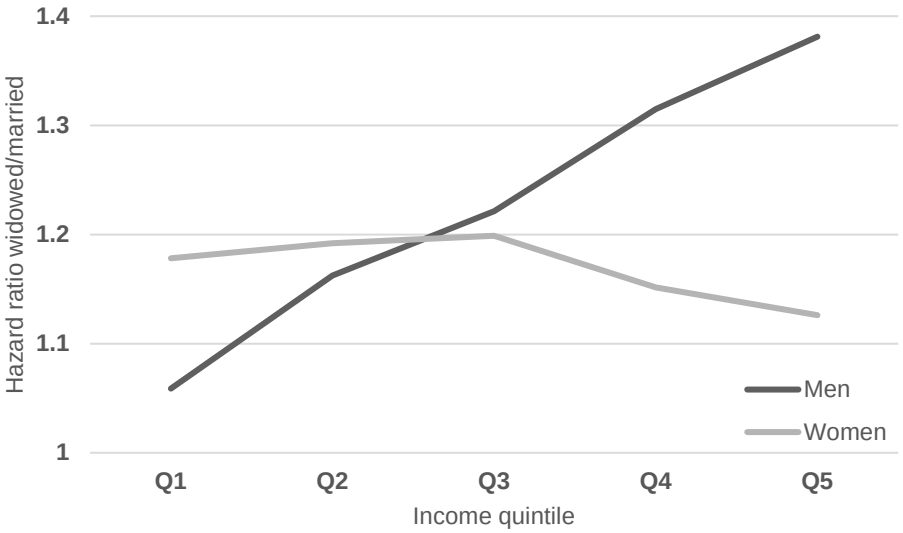


Figure 1 shows that the widowhood effect is greater for women than for men in the category with only primary education and of similar size for men and women with secondary education shorter than three years. In the categories with three years of secondary education and higher, the effect is smaller for women than for men. Figure 2 shows the widowhood effect for men and women over income quintiles. The widowhood effect is grater for women than for men in income quintile 1 and 2 and smaller for women than for men in quintiles 3-5. Hypothesis 2a "Women experience a smaller widowhood effect than men" finds support in the higher educational categories and income quintiles, but not in the lower.

The size of the widowhood effect increases slightly for women between the first and second educational category in Figure 1. It drops at the third category and increases again over the fourth- and fifth category. For men, the widowhood effect increases over all the educational categories, with the largest increase occurring between the first and the second category. For women, the widowhood effect remains at roughly the same level over the first three quintiles and decreases between quintile 3 and 5. For men, the effect increases across all quintiles. Hypothesis 2b "Individuals with high SES experience a smaller widowhood effect than individuals with lower SES" is only supported for women when SES is measured through income quintiles. For men it is completely contradicted both when SES is measured through educational level and income quintile. Figure 1 and 2 both show a consistent increase in the size of the widowhood effect over the SES-categories for men, while the pattern for women is less consistent. The widowhood effect is also greater for women than for men in the groups with low SES but smaller for women in the groups with higher SES. Hypothesis

2c “The differences between those with low- and high SES in terms of the widowhood effect are larger for women than for men” is therefore not supported.

Discussion

This study has contributed to the field of widowhood mortality research by showing how gender, widowhood and SES interact as determinants of mortality. Most previous research on widowhood mortality has been examining the relations between these factors separately, not considering how the significance of each of them can vary between demographic subgroups. Due to the lack of previous research on the combined effects of these determinants, I drew on findings from research areas with bearing on widowhood mortality and proposed gendered pathways through which SES and widowhood influence mortality on the basis of findings from diverse research areas, including coping strategies, old age poverty and social support patterns. Along with exploring widowhood mortality from various perspectives, this study highlights the intersectionality of vulnerability in widowhood related to two main social stratifiers, gender and SES.

The results from this study indicate that the socioeconomic gradient in mortality is weaker for widowed men than for married men. For women there is no difference in the educational gradient, while the income gradient is stronger for the widowed. One possible explanation for men’s weaker socioeconomic gradient after widowhood may be by that men with higher SES enjoy greater marital benefits. This would have a dualistic effect in that benefits like health monitoring from the spouse are protective, while loss of such benefits may be distressing. As I previously argued, men with high SES appear to be more advantaged in marriage both in terms of material benefits and of health monitoring from their spouse, at least in the older generations. A second possibility is that the assumption that widowhood increases the socioeconomic gradient is incorrect. My argument was that the resources required through education would be more crucial in stressful life situations, such as widowhood. The differences in mortality risk would, therefore, be larger between groups with different educational level in widowhood than in marriage. It is possible that the death of a spouse instead takes the acquired ability to act rationally and awareness of poor health behavior out of play. Zajacova (2006) finds that the health returns from education is higher for married men than for divorced men and suggests that the stress of the new life situation prevents men from translating high social status into health. Wortman et al. (1993) find that individuals with higher intellectual resources, self-esteem and sense of mastery are more vulnerable than others in terms of mental health after sudden spousal loss. They argue that those who, to the

highest extent, perceive life as controllable may experience the loss of their spouse as more devastating than do others. If this, to at least some extent, applies for when the loss is not sudden, it would explain the lack of difference in educational gradient between widowed and married women. Those with higher education may experience the loss as more shattering, while they at the same time have more tools to handle the stress and grief. The increase in the income gradient for women after widowhood may be due to that the income loss and risk of poverty is more significant for women after widowhood than for men.

For men, the widowhood effect is smaller in the lower SES categories than in the higher. For women, there is no consistent pattern of the widowhood effect over the educational categories, but the widowhood effect is smaller in the two highest income quintiles than in the other three. The increase in the widowhood effect over the SES category indicates that the protective qualities of higher SES are less important for men's ability to handle loss than risk factors like loss of marital benefits or the emotional shock described above. It may also be an indication that the advantage of high SES for men to some extent comes from an increased likelihood of finding a resourceful spouse. The lack of a consistent pattern of the widowhood effect over the educational categories for women may be due to the widows with higher education being a rather select group, as higher education is less common for women in the cohorts most exposed to widowhood. The widowhood effect progression over the income quintiles for women could be the result of the more narrow income distribution among women, making women with below-average incomes facing only similar types of stressors. The women in the two highest quintiles may stand out in terms of labor market participation, economic security and ability to pick up new everyday tasks. The clearer pattern of the widowhood effect over the SES-categories for men than for women may stem from the wider income distribution and less skewed age distribution between educational categories among men.

The higher widowhood effect for women than for women in the lower SES-categories implies that income and education influence the direction of the association between gender and the widowhood effect. One contributing factor to such a moderating effect may be inequality problems in the Swedish health care system. The Swedish National Board of Health and Welfare (Socialstyrelsen) has pointed out several groundless differences in terms of access and quality of health care between gender- and educational groups. Compared to men, women's health problems tend to be more advanced by the time they are treated or diagnosed, and older women are more exposed to improper medication use and do less often receive medication that follows national guidelines (Socialstyrelsen 2011) . Corresponding

differences have been found between individuals with only primary education/low income and others. The effect of the health care inequality is likely amplified also for older individuals who do not have a spouse to support them (ibid.). Therefore, it appears as lack of higher education both exposes women to obstacles in the health care system and prevents them from getting adequate care. In addition, women with only primary education are more likely than are others to provide informal care to a sick spouse, without professional care assistance (Socialstyrelsen 2009), which might bring relevance to the "wear and tear"-explanation of the widowhood effect for this group. This propensity might come from a more restrictive assessment of women's need for assistance from Swedish municipalities, together with low means to pay for private alternatives. Wattmo et al. (2013) find that men living with spouse with Alzheimer's disease are offered more hours of community-based home help services than are women in the same situation. Among single Alzheimer patients, men are also granted more assistance than women with the same degree of disease, which enables men to remain in their own homes longer before eventual nursing home placement.

The wide age-distribution in this study makes comparisons based on educational level somewhat complicated. Higher education is less common among the older generations than among the younger ones, especially for women. In the older generations, the highly educated should be a more select group while the group with lower education is more diverse than is its younger counterpart. Regarding income, the range of the quintiles is larger for men than for women as well as for younger cohorts than for older ones. The significance of belonging to a certain income quintile may therefore be different depending on gender and birth year. For further exploration how the widowhood effect varies between demographic subpopulations, comparisons between cohorts would therefore be interesting. Another possible next step would be to explore immediate vs. long-term differences in the widowhood effect, which would require data that provides smaller time units to be able to capture deaths that occur in the same year as the transition to widowhood.

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