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Gray divorce and mental health in the United Kingdom

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ABSTRACT

The number of older people who experience marital break-up has increased in many Western countries. However, limited empirical attention has been given to the study of the consequences of later-life divorce or separation. Previous studies on gray divorce are often cross-sectional and tend to capture a mix of short- and long-term effects of divorce and possibly selection effects into divorce. Drawing on data from nine waves of the UK Household Longitudinal Study (2009/2010-2017/2018), we analyze the effect of marital break-up on the mental health of 909 adults aged 50 or over to test the crisis model and the chronic strain model of divorce. We use fixed effects linear regression models to account for time-invariant confounders and distinguish between pre- and post-divorce effects. Our results indicate that older adults' depressive symptoms (GHQ) increase in the years before and upon union dissolution. After separation, depressive symptoms decrease and return to approximately previous baseline levels. Our analyses on heterogeneity in the effects of gray divorce show that post-divorce adjustment is faster for childless adults than for parents. We find no evidence that adjustment after gray divorce is slower for women than for men, or for persons who already experienced a prior union dissolution than for those who separate for the first time. The results are consistent with the crisis model of divorce but in contrast with the chronic strain model of divorce. Older adults are able to adjust to marital break-up, and their fertility histories tend to moderate the negative effect of later-life divorce on mental health.

1. Introduction

Marital break-up is an increasingly common experience for older adults in Western societies. Later life divorce – also known as gray divorce (i.e. divorce at age 50 or older) – is more common among middle-aged than older adults, among those in higher-order marriages than those in first marriages, and among adults in good than in poor health (Brown et al., 2016, 2019; Lloyd and Zick, 1986; Raley and Sweeney, 2020). The rising divorce rates among older adults raise the question of whether and how a marital disruption in later life affects mental health.

Longitudinal studies focusing on the general population have shown that after temporary decreases in mental health due to union dissolution, mental wellbeing tends to return to pre-divorce levels (Amato, 2000; Clark and Georgellis, 2013; Leopold, 2018; Lucas, 2007; Monden and Uunk, 2013). However, this general pattern might not reflect the particular patterns for older adults, for whom divorce may have a more detrimental impact. Williams and Umberson (2004) have, for instance, shown that the transition to divorce has greater and more enduring detrimental consequences on physical health among middle-aged and older men than among men in younger age groups, and Wang and Amato (2000) have suggested that it may become increasingly challenging with older age to adjust to divorce. Although older adults generally have more economic resources that may help them to cope with some of the challenges resulting from marital break-up (Vespa, 2012), they tend also to have fewer social resources from which emotional and practical support can be derived.

The small body of research focusing specifically on the mental health of divorced older adults is often cross-sectional and indicates that divorced persons have worse mental health in later life, compared to partnered counterparts (Glaser et al., 2008; Hank and Wagner, 2013; Waldron et al., 1997). However, findings of these cross-sectional studies should be interpreted with caution, because estimates of divorce in these studies may effectively capture selection factors. For instance, personality traits, socio-economic status and physical health may be predictive of both divorce (Brown and Lin, 2012; Jockin, McGue & Lykken, 1996; Matyasak, Styrc & Vignoli, 2014) and later-life mental health (Grundy, Van den Broek and Keenan, 2019; Steunenberg et al., 2006). Failure to adjust for every single potential confounder of this kind will result in a biased estimate of the effect of divorce. Furthermore, cross-sectional studies often do not make the distinction between long-term divorcees and gray divorcees (Greenwood, 2012). This is unfortunate, because it blurs estimates by capturing a mix of immediate

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effects of divorce in later life and long-term effects of divorce that occurred earlier in the life course. In other cases, follow-up studies conducted many years after divorce (Pudrovska and Carr, 2008) as well as retrospective accounts to capture pre-divorce psychological states (Bowen and Jensen, 2017; Crowley, 2019; Gray et al., 2011) might not be reliable and fail to describe mental-health trajectories around union dissolution.

An exception to this literature is Lin et al. (2019)'s longitudinal study, which provides evidence on the effect of gray divorce on depressive symptoms, by comparing the mental health trajectories of divorced, widowed and married adults. Their multilevel analysis shows that depressive symptoms increased immediately following marital dissolution, but gradually recovered after the event. In the current study, we extend earlier research on the mental health impact of gray divorce in multiple ways. Drawing on British panel data, we estimate fixed effects models to analyze how older people's depressive symptoms develop before, upon and following divorce. As explained in further detail later, the approach taken is considerably less prone to bias due to omitted confounding variables than multilevel estimates and the commonly taken cross-sectional approach. Furthermore, whereas Lin et al. (2019) do not examine pre-divorce effects, we analyze the entire process of marital break-up, in which people's mental health may already decline in anticipation of an upcoming separation. Studying these patterns of changes in mental health is important, because the effect of divorce may include a set of stressful experiences that occur before separation. The extent and speed of post-divorce recovery may depend on whether the level of mental health shortly before separation is included in the baseline (as done by Lin et al., 2019) or analyzed as an anticipation effect. The approach adopted in the current study allows us to distinguish whether people's mental health recovers fully to the baseline levels (two years before separation) or, alternatively, whether it recovers only to the level that they had in the year before separation when they plausibly already struggled with marital strain. Moreover, we will explore potential heterogeneity in the impact of divorce in later life. We analyze gender differences in the effect of divorce on mental health, since the consequences of union dissolution may differ substantially between men and women (e.g. Mandemakers et al., 2010). Additionally, it may be expected that the presence of children has the potential to moderate the impact of gray divorce and that the mental health implications of first divorces differ from those of subsequent divorces. The latter two moderators have received only limited attention in previous studies on later-life divorce, although the effect of divorce on parents with minor children is widely documented in existing research (e.g. Williams and Dunne-Bryant, 2006). We will therefore test whether gender, parenthood status and earlier experiences of divorce moderate the effects of later-life divorce on mental health.

2. Theoretical background

The crisis model of divorce posits that marital break-up is a so-called stress-to-adjustment process that leads to a temporary decrease in wellbeing (Amato, 2000; Johnson and Wu, 2002). Before separation, estrangement from one's spouse is stressful and is often accompanied by disputes and conflicts between partners. Couples may spend considerable time and effort to attempt to renegotiate their relationship prior to final separation. Additional stress may be associated with the decision to separate that is often taken by one of the two partners. After the decision to separate, the end of marriage or cohabitation brings several life challenges, such as having to find new accommodation, arranging custody for children, division of goods, and adjustment to living alone, all of which can be detrimental for individuals' wellbeing (Amato, 2000; Leopold and Kalmijn, 2016). However, these practical and emotional changes are followed by adjustment, through which the wellbeing of divorcees returns to previous baseline levels. The crisis model would thus lead one to expect a mental health decline preceding divorce, followed by recovering mental health post-divorce. Longitudinal studies examining multiple wellbeing outcomes in the general population have provided evidence in support of this hypothesis ([psychological stress] Booth and Amato, 1991; [life satisfaction] Clark et al., 2009; [life satisfaction and depression] Clark and Georgellis, 2013; [multiple outcomes including physical and mental health] Leopold, 2018; [happiness] Lucas, 2007; [depression and health] Kalmijn, 2017; [depression] Kalmijn and Monden, 2006; [antidepressant medication] Monden et al., 2015; [life satisfaction] Soons et al., 2009).

Whereas the crisis model of divorce emphasizes post-divorce recovery, the chronic strain model suggests that marital break-up produces a persistent decline in subjective wellbeing and mental health (Amato, 2010; Monden et al., 2015; Johnson and Wu, 2002). Living as a divorced individual is associated with lack of social support and economic hardship (Poortman, 2000), which may affect mental health and an individual's ability to cope with other stressful life events (Lorenz et al., 2006). Therefore, in contrast with a temporary crisis, divorce in later life may imply impaired mental health as a permanent feature of divorced adults.

It remains unclear to what extent the long-term and short-term effects of divorce, postulated in the chronic strain model and the crisis model, can also be observed among gray divorcees. It has been suggested that adjustment to divorce may be more difficult for older persons than for their younger counterparts (Wang and Amato, 2000; Chiriboga, 1982). Wang and Amato (2000) argued that older people are less able to recover after divorce, because they have invested more time and emotional resources in their marriages and have a lower probability of remarrying than younger divorcees. However, in a recent longitudinal study on the U.S., Lin et al. (2019) showed that older persons do recover after union dissolution. The authors described recovery following later-life divorce as convalescence, i.e. “slow, gradual recovery from a weakened state” (p. 164). They found that older divorcees recovered in about four years, which is approximately twice as long as it takes for younger divorcees.

The mental health impact of gray divorce may be contingent on personal characteristics. First, it has been suggested that divorce affects women more than men (e.g., Marks and Lambert, 1998). Consistent with this idea, some studies on the general population showed that psychological distress increased around the time of divorce for women but not for men (Kalmijn and Monden, 2006; Mandemakers et al., 2010), while other studies suggested a beneficial effect of divorce for men and a detrimental effect for women in terms of depression (Clark and Georgellis, 2013). It should be noted that in much previous research focusing on the general population little or no evidence for gender differences in the effects of divorce was found (Amato, 2000; Strohschein et al., 2005; Leopold, 2018). However, gender differences in the mental health impact of divorce may be expected to be particularly salient when divorce occurs in later life. Marks and Lambert (1998) argued that gender differences in the impact of divorce are driven by women's poorer prospects of remarriage. Given that the decline in the probability of remarriage after divorce with increasing age is steeper and starts earlier for women than for men (Beaujouan, 2012), this potential source of gender differences is relatively pronounced among gray divorcees.

Second, impact of separation may vary by the parental status of the older divorcee. The presence of minor children is known to exacerbate the negative effect of separation on wellbeing among young parents (Leopold and Kalmijn, 2016), but far less is known about how the impact of divorce in later life may be shaped by parenthood when the children reached adulthood and are no longer dependent on parents' resources. Adult children are an important source of support and companionship for older adults (Dykstra, 2015; Steinbach et al., 2019) that divorce may put in jeopardy. When parents have conflicts, adult children may take the side of one and weaken their relationship with the other. They may also withdraw from relationships with both parents (Greenwood, 2012). Research has shown that parental divorce is associated with less frequent parent-child contact and a poorer quality of

the relationship between parents and adult children, also when divorced parents are older and the children have already reached adulthood (Kaufman and Uhlenberg, 1998; Kalmijn, 2007; Shapiro, 2003; Tosi and Gähler, 2016; Ward et al., 2014). Infrequent face-to-face contacts with adult children and poor quality parent-child relationships are, in turn, associated with worse mental health for older adults (Koropeckyj-Cox, 2002; Teo et al., 2015; Tosi and Grundy, 2019). Although childlessness per se is associated with higher risks of loneliness and depression in later life (Gibney et al., 2017; Grundy, Van den Broek and Keenan, 2019; Maximova and Quesnel-Vallée, 2009; Van den Broek et al., 2019), these considerations lead us to expect that the impact of gray divorce on mental health is more strongly negative for parents than for childless older adults.

Third, the mental health consequences of a first divorce may differ from those of subsequent divorces. Earlier research examining retrospective information on family histories suggests that adults who divorced more than once are less likely to be happy (Hetherington and Kelly, 2002) and more likely to feel lonely in later life (Peters and Liefbroer, 1997). On the one hand, previous experiences of divorce may increase individual awareness about how to face the negative experience of union dissolution. On the other hand, the negative effects of multiple union disruptions may induce feelings of repeated failures or social stigma associated with later-life divorce. Some authors indicate that divorce is often stigmatized (Gerstel, 1987) and adults who divorced multiple times are particularly likely to be perceived as interpersonally, morally, and psychologically inferior (Hoffman and Willers, 1996). Social stigma is, in turn, a cause of health inequality and has detrimental effects on multiple life domains, such as social relationships and coping behaviors (Hatzenbuehler et al., 2013).

3. Data and methods

3.1. Sample

We use data from the nine waves (2009/2010–2017/2018) of the UK Household Longitudinal Study (UKHLS) (University of Essex, 2019). This annual population-representative survey includes approximately 40,000 households and collects information on many aspects of life, including physical and mental health, from all household members aged 16 or over. We select older adults aged 50 or over who experienced divorce/separation during the observation window. We excluded, therefore, individuals who separated before entering the survey and those who remained in partnership throughout the observation window. This choice was driven by the need of distinguishing between the immediate effects and the longer-term effects of divorce. We further excluded 819 individual-year observations with missing values in the dependent variable. The analytical sample includes 909 older adults followed for 5.1 points in time on average, corresponding to 4650 individual-year observations (see Tables 1 and 2).

3.2. Dependent variable

The dependent variable is the Caseness version of the GHQ depression score computed from the General Health Questionnaire, which consists of twelve questions regarding mental wellbeing. These are: have you recently 1) been able to concentrate on whatever you're doing? 2) lost much sleep over worry? 3) felt that you were playing a useful part in things? 4) felt capable of making decisions about things? 5) felt constantly under strain? 6) felt you couldn't overcome your difficulties? 7) been able to enjoy your normal day-to-day activities? 8) been able to face up to problems? 9) feeling unhappy or depressed? 10) been losing confidence in yourself? 11) been thinking of yourself as a worthless person? 12) been feeling reasonably happy, all things considered?. The answer categories were four points on a Likert scale ranging from “not at all” to “much more than usual”. The items were dichotomized and the positive ones reversed. The scale converts these items into a single depression score, resulting in a continuous scale with a range of 0 (less distressed) to 12 (most distressed). In our sample, the scale has a good internal consistency: the KR-20 coefficient is equal to 0.93 (Kuder and Richardson, 1937). The scale has been validated in the United Kingdom and other European contexts, as a reliable measure indicator of depressive symptoms (Goldberg et al., 1997; Lundin et al., 2016; Romppel et al., 2013). Table 1 presents descriptive statistics of the sample, including the means and standard deviations of the outcome measure.

Table 1
Characteristics of the sample: dependent variables, controls, and moderators.

	% or mean (SD)	N.
Dependent variable		
GHQ depression score	2.5 (3.6)	
Control variables		
Age	58.9 (7.7)	
Moderators (Time constant)		
Women (vs. Men)	56.9	2647
Higher-order divorce (vs. first divorce)	27.7	1291
Childless (vs. parents)	19.5	906
N. of divorcees		909
Individual-year observations		4650

We chose GHQ score as dependent variable to compare our results with previous research findings on marital disruption in the United Kingdom (Clark and Georgellis, 2013; Wade and Pevalin, 2004). We also replicated our analyses using the Mental Component Summary score computed from the Short Form Health Survey (SF-12) (Ware et al., 1996) to check the robustness of our findings (see Supplementary Materials). The results on SF-12 mental health are described and discussed in the conclusive remarks.

3.3. Independent variable

The independent variable is a measure of the time to and from marital break-up. We, first, identified older adults who divorced or separated during the observation window, by using information about marital status. We considered respondents who reported being married or living with a partner in a given point in time and divorce or separate in the subsequent interview. Second, we calculated the number of years elapsed between the transition to divorce and the date of each interview. We created a categorical variable distinguishing between: 2 or more years before divorce (baseline); 1 year before divorce (anticipation); the year of divorce (immediate effect); 1 year after divorce (adjustment); 2 years after divorce; and 3 or more years after divorce. Note that for most respondents observations are only available for a selection of these time-points (details in Supplementary Materials). Table 2 shows the distribution of the independent variable: the sample includes 675 individual-year observations in the year of divorce, 481 individual-year observations in the pre-divorce year and 525 individual-year observations in the year after divorce (in total: 909 divorcees corresponding to 4650 individual-year observations).

3.4. Moderators

We analyze the moderating effect of gender, high-order divorces and parenthood status. The variable regarding first/second union dissolution is derived from a question about the number of marriages or cohabitations that a respondent has had in life. This is treated as a time-constant dichotomous variable distinguishing between older adults who were in their first marriage or cohabitation at baseline, and those who had at least one partner relationship prior to the current one. Table 2 presents more details about the persons in our sample. In our sample, there are 518 women (3744 individual-year observations) and 391 men (2647 individual-year observations) who separate during the

Table 2
Sample of older adults aged 50 or over who divorce or separate over the observation window.

	First divorce		Higher- order divorce		Childless		Parents		Women		Men		Total	
	N.	%	N.	%	N	%	N	%	N	%	N	%	N.	%
Years before/after gray divorce														
−2 or more	954	28.4	386	29.9	278	30.7	1062	28.4	740	27.9	600	30.0	1340	28.8
−1	333	9.9	148	11.5	96	10.6	385	10.3	274	10.3	207	10.3	481	10.3
0	489	14.5	186	14.4	127	14.0	548	14.6	386	14.6	289	14.4	675	14.5
+1	390	11.6	135	10.5	100	11.0	425	11.3	288	10.9	236	11.8	525	11.3
+2	347	10.3	121	9.4	93	10.3	375	10.0	273	10.3	195	9.7	468	10.1
+3 or more	846	25.2	315	24.4	212	23.4	949	25.3	686	25.9	475	23.7	1161	25.0
N. of divorcees	675		234		170		739		518		391		909	
Individual-year observations	3359	100	1291	100	906	100	3744	100	2647	100	2002	100	4650	

observation window. We observe 675 first-time divorcees and 234 higher-order divorcees. Moreover, among the cohorts considered here (born before 1959) only few older adults were childless (Berrington, 2017). Among gray divorcees, 170 respondents were childless and 739 had at least one adult child. Our dichotomous parenthood status measure was coded based on the information on the total number of children that the respondents had in life. Parenthood status is treated as a time constant factor, because only few people become parents after age 50.

3.5. Analytical strategy

We use fixed effects linear regression models to predict changes in GHQ depressive symptoms before, upon and after marital break-up (cf. Amato and Anthony, 2014). Change in GHQ score is modelled as function of time to/since gray divorce, as indicated in equation (1).

$$\ddot{GHQ}_{it} = \beta_1 \ddot{DIV}_{it} + \beta_2 \ddot{AGE}_{it} + \beta_3 \ddot{AGE^2}_{it} + \varepsilon_{it} \quad (1)$$

The double accents on the *GHQ*, *DIV*, and *AGE* variables in the equation indicate that, as part of the fixed effects analytical strategy, the mean score for person *i* over all time points for the respective variable has been deducted from person *i*'s score on this variable on time-point *t*. Consequently, all time-invariant characteristics, including those not observed, that may bias the estimate of the association between gray divorce and mental health are accounted for (Allison, 2009).

GHQ is the depression score of person *i* at time point *t*. *DIV* is a categorical variable capturing the time before and after the separation of individual *i* at time *t*. As described earlier, six categories are distinguished: two or more years before divorce (baseline); one year before divorce (anticipation); the year of divorce; one year after divorce; two years after divorce; and three or more years after gray divorce. This specification enables us to capture not only the immediate effect of gray divorce on older adults' depressive symptoms, but also the anticipation and adaptation effects. Anticipation effects, which occur one year before the event, may be due to increased conflicts and decreased quality of partner relationships before the actual decision to separate (cf. Kalmijn and Monden, 2006). Recovery following separation can be associated with individuals' ability to adapt to changes in living arrangements. This strategy to examine how the effects of marital break-up are distributed before and after the event has been used in previous research focusing on wellbeing implications of different life course events, such as divorce and home returning (Goisis et al., 2019; Tosi, 2020).

AGE refers to individual age. A quadratic term was added to account for potential non-linearity in the effect of increasing age. Given that depressive symptoms may change with both historical time (e.g. Brexit referendum, the economic recession, or the terrorist attacks in Great Britain) and individual ageing, we performed sensitivity analyses to check whether our results are affected by period effects and the functional form of age (see Supplementary Materials). The substantive results are similar to those reported in the final models in which we include the quadratic form of age and do not account for potential period effects.

$$\ddot{GHQ}_{it} = \beta_1 \ddot{DIV}_{it} + \beta_2 \ddot{AGE}_{it} + \beta_3 \ddot{AGE^2}_{it} + \beta_4 GENDER_i \ddot{DIV}_{it} + \varepsilon_{it} \quad (2)$$

$$\ddot{GHQ}_{it} = \beta_1 \ddot{DIV}_{it} + \beta_2 \ddot{AGE}_{it} + \beta_3 \ddot{AGE^2}_{it} + \beta_4 CHILDLESS_i \ddot{DIV}_{it} + \varepsilon_{it} \quad (3)$$

$$\ddot{GHQ}_{it} = \beta_1 \ddot{DIV}_{it} + \beta_2 \ddot{AGE}_{it} + \beta_3 \ddot{AGE^2}_{it} + \beta_4 PRIOR\ DIV_i \ddot{DIV}_{it} + \varepsilon_{it} \quad (4)$$

In the basic model shown in Equation (1) the estimated impact of divorce, including anticipation and adaptation effects, is constrained to be similar for persons with different background characteristics. In subsequent models, heterogeneity in the effect of marital break-up on symptoms of depression is allowed. As shown in equations (2)–(4), the function of time since/to divorce by which an individual *i*'s depressive symptoms vary will be allowed to vary by, respectively, gender (*GENDER*), parenthood status (*CHILDLESS*) and whether or not someone had at least one partner relationship prior to the one at the beginning of the observation period (*PRIOR DIV*). In these models, gender, parenthood status and divorce order are modelled as time-constant characteristics that vary between individuals, but not over time.

4. Results

Table 3 presents results from fixed effects linear regression models predicting changes in GHQ depressive symptoms. Model 1 shows that older adults' depressive symptoms increase one year before divorce or separation. Such an anticipation effect is not surprising, given that the process leading up to family dissolution may involve marital conflict and decreases in relationship quality before the decision to separate. GHQ scores increase by 0.36 points in the year before divorce and by 0.70 points around the time of the marital break-up. After marital break-up, the depressive symptoms of older adults rapidly return to approximately the baseline level. The coefficient related to the category "+1" year after separation is non-significant and close to zero (Coef. = 0.07). Although there are some fluctuations in GHQ score, this pattern suggests that older adults recover to pre-separation levels in the year after marital break-up (see Fig. 1). To capture the adjustment process, we consider the year of divorce as reference category (category "0"). Changing reference category allows us to test whether increases in depressive symptoms persist after union dissolution (as the chronic strain model would lead one to expect) or decrease significantly after the year of divorce (in line with the crisis model). The results show that older adults' symptoms of depression decrease by 0.63 (S.E. = 0.17; p-value < 0.01) one year after divorce, by 0.50 (SE = 0.20; p-value = 0.01) two years after divorce, and by 0.70 (SE = 0.24 p-value < 0.01). The results are consistent with the crisis model of divorce, but in contrast with the chronic strain model of divorce. In line with the crisis model of divorce, depressive symptoms increase before

Table 3
Fixed effects linear regression models predicting changes in GHQ depressive symptoms.

	Model 1		Model 2	
	Coef.	S.E.	Coef.	S.E.
Years before/after gray divorce (Ref. −2 or more)				
−1	0.36*	(0.17)	0.19	(0.23)
0	0.70**	(0.22)	0.89**	(0.29)
+1	0.07	(0.25)	−0.01	(0.29)
+2	0.20	(0.29)	0.18	(0.32)
+3 or more	−0.00	(0.35)	−0.04	(0.39)
Years before/after gray divorce (Ref. −2 or more) * Women (vs. Men)				
−1 * Women			0.30	(0.29)
0 * Women			−0.32	(0.34)
+1 * Women			0.14	(0.33)
+2 * Women			0.02	(0.34)
+3 or more * Women			0.05	(0.33)
Age	−0.02	(0.15)	−0.01	(0.15)
Age^2	0.00	(0.00)	−0.00	(0.00)
Individual-year observations	4650		4650	
R-squared	0.01		0.01	
N. of divorcees	909		909	

Note: Robust standard errors **p < 0.01, *p < 0.05, †p < 0.1.

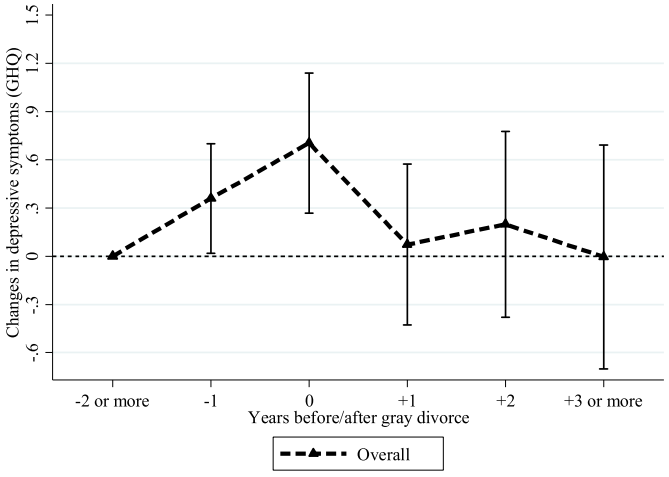

Fig. 1. Predicted change in depressive symptoms relative to baseline (Δ GHQ), based on Model 1 in Table 3.

and upon union dissolution and then converge to baseline levels in the year after separation. However, this rapid recovery after union dissolution is in contrast with the idea of 'convalescence' indicating slow and gradual improvements in mental health following later-life divorce (Lin et al., 2019).

In Model 2 we examine whether the depression trajectories around gray divorce vary by gender. The main effect indicates that men's depressive symptoms increase by 0.89 points in the year of union dissolution. Fig. 2 presents the estimated changes in depressive symptoms for men and women. Among both men and women, GHQ score increases around marital break-up and rapidly returns to previous baseline levels in the post-separation period. The interaction coefficients are not statistically significant. We thus did not find conclusive evidence of systematic gender differences in the effect of gray divorce on depressive symptoms.

4.1. Parenthood and higher-order divorces

In Models 3 and 4 we add interaction terms to test the moderating effects of parenthood status and previous experiences of union dissolution (Table 4). Model 3 and Fig. 3 show results on depression

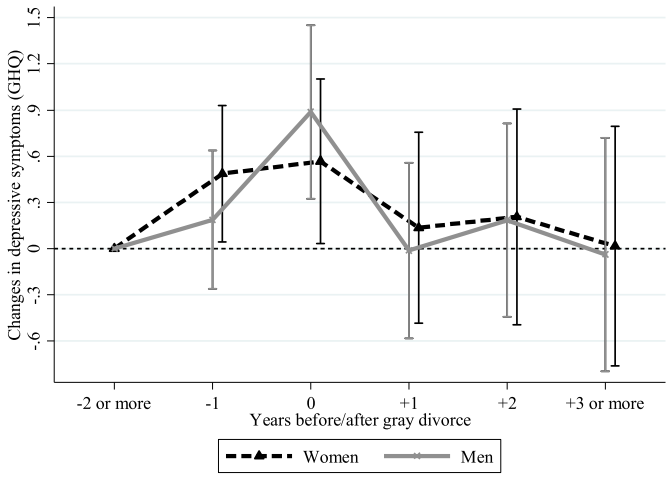

Fig. 2. Predicted change in depressive symptoms relative to baseline (Δ GHQ), based on Model 2 in Table 3.

Table 4
Fixed effects linear regression models predicting changes in GHQ depressive symptoms.

	Model 3		Model 4	
	Coef.	S.E.	Coef.	S.E.
Years before/after gray divorce (Ref. −2 or more)				
−1	0.43*	(0.20)	0.33†	(0.20)
0	0.67**	(0.24)	0.72**	(0.25)
+1	0.25	(0.28)	−0.03	(0.28)
+2	0.26	(0.32)	0.13	(0.32)
+3 or more	0.10	(0.38)	−0.03	(0.37)
Years before/after gray divorce (Ref. −2 or more) * Childless (vs. Parents)				
−1 * Childless	−0.30	(0.34)		
0 * Childless	0.22	(0.39)		
+1 * Childless	−0.87*	(0.37)		
+2 * Childless	−0.27	(0.41)		
+3 or more * Childless	−0.46	(0.37)		
Years before/after gray divorce (Ref. −2 or more) * Higher-order divorce (vs. First divorce)				
−1 * Higher-order divorce			0.08	(0.32)
0 * Higher-order divorce			−0.05	(0.36)
+1 * Higher-order divorce			0.39	(0.37)
+2 * Higher-order divorce			0.23	(0.37)
+3 or more * Higher-order divorce			0.09	(0.36)
Age	−0.04	(0.15)	−0.01	(0.15)
Age^2	0.00	(0.00)	−0.00	(0.00)
Individual-year observations	4650		4650	
R-squared	0.02		0.02	
N. of divorcees	909		909	

Note: Robust standard errors **p < 0.01, *p < 0.05, †p < 0.1.

trajectories around gray divorce for parents and the childless. We find no significant differences by parenthood status in the estimated pre-divorce depressive symptoms trajectories, while the effect of the category "1 year" after divorce differs significantly between parents and childless persons. As illustrated in Fig. 3, parents and childless persons adapt to gray divorce on different time scales: the depressive symptoms of childless persons decrease to and below the baseline level in the years after union dissolution, while adjustment to separation is slower for parents. After divorce, parents' depressive symptoms return to approximately the baseline levels roughly three years after the event. With respect to the year of divorce, parents' depressive symptoms decrease by 0.57 (p-value = 0.03) three years after marital dissolution. Conversely, the GHQ score of childless adults decreases rapidly below the baseline levels, suggesting that marital break-up might have some positive implications for this subgroup of the population. However, the

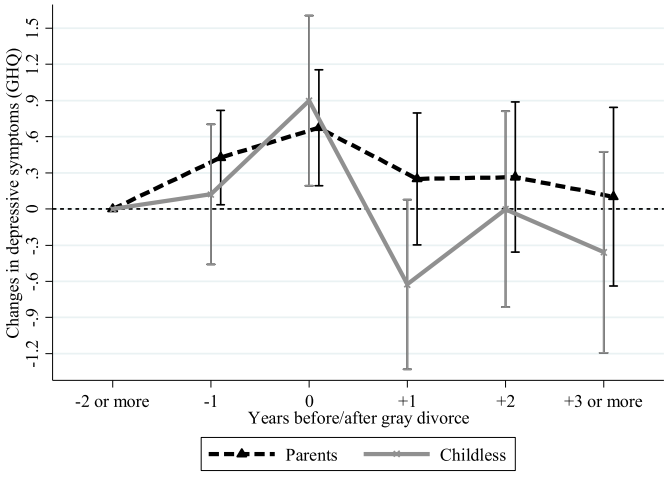

Fig. 3. Predicted change in depressive symptoms relative to baseline (Δ GHQ), based on Model 3 in Table 4.

GHQ score associated with the year after gray divorce is only marginally significantly lower than the baseline level for childless persons (Coef. = −0.62; S.E. = 0.35; p-value = 0.08). Two years after separation, childless adults' depression score is statistically indistinguishable from the baseline level, although the variability around the estimates is high. We find, therefore, evidence in support of the hypothesis that adjustment to gray divorce varies according to parenthood status.

In Models 4, we include interactions between gray divorce and divorce order. Interaction coefficients are positive with regard to the years after divorce. Although interactions are in the expected direction, there is no significant heterogeneity in post-divorce adaptation by divorce order. Fig. 4 shows that the depression patterns associated with first and second divorces are similar in the years before and during family dissolution, but appear to differ slightly in the post-divorce period. Adjustment for older adults who divorce or separate for the second time appears slower compared to the depression trajectories of first-time divorcees. However, the interaction terms are not significant, so our analyses do not provide conclusive evidence that recovery trajectories differ systematically between the two groups.

5. Discussion

Drawing on data from nine waves of the UK Household Longitudinal Study, we assessed whether union dissolution is associated with an increase in depressive symptoms among middle-aged and older adults. Most longitudinal studies analyzing the effect of divorce on mental wellbeing did not focus specifically on the older population (e.g. Mandemakers et al., 2010), while research specifically on later-life divorce is often cross-sectional (Bowen and Jensen, 2017; Brown and Lin, 2012; Gray et al., 2011; Glaser et al., 2008). We integrate these two streams of research, by examining the implications of gray divorce on mental health longitudinally, and apply the crisis model and the chronic strain model of divorce to this increasing sub-group of the population.

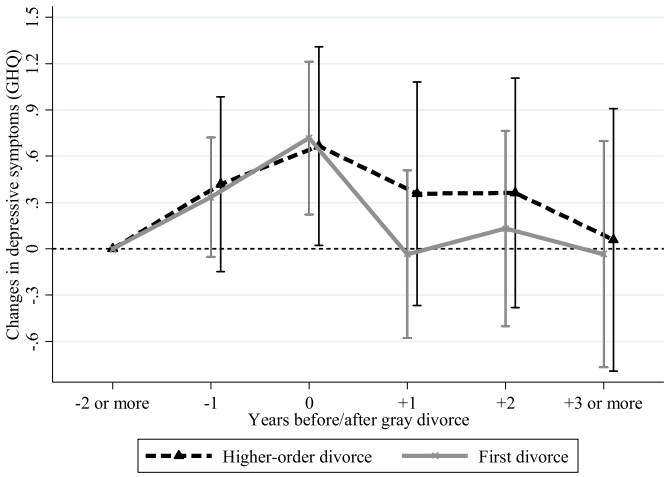

Fig. 4. Predicted change in depressive symptoms relative to baseline (Δ GHQ), based on Model 4 in Table 4.

A key finding of this study is that later-life union dissolution is associated with a temporary decline in mental health. This finding is consistent with the crisis model of divorce, but in contrast with the long-term impairment in mental health postulated in the chronic strain model of divorce. The findings show that, in line with previous research findings on divorce and wellbeing in the general population, depressive symptoms increase in anticipation of a divorce or separation in later life. Marital break-up is a broader process, which involves stress and intra-marital conflicts before the actual decision to separate (Bulanda et al., 2016). Consistent with the crisis model of divorce (Amato, 2000; Amato and Anthony, 2014), older adults' depressive symptoms increase before and upon marital break-up and return to approximately previous levels after the event. We showed that the depression trajectories of gray divorcees are similar to those described in previous research for younger age groups; thus the ability to adjust to marital break-up does not vanish during older ages.

Regarding the timing of adjustment, Lin et al. (2019) describe the effect of gray divorce on depression as a convalescence that takes about four years before full recovery. Their outcome measure is the Center for Epidemiologic Studies Depression Scale. Our results on GHQ scores show faster adjustment, with individuals recovering one year after gray divorce. These varying findings may depend on different methods and outcome measures. We find a slower adjustment after union dissolution in the analysis on SF-12 mental health (see Supplementary Materials). With respect to the year of divorce, SF-12 mental health recovers significantly three years after the event in the SF-12 models (Coef. = 1.40; S.E. = 0.69; p-value = 0.04). Despite the varying time scales, older adults do recover; a result that does not support either the chronic strain model or the claim that adjustment to divorce is increasingly challenging in older age (Wang &Amato, 2000).

With regard to moderators, we find no evidence to suggest that the impact of gray divorce on mental health varies by gender, but our results suggest that later-life divorce is more detrimental for parents than for the childless. Previous studies have examined the role of younger children for divorced parents' well-being. These studies showed that the effect of marital break-up on subjective and mental wellbeing is larger for parents than for the childless (Leopold and Kalmijn, 2016; Williams and Dunne-Bryant, 2006). There are also studies on the beneficial effects of partnership and parenthood on mental health (e.g. Grundy et al., 2019), but there remains lack of research on how parenthood status interact with divorce in later life. Our results on both GHQ and SF-12 scales (see Supplementary Materials) support the hypothesis that post-separation adjustment tends to vary by parenthood status, with parents recovering slower than their childless counterparts. This suggests that the moderating effect of having a child in later life on the mental health impact of divorce persists in later life when children are no longer dependent on parents.

Our study did not provide evidence on the moderating role of prior experiences of divorce. Our analysis on GHQ depression score did not show any significant differences between first divorces and higher-order divorces. However, adjustment to post-divorce circumstances varied significantly by the number of marriages and cohabiting unions in the SF-12 models (Supplementary Materials). This provides tentative evidence in support of the hypothesis that multiple union dissolutions are detrimental on older people's mental health (Hetherington and Kelly, 2002). Further research on larger samples is needed to examine

the effect of multiple experiences of partnership and union dissolution on later-life mental health more closely.

An important limitation should be acknowledged in interpreting these results. The relatively low number of divorces in our sample necessitated us to run models on the overall sample of men and women when examining the role of parenthood status and divorce order. This is unfortunate, because parenthood and divorce order might have different moderating effects for men and women. Moreover, the relatively small sample size led to somewhat imprecise coefficient estimates, particularly for interaction terms which were based on smaller subgroups. The inconclusive results with regard to whether or not previous experience of separation increases the negative impact of later-life marital disruption may thus be due to limited statistical power. Replication of the current study with other datasets in combination with meta-analysis may provide better insights in potential differences in the mental health impact of higher-order divorces versus first divorces.

Nevertheless, these limitations are largely offset by the advantages of using rich longitudinal data that enable us to look at changes in their mental health states before, upon and after gray divorce. Our results indicate that, in line with the crisis model, older people's depressive symptoms increase around marital break-up and approximately return to previous levels in the years after the event. Individuals are able to adjust to divorce, also when it occurs at a later stage of the life course. Such adjustment tends to be slower for parents with adult children than for childless older adults.

CRediT authorship contribution statement

Marco Tosi: Conceptualization, Methodology, Data curation, Formal analysis, Writing - original draft. **Thijs van den Broek:** Conceptualization, Methodology, Writing - review & editing.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2020.113030.

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