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Children's strains, parents' pains? How adult children's union dissolution influences older parents' health

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Abstract

Objective: This study aimed at investigating gender differences in the longitudinal associations between adult children's union dissolution and older parents' health.

Background: The family life course perspective and theories of social stress suggest that adult children's union dissolution may affect a parent's health. However, the extent to which parental health changes before and after a child's separation is still barely investigated.

Method: Data from four waves of the Dutch component of the Survey of Health, Ageing and Retirement in Europe (SHARE) were linked to panel register data from the System of Social-statistical Datasets (SSD). We applied a fixed-effects approach to 4,985 parent-child dyads nested in 2,511 parents to assess the influence of children's union dissolution on three different measures of parental health (depression, grip strength, and frailty).

Results: Results indicated that parents' health conditions worsen as one of their children gets separated. In addition, we found anticipation effects of children's union dissolution on parental health. Among parents, no clear gender differences emerged. The separation of a son exerts a stronger burden on parental health than that of a daughter.

Conclusion: This research contributes new findings, expanding the small existing body of literature to both physical and mental health outcomes. Furthermore, it highlights the importance of focusing on both the period before and after a child's separation. Gender-related differences help to understand the pathways to poor health at older ages.

Key words: Administrative data, demographic events, divorce, fixed-effects models, frailty, gender, health inequalities, intergenerational relationships, life course, linked lives, marriage, Netherlands, panel data, union dissolution



1. Introduction

The health and well-being consequences of union dissolution – the end of marriage or cohabitation through divorce or separation – have been the topic of much research. Divorce can lead to increased well-being for those who have experienced conflict and tension in a relationship (Amato, 2010), including improved physical and mental health in the short term (Leopold, 2018; Monden & Uunk, 2013; Raley & Sweeney, 2020; Williams & Umberson, 2004). Yet, the literature provides evidence that parental union dissolution negatively affects the well-being of the ex-partners involved in the separation (Leopold & Kalmijn, 2016; Monden & Uunk, 2013), parent-child relationships (Kalmijn, 2013, 2016; Kalmijn et al., 2019; Spitze et al., 1994), and also children's health outcomes (Goisis et al., 2019; Strohschein, 2005). There are also well-documented gender differences in the consequences of union dissolution (Kalmijn, 2007; Kalmijn & Monden, 2006; Leopold, 2018). Less straightforward and less investigated are the intergenerational health consequences of a marital breakup in the opposite direction: how does adult children's union dissolution affect the health status of an older parent? Longitudinal studies based on this research question have predominantly focused on parents' mental well-being and indicate that children's union dissolution may have either no (e.g., Milkie et al., 2008) or weak to moderate negative effects on parents' depressive feelings (Kalmijn & de Graaf, 2012; Tosi & Albertini, 2019).

The family life course perspective (Elder et al., 2003; Pearlin, 2010; Pearlin et al., 1981; Pearlin & Skaff, 1996) and the theories of social stress (e.g., Pearlin et al., 1981, 2005) place fundamental importance on gender as a factor that may moderate the negative impact of stressful events on health. In addition, prior research has found gender differences in intergenerational family ties, uncovering that mothers and daughters have the most intense intergenerational bonds of all parent-child relationships (Fingerman et al., 2020; Willson et al., 2003). In line with the idea that women's life course is closely tied to child-rearing and that they play a key role in bonding families together (Rossi & Rossi, 1990), we would expect that children's distressful life-course events have a greater impact on their mothers' than on their fathers' lives. Interestingly, while some studies have found no differences according to gender (Ko & Sung, 2022; Milkie et al., 2008; Tosi & Albertini, 2019), other studies found that mothers are more affected by their children's union dissolution than fathers (Kalmijn & de Graaf, 2012).

This study aims at investigating gender differences in the longitudinal association between adult children's union dissolution and older parents' health. In doing so, we trace the change in three different outcomes covering three health domains: mental health, physical health, and general health. To date, empirical evidence connecting offspring's distressing family events with parental outcomes is not based on longitudinal data – so the causal spectrum cannot be further investigated – and focused mainly on the mental component of health (e.g., Fingerman et al., 2012; Greenfield & Marks, 2006; Kalmijn, 2016; Pillemer et al., 2017). These studies yield notable insights, but they often remain descriptive because of their cross-sectional character. More recently, a smaller but growing literature has developed on longitudinal methods to disentangle the effects of children's union dissolution from other sources of confounding (Kalmijn & de Graaf, 2012; Ko & Sung, 2022; Milkie et al., 2008; Tosi & Albertini, 2019). To further substantiate these findings, this study looked at more fine-grained and in-depth information on both the marital and cohabiting history of all adult children, and their consequences on different dimensions of parental health.

Extant research on this topic faces three main challenges. First, recent longitudinal studies are based on survey data providing limited information on the precise timing of children's separation. Having additional detailed dyadic information – especially referring to a period before union dissolution – on both married and cohabiting adult children of a parent might significantly advance this line of research (Carr & Springer, 2010; Umberson & Thomeer, 2020). This would make it possible to use a dynamic fixed-effects approach to more robustly and flexibly assess the time path of the treatment effect of interest (i.e., children's union dissolution) on parental health.

Second, there has been less attention given to children's separation as a process. In particular, generally overlooked within the current literature is the concept of “anticipatory stressors” – i.e., “negative events and strains” that do not (yet) exist as a reality but are considered as having the potential to become so (Pearlin & Bierman, 2013, p. 328) – towards the end of the marital relationship (Pearlin & Bierman, 2013). Although the idea of anticipatory health effects of children's union dissolution on parental health is implied within the current literature (Amato, 2000), research that explicitly focuses on fully developing anticipatory health effects is lacking. A stronger focus on anticipatory dyadic-level stressors may bring with it the potential to

gain important insights into the mechanisms linking children's dissolutions of de facto partnerships with parental health, the focus of our study.

Third, previous longitudinal studies have not focused on dimensions of health other than the mental one. In this domain, research has established strong evidence that children's union dissolution affects parents' depressive feelings (e.g., Kalmijn & de Graaf, 2012; Ko & Sung, 2022; Tosi & Albertini, 2019). Yet, disruptive family events could have an impact on both mental and physical health in later life (Thomeer & Ostergren Clark, 2021; Umberson & Thomeer, 2020). The extant evidence shows that exposure to adversities in the family domain can lead to increased levels of stress and allostatic load (Danese & McEwen, 2012; Lin et al., 2022; Nusslock & Miller, 2016), inflammation and dysfunction in the immune system (Danese & McEwen, 2012; Fagundes et al., 2013), which can, in turn, detrimentally affect muscular strength and physical functioning later in life (Dalle et al., 2022; Kamper et al., 2021; Schaap et al., 2006). Omitting the physical dimension of health may result in an incomplete picture of the impact of children's union dissolution on different dimensions of parental health. In this study, we argue that the consequences of children's separation on parents' health – and the gender differences therein – may extend into various dimensions of health (i.e., mental, physical, and general health).

Given the shortcomings mentioned, this study aimed at extending the literature by investigating gender differences in how children's union dissolution is associated with parents' health in later life. To do so, we used a combination of dyadic panel data from administrative (System of Social-statistical Datasets [SSD]) and survey sources (Survey of Health, Ageing and Retirement in Europe [SHARE]), containing complete life course information on survey respondents and their children. This allowed us to include parents' information on health linked to all children in the family. Contrary to previous research on this topic, this study employed various measures of physical and mental health to come to a wider agreement about the impact of children's union dissolution on parental health. In addition, we assessed the heterogeneity of these effects across parents' and children's gender.

2. Theory and Hypotheses

2.1 *Children's union dissolution and associations with parental health*

The family life course perspective (Elder et al., 2003; Pearlin, 2010; Pearlin et al., 1981; Pearlin & Skaff, 1996) and the theories of social stress (e.g., Pearlin et al., 1981, 2005) provide a framework for examining how adult children's union dissolution may affect a parent's health status. According to the life course heuristic principle of "linked lives" (Carr, 2018), individuals' lives are embedded in social relationships with nearest others and influenced by them, especially across generations by bonds of kinship (Elder, 1994, 1995; Elder et al., 2003; Moen & Hernandez, 2009, 2009; Settersten, 2005; Sutor et al., 2011). This suggests that when a person in the family system undergoes change, so must all the familial role partners of that person.

Theories of social stress (Pearlin, 1989, 2010; Pearlin et al., 1981; Pearlin & Skaff, 1996) – which conceptualize stress as the result of excessive life demands combined with insufficient resources capable of addressing such demands – are often used to predict the causes of critical health problems. The emphasis on the concept of "linked lives" has been theoretically integrated with the theories of social stress, such as Pearlin's stress process model (Pearlin, 2010; Pearlin et al., 1981; Pearlin & Skaff, 1996). Within this framework, when an adult child experiences a stressful life course event (e.g., a union dissolution), the effects of that change may radiate through all familial role partners interlinked to the person.

Recent empirical evidence suggests that adverse family events can have an impact on both physical and mental health later in life (Thomeer & Ostergren Clark, 2021; Umberson & Thomeer, 2020). Collectively, these studies suggest that individuals with exposure to early-life adversities in the family domain have chronic stress and elevated allostatic load (e.g., Danese & McEwen, 2012; Lin et al., 2022; Nusslock & Miller, 2016). In turn, this is associated with increased levels of inflammation and dysfunction in the immune system (Danese & McEwen, 2012; Fagundes et al., 2013) which subsequently cause damage to skeletal muscle and lower physical functioning (Dalle et al., 2022; Kamper et al., 2021; Schaap et al., 2006). Empirical evidence regarding intergenerational ties suggests that stressful life course events in one generation are associated with stress outcomes across generations of families, including young adults (Fingerman et al., 2012; Kalmijn & de Graaf, 2012) and midlife offspring (Bangerter et al., 2016; Gilligan et

al., 2013; Pillemer et al., 2017; Suito et al., 2016). According to the stress-process theory, these stressors may in turn result in negative physical and mental health outcomes for the older generation (Pearlin, 2010; Pearlin et al., 1981; Pearlin & Skaff, 1996). Therefore, the consequences of a child's separation are expected to reverberate into a decline in both the mental and physical health of the older generation (i.e., their parents).

There are different social mechanisms through which a child's union dissolution may directly affect a parent's health status (for a review, see Kalmijn & de Graaf, 2012; Tosi & Albertini, 2019). First, parents might have some expectations about the ideal marital life course of their children. When these expectations are not met, they can suffer from stress and this might in turn impact negatively their health conditions (*normative mechanism*) (Kalmijn & de Graaf, 2012; Pillemer et al., 2012). Second, parents are empathic toward their children and thus they can easily take their perspective and be concerned about their problems. This means that parents might experience a deterioration in their health when children are undergoing a union dissolution and facing problems in their well-being as well (*altruistic mechanism*) (Knoester, 2003). Third, parents may feel responsible for their children's life course choices because they have socialized their children during childhood and adolescence. This means that a child's union dissolution can be seen by the parent as a failure of their parental role and this, in turn, may affect their health conditions (*responsibility mechanism*) (Hagestad, 1986). Fourth, health can "spread" across relationships or "spillover" from one family member to another (Umberson & Thomeer, 2020). This suggests that the stress associated with marital separation can be transmitted within social networks and from children to parents via their social interactions (*social contagion mechanism*) (Umberson & Thomeer, 2020; Wethington, 2013; Wolf et al., 2015).

Guided by the above theoretical arguments and empirical literature, we evaluate the hypothesis that a child's union dissolution is associated with an increase in parents' poor health conditions (*Hypothesis 1*).

2.2 Union dissolution as a process. Anticipation and temporary effects

A life-course perspective on the links between children's union dissolution and parents' health requires attention to time and time-related phenomena, such as anticipation effects (Bernardi et al., 2019, 2020). The dynamics of marital breakup must be understood from both subjective and interpersonal perspectives: that is, how parents anticipate or project their children's lives looking forward, and how they review, interpret, and evaluate their lives in the present and looking backwards. Therefore, parents' opportunities and constraints might be affected by their children's past biographical experiences (which may be called the "shadows of the past"), their current circumstances, and the anticipation of their future (the "shadows of the future") (Bernardi, Huinink, & Settersten, 2018).

In their work on the stress process, Pearlin and Bierman (2013) suggest that anticipatory stressors are likely experienced with greater frequency than currently recognized and thus deserve more attention than they currently receive. Pearlin and Bierman (2013, p. 328) defined anticipatory stressors as "negative events and strains" that "do not exist as realities but are viewed as having the potential to become so". Relatedly, the notion of anticipatory stressors is implicit within the crisis model, as one component of the stress experience (e.g., Amato, 2000).

According to the crisis model of divorce (Amato, 2000), union dissolution is a dynamic process that involves a series of practical changes, each of which involves stress and strains for those who experience it. These stressors include conflict, moving, adjusting to living alone, making new financial arrangements, finding a new partner, and so forth. These stressors might have consequences that also extend to those very close to the divorcees (Fingerman et al., 2012).

The crisis model of divorce has two central features. First, an important principle of the model is that the consequences of union dissolution begin *before* the separation itself (Amato, 2000). Therefore, an anticipation effect of children's separation on parental health also applies: since union dissolution is a process and not an event, the health conditions of parents whose children are going through a separation should start to deteriorate throughout this process. Second, another postulate of the crisis model is that the effects of divorce are temporary. After practical arrangements have been made after the union dissolution and children are adapted to their new routines, they should start to feel better and consequently also their parents. Similarly, the emotional consequences of losing a partner are supposed to be transient (Stroebe et al., 2007).

The above considerations result in the following hypotheses regarding children's union dissolution and their associations with parental health. First, we expect that the negative effects of children's union dissolution on parental health start to manifest in the period preceding the separation itself (*Hypothesis 2a*). Second, we expect that parental health gradually reverts to pre-separation levels in the years after the union dissolution (*Hypothesis 2b*).

2.3 *The role of gender in the associations between children's union dissolution and parental health*

Both the life course perspective and the theories of social stress place fundamental importance on social statuses – such as gender – as conditioning the relationship between stressors emerging from adverse life course events and health outcomes (Bengtson & Allen, 1994; Elder, 1998; Pearlin, 1989, 2010; Pearlin et al., 1981; Pearlin & Skaff, 1996; Umberson et al., 2010). In this regard, research has shown the existence of gender differences in psycho-physiological stress responses (Schmaus et al., 2008), coping styles (Matud, 2004), and stress-induced negative health outcomes, including cardiovascular disease and depression (Liu & Waite, 2014; O'Neil et al., 2018; Piccinelli & Wilkinson, 2000). Similarly, union dissolution and its consequences for the ex-partners are recognized to be a gendered phenomenon (Kalmijn, 2007; Kalmijn & Monden, 2006; Leopold, 2018). Since women's bonds as mothers, daughters, sisters, and grandmothers tie families (Rossi & Rossi, 1990), we should expect children's (and especially daughters') life-course events to have a larger impact on the lives of mothers than on fathers.

Several theoretical considerations suggest somewhat stronger effects of children's union dissolution on a mother's health. First, although some recent literature suggests that the proportion of men assuming important roles within the family sphere (e.g., childcare) is increasing (Nomaguchi & Milkie, 2020; Patterson & Margolis, 2019; Sharma et al., 2016), the bonds between mothers and children are expected to be stronger than the bonds between fathers and children (Rossi & Rossi, 1990). Mothers traditionally invest more resources in family relationships, are more engaged in their children's lives (Rossi & Rossi, 1990), and most often take on a leading role in kinkeeping (Kalmijn, 2007; Rosenthal, 1985). Recent empirical evidence is consistent with the idea that women “tie families” (Rosenthal, 1985; Rossi & Rossi, 1990), suggesting that mothers and daughters have the most intense intergenerational bond of all parent-child relationships (Fingerman et al., 2020; Willson et al., 2003). Following their child's birth, parents (women especially) become more traditional in their gender-related attitudes and behaviours (Ferriman et al., 2009; Katz-Wise et al., 2010) and this might strengthen the mother's involvement in the upbringing of their children. Traditional gender beliefs and role expectations of other individuals towards mothers often reflect these assumptions in everyday social interactions (Ridgeway & Correll, 2004). This suggests that the above-mentioned normative mechanism (Kalmijn & de Graaf, 2012; Pillemer et al., 2012) might be more dominant for mothers than for fathers, as they may regard their child's union dissolution more as a personal failure than fathers, resulting in more stress deriving from their feelings of shame and guilt.

Second, physical household labour remains the focus of most research on gender differences in family responsibilities, but researchers have also drawn attention to “hidden” or “invisible” forms of labour, such as kinkeeping (Kalmijn, 2007; Rosenthal, 1985) and cognitive and emotional labour (Damingler, 2019; Daniels, 1987; Devault, 1999). Using a convenience sample of 35 couples with young children, Damingler (2019) found that cognitive labour – i.e., mental activities such as anticipating the needs of family members, identifying options for meeting those needs, deciding among the options, and monitoring the results – was disproportionately shouldered by mothers. Similarly, psychosocial literature suggests that women are far more likely than men to feel what another feels (i.e., they are more emphatic) (O'Brien et al., 2013; Rueckert & Naybar, 2008; Singer et al., 2006). These considerations suggest that if the above-mentioned “altruistic” mechanism is at work (Kalmijn & de Graaf, 2012; Knoester, 2003; Tosi & Albertini, 2019), this might be more dominant for mothers than for fathers, with more detrimental health consequences of children's union dissolution for mothers.

However, some recent literature suggests that fathers might experience a similar decline in health and well-being as mothers when their children get divorced. Nomaguchi and Milkie (2020) indicate that gender differences in how parenting is experienced are narrowing. For example, men report that experiencing fatherhood makes them reorient their worldviews, values and priorities, relationships, and perceptions of work and family responsibilities (Daly et al., 2013). Fathers more than mothers report that time with their children is too scarce, and when they are unable to spend more time with them, this, in turn, relates to

fathers' low levels of physical and mental well-being (Milkie et al., 2019). Accordingly, the detrimental effect of children's union dissolution on parental health might be not a purely maternal phenomenon, but could also affect fathers to an equal extent. Thus, in contrast to our previous theoretical considerations, children's union dissolution could have a similar negative impact on fathers' as on mothers' health. However, it must be recognised that these recent trends in how fatherhood is experienced mainly concern the new generations of fathers (Fingerman et al., 2020; Schoppe-Sullivan & Fagan, 2020). Therefore, since this is a relatively new phenomenon, we shouldn't expect that the young generations of fathers have already experienced their children's union dissolution.

Given these considerations, we assume that the consequences of a child's separation should be divided along children's gender lines as well. Particularly, parents may perceive sons' and daughters' marital issues differently, given the gender-specific role expectations. For example, daughters are generally seen as kin-keepers because they are more socialized to be family-oriented (Kalmijn, 2007; Rosenthal, 1985; Rossi & Rossi, 1990). In addition, while men are more vulnerable to short-term consequences of marital breakup for subjective measures of well-being (Leopold, 2018), women experience deeper drops in social and economic resources (e.g., money, time, etc.) after the separation (Leopold, 2018; Leopold & Kalmijn, 2016). Thus, daughters might encounter more struggles and have fewer resources to provide help or social support to their parents after their union dissolution, or they might also need more help to tackle their issues and strains arising from it. If this is the case, it suggests that daughters' union dissolution would be more detrimental to parents' health than sons' union dissolution. Therefore, if the expectations of the "altruistic" (Kalmijn & de Graaf, 2012; Knoester, 2003) and "social contagion" mechanisms (Umberson & Thomeer, 2020; Wethington, 2013; Wolf et al., 2015) are well-founded, we should expect that a daughter's union dissolution has a stronger detrimental impact on parental health.

Longitudinal studies have provided empirical evidence for a stronger effect of children's union dissolution on mothers' mental well-being (Kalmijn & de Graaf, 2012), though other studies did not find such a gender differential effect (Ko & Sung, 2022; Milkie et al., 2008; Tosi & Albertini, 2019). Research findings are mixed also regarding children's gender. One study found no interaction between union dissolution and children's gender, even after distinguishing all the possible parent-child gender compositions (Tosi & Albertini, 2019). However, a recent study using data from China shows that a son's distressing marital circumstances (including union dissolution) exert a burden on parental psychological distress, whereas that of a daughter shows no such adverse consequence (Chen & Tong, 2021).

Considering the above theoretical arguments and empirical findings, we propose the following hypotheses. First, an adult child's union dissolution has a stronger detrimental impact on the health of mothers than on fathers (*Hypothesis 3a*). Second, a daughter's union dissolution rather than a son's union dissolution has a stronger detrimental impact on parental health (*Hypothesis 3b*).

3. Method

3.1 Data and sample

In this study, we addressed the lack of precise data on adult children's union dissolution by linking parents with all their adult children's marital and cohabiting histories. To do so, we used dyadic panel data from both survey and administrative sources. First, this study used data from the Dutch component of the Survey of Health, Ageing and Retirement in Europe (SHARE). SHARE is a multidisciplinary longitudinal survey representative of the non-institutionalized population aged 50 and over (Börsch-Supan et al., 2013). One of the key advantages of SHARE is that it includes a variety of individual measures of both subjective and objective health. At baseline, SHARE enrolled a random sample of Dutch residents born in 1954 or earlier and their current partners living in the same household. Baseline interviews were conducted in 2004 ($n=2,968$). Follow-up interviews were carried out in 2006–2007, 2011, and 2013.

Second, Dutch SHARE respondents were linked to register data from the System of Social-statistical Datasets (SSD) (Bakker et al., 2014). Unlike previous studies, this made it possible to link each SHARE participant to all their adult children. The SSD is a combination of various administrative micro datasets, among which are the population, housing, and tax registers. The SSD covers the entire population of the Netherlands and contains detailed and complete individual-level data on family histories (e.g., the occurrence and timing of cohabitations and separations, leaving and returning to the parental home, etc.),

education, work histories, and healthcare use. Consent to link survey data with administrative records was asked in SHARE wave 5 (2013).

This study performs the analysis on parent-child dyads. The initial raw sample included 23,223 observations from 11,163 dyads (6,493 parents). In this study, we use only records of individuals who met the original SHARE sample criteria, i.e., 50 years of age or older (350 observations excluded), and who had at least one child (1,241 observations excluded). From this set of dyads, both biological (94.85 per cent at baseline) and adopted children (5.15 per cent at baseline) were selected. We further restricted the sample to parents who provided consent for linking their survey data with administrative records (3,957 observations excluded).¹ Moreover, we excluded respondents whose children were not at risk of union dissolution (i.e., they were not cohabiting at baseline) (3,954 observations deleted).

Data missingness among variables of interest was addressed using Multivariate Imputation by Chained Equations (MICE), and 30 data sets were imputed (Allison, 2001; Sidi & Harel, 2018; van Buuren, 2007). The imputation model included all variables from the analyses (i.e., independent variables, outcome variables, and covariates) and accounted for the longitudinal (panel) structure of the data (Allison, 2001, pp. 73–76). A sensitivity analysis was conducted using list-wise deletion, which produced substantively identical results as the main analyses.

Only individuals who participated in at least two waves of SHARE data collection were included in the analyses (2,070 observations excluded). After this selection, the final analytic sample included 1,120 fathers (2,184 father-child dyads) and 1,391 mothers (2,801 mother-child dyads), for a total of 10,872 observations. [Supplementary Table A1](#) gives an overview of the data missingness and describes the steps taken to refine the sample. Table 1 provides descriptive information on the study sample.

3.2 Measures

3.2.1 Dependent variables

Three dimensions of health, recorded in the SHARE survey, will served as dependent variables in the study: a measure of *mental health* (EURO-D score), a measure of *physical health* (maximum grip strength), and a measure of *general health* (based on a 40-items Frailty Index [Romero-Ortuno & Kenny, 2012]). In addition to mental well-being, these two other health outcomes offer a useful model for assessing children's union dissolution links with disease processes in specific dimensions of parental health: grip strength as a proxy measure for overall muscle strength and physical health (Andersen-Ranberg et al., 2009; Hank et al., 2009; Jürges, 2007; Rijk et al., 2016) and the Frailty Index as a proxy of general health (Romero-Ortuno & Kenny, 2012).

The first dependent variable, depressive feelings, was measured through the EURO-D depression scale that is based on 12 items – i.e., depression, pessimism, suicidality, guilt, sleep, interest, irritability, appetite, fatigue, concentration, enjoyment, and tearfulness – and ranges from 0 to 12. The scale's internal consistency reliability has been tested and confirmed in previous research (e.g., Ploubidis & Grundy, 2009; Prince et al., 1999). In the present study, the reliability coefficient (Cronbach's alpha) was 0.69, which is commonly considered appropriate to sum the items into a scale.

The second dependent variable was grip strength (GS), which has become a widely accepted objective measure of general physical health with an independent explanatory power (Hank et al., 2009; Rijk et al., 2016) and is a strong predictor of physical vulnerability and mortality at older ages (Andersen-Ranberg et al., 2009; Hank et al., 2009; Jürges, 2007; Rijk et al., 2016). This variable is an indicator of measured general functional performance and is particularly suitable for gender and international comparisons (Andersen-Ranberg et al., 2009; Wu et al., 2017). GS in kilograms was measured using a hand-held dynamometer twice, using both hands (four measurements in total for each respondent, two for each hand). We consider the maximum of the four observations as the relevant value for each respondent (Andersen-Ranberg et al., 2009). A higher score reflects higher GS and hence better health (variable range: 1-80).

Third, as previously validated (Romero-Ortuno & Kenny, 2012), we used a 40-item Frailty Index (FI) as an outcome variable. This measure is a count of physical and mental health problems reflecting the accumulation of potential deficits affecting a given person (Rockwood & Mitnitski, 2007). The FI indicates the likelihood that frailty is present and it has been consistently found to be a strong predictor of adverse

1 Of the 4,168 respondents participating in the fifth wave of SHARE, 3,799 (91.15 per cent) gave permission to link their survey responses to administrative data from the SSD.

health outcomes, including subsequent mortality (Fried et al., 2001; Romero-Ortuno & Kenny, 2012; Ryan et al., 2022). One of the characteristics of the FI is that the deficits should occur across a variety of organ systems and physiological functions (Kojima et al., 2019; Ryan et al., 2022; Searle et al., 2008). Therefore, unlike single-item health measures, the FI can provide a more general and complete picture of older adults' overall health.

The construct validity of the FI adopted in this study has been validated on the SHARE dataset through its relationship to chronological age (Romero-Ortuno & Kenny, 2012). Its criterion validity has been examined in its ability to predict mortality (Romero-Ortuno & Kenny, 2012). Therefore, we constructed the FI following the same procedure adopted by Romero-Ortuno and Kenny (2012), including objective health markers (e.g., grip strength), functional impairments in personal and instrumental activities of daily living, self-reported health and comorbidities, mood (sadness or depression, lack of enjoyment, etc.), limitations in cognition (impaired orientation to date: day, month, year, and day of the week, etc.), and other measures. For the complete list of variables, see [Supplementary Table A2](#). Each individual's deficit points were then summed and divided by the total number of deficits evaluated (in this case 40) to obtain a FI with a theoretical range from 0 (no deficits present) to 1 (all deficits present). For example, a respondent with five deficits would have a FI value of .125 (5/40). Higher values indicate a greater number of health problems and hence greater frailty. In our study, internal consistency reliability for the 40 items was strong, with Cronbach's alpha coefficient of 0.85.

3.2.2 Independent variable

The main independent variable in the study was children's union dissolution. Unlike in the United States, cohabitation instead of marriage is much more popular and accepted in the European context (Kiernan, 2002), especially in the Netherlands (Liefbroer & Fokkema, 2008). For these reasons, we define "union dissolution" as the end of marriage or cohabitation through divorce or separation. We measured this variable using separate dummies for the years before and after separation (cf. Allison, 1994; Brüderl & Ludwig, 2014). This modelling strategy allowed us to exclude the influence of time-constant factors and, contrary to previous studies, to identify the temporal path of the causal effect more flexibly.

Table 1: Description of the SHARE variables used in the analysis.

	Whole sample (N=10,872)			Fathers (N=4,700)			Mothers (N=6,172)		
	Freq.	% (mean)	SD	Freq.	% (mean)	SD	Freq.	% (mean)	SD
Parent's characteristics									
<i>Depression</i>	10,872	(1.76)	1.83	4,700	(1.36)	1.60	6,172	(2.06)	1.92
<i>Grip Strength</i>	10,872	(34.67)	11.11	4,700	(43.99)	9.00	6,172	(27.58)	6.27
<i>Frailty Index</i>	10,872	(0.10)	0.08	4,700	(0.09)	0.07	6,172	(0.11)	0.09
<i>Age</i>	10,872	(67.74)	8.64	4,700	(68.71)	8.40	6,172	(67.00)	8.75
<i>Gender</i>									
Fathers	4,700	43.23							
Mothers	6,172	56.77							
<i>Marital status</i>									
Married	9,017	82.94		4,239	90.19		4,778	77.41	
Never married	15	0.14		12	0.26		3	0.05	
Divorced	527	4.85		162	3.45		365	5.91	
Widowed	1,313	12.08		287	6.11		1,026	16.62	
<i>Number of children</i>									
1	471	4.33		226	4.81		245	3.97	
2	4,160	38.26		1,853	39.43		2,307	37.38	
3+	6,241	57.40		2,621	55.77		3,620	58.65	
<i>Level of education</i>									
Low	5,741	52.81		1,955	41.60		3,786	61.34	
Middle	2,643	24.31		1,278	27.19		1,365	22.12	
High	2,488	22.88		1,467	31.21		1,021	16.54	

Table 1: Description of the SHARE variables used in the analysis (continued).

	Whole sample (N=10,872)			Fathers (N=4,700)			Mothers (N=6,172)		
	Freq.	% (mean)	SD	Freq.	% (mean)	SD	Freq.	% (mean)	SD
<i>Income quartiles</i>									
1st	2,774	25.52		965	20.53		1,809	29.31	
2nd	2,924	26.89		1,302	27.70		1,622	26.28	
3rd	2,788	25.64		1,302	27.70		1,486	24.08	
4th	2,386	21.95		1,131	24.06		1,255	20.33	
Children's characteristics									
<i>Time before/after child's union dissolution</i>									
-4/-2 years	275	2.53		114	2.43		161	2.61	
-2/0 years	285	2.62		127	2.70		158	2.56	
0 (Ref.)	9,319	85.72		4,033	85.81		5,286	85.64	
0/2 years	346	3.18		146	3.11		200	3.24	
2/4 years	298	2.74		126	2.68		172	2.79	
4/6 years	349	3.21		154	3.28		195	3.16	
<i>Child's gender</i>									
Sons	5,302	48.77		2,266	48.21		3,036	49.19	
Daughters	5,570	51.23		2,434	51.79		3,136	50.81	
<i>Legally divorced</i>									
No	9,632	88.59		4,150	88.30		5,482	88.82	
Yes	1,240	11.41		550	11.70		690	11.18	
<i>Geographic distance between child and parent</i>									
0-2 km	3,137	28.85		1,328	28.26		1,809	29.31	
2-5 km	1,807	16.62		795	16.91		1,012	16.40	
5-10 km	1,274	11.72		562	11.96		712	11.54	
10-60 Km	2,481	22.82		1,058	22.51		1,423	23.06	
60 Km+	1,961	18.04		862	18.34		1,099	17.81	
Co-Residence	212	1.95		95	2.02		117	1.90	
<i>Time since cohabitation started</i>									
0-2 years	650	5.98		308	6.55		342	5.54	
2-4 years	792	7.28		343	7.30		449	7.27	
4-6 years	859	7.90		388	8.26		471	7.63	
6-8 years	997	9.17		438	9.32		559	9.06	
8+ years	7,574	69.67		3,223	68.57		4,351	70.50	
Individuals	2,511	100.00		1,120	100.00		1,391	100.00	
Parent-child dyads	4,985	100.00		2,184	100.00		2,801	100.00	
Observations	10,872	100.00		4,700	100.00		6,172	100.00	

Note: Unless otherwise indicated, values are reported in percentages. Multiple imputed dataset (N=10,872)

Source: SHARE data, years 2004–2013, System of Social-statistical Datasets (SSD)

3.2.3 Control variables

Other covariates used in the analysis refer to socio-demographic characteristics of parents and children. Considering parents' characteristics, models control for gender (0=fathers, 1=mothers), age (centred), marital status ("married and living with spouse", "never married", "divorced", and "widowed"), number of children (1, 2, 3+), level of education (*low*=ISCED 0, 1, and 2; *middle*=ISCED 3 and 4; and *high*=ISCED 5 and 6), and wave-specific income quartiles.

Regarding children's characteristics, regression models control for gender (0=sons, 1=daughters) and geographical distance between parent and child ("2-5 km", "5-10 km", "10-60 Km", "60 Km+", "Co-Residence") (Tosi, 2020). In addition, models control for a variable which identifies whether the child had experienced the legal cessation of a marital commitment at the time of the interview (0=no, 1=yes). The marital commitment includes both marriage and registered partnership.

The definition of time was chosen according to our analytical purposes. We aimed to measure health changes among parents with children at risk of experiencing a partnership dissolution. The onset of marital breakup (i.e., union dissolution) risk differs across children as they start living together with their partners at different ages. To measure time consistently across individuals, we defined time as years since cohabitation (“0-2 years”, “2-4 years”, “4-6 years”, “6-8 years”, and “8+ years”).

3.3 Analytic strategy

This study used a multilevel approach to investigate the associations between children’s union dissolution and within-parent changes in mental, physical, and general health. The main advantage of this strategy is that the causal spectrum of the link between children’s union dissolution and parents’ health can be investigated, by excluding the confounding effect of individual time-constant heterogeneity (Allison, 2009; Halaby, 2004; Wooldridge, 2020).

The analytical strategy implemented consists of time-distributed fixed-effects models, also known as event studies or dummy impact functions (Allison, 1994; Brüderl, 2019). Unlike classical fixed-effects methods, this dynamic strategy enables us to assess the effect of children’s separation on parental health for each year around the event, and therefore to capture (1) potential *anticipation effects* occurring before the actual date of the children’s union dissolution and (2) potential *adaptation effects* occurring after the marital breakup. Specifically, we estimate the following regression model:

$$Y_{it} = \alpha_i + \sum_{p=-s}^s \beta_p D_{it}^p + \beta_2 X'_{it} + \varepsilon_{it}$$

In this model, Y_{it} is the health outcome of individual i at time t . α_i represents unobserved individual time-constant factors, i.e., the individual fixed-effects. D_{it}^p denotes a set of dummy variables where p is the time prior/after the transition to a child’s union dissolution. The maximum horizon forward and backwards from the time of union dissolution is s and $-s$, respectively. X'_{it} is a set of covariates (time since cohabitation, age, marital status, income quartiles, etc.). The idiosyncratic error term ε_{it} varies across individuals and over time.

Since we controlled for individual fixed-effects in our analysis, we included parents with children that do not separate during the observation window, as well as parents whose children have already separated more than 6 years before the survey as a control group. We assigned a fixed value for the impact dummy for this group of parents that do not experience change over time. More precisely, we used the following categorical version of time before/after a child’s union dissolution: 4-2 years pre-separation, 2 years pre-separation, first 2 years since the separation, 2-4 years since the separation, and 4-6 years since separation. If a child’s union dissolution only has a temporary effect, the magnitude of the estimates would decrease over time.

Since the unit of analysis was the parent-child dyad, parents with multiple children were present in multiple observations in the sample. We employed clustered standard errors to adjust the estimates for the correlation between dyads within the same parent. Moreover, the clustering of multiple observations within SHARE respondents enabled us to focus exclusively on changes within individuals (i.e., parents) over time. This approach relates temporal variation in the dependent variables only to temporal variation in the independent variables. The strength of this strategy is that it allows controlling for observed and unobserved time-invariant individual characteristics.

We estimated all models separately for fathers and mothers, as well as for sons and daughters to keep the models parsimonious and to retain information about gender differences in the level of the outcomes estimated for the reference period. To test whether separation-related changes in the health outcomes differed significantly between men and women, we estimated a series of fully interacted models. The interactions between union dissolution and parents’ and children’s gender estimated from fully interacted models and their relative F-tests are shown in Tables A3-A5.

Because the health outcomes were measured on different scales, we standardized the scores of depression, GS, and FI separately by gender to allow for a direct comparison between the indicators. All data were analysed using Stata 16.

4. Results

Table 1 provides summary statistics for our sample. We observed 667 (14.19 per cent) transitions to union dissolution in father-child dyads and 886 (14.36 per cent) transitions in mother-child dyads. Table 2 shows the results from the time distributed fixed-effects regression models, accounting for the correlation between regressors and individual time-constant unobserved heterogeneity. The results indicate an association between adult children's transition to union dissolution and parents' depressive symptoms (Euro-D) and Frailty Index (FI). More specifically, in the two years preceding an adult child's separation, depressive feelings of parents increased by approximately one-fifth of a standard deviation (or 2.14 points in the Euro-D scale ranging from 0 to 12) (Table 2; $b = 0.21$; 95% CIs: 0.08, 0.34; $p < 0.01$) and the FI by nearly one-fifth of a standard deviation (or .012 points in the FI score ranging from 0 to 1) (Table 2; $b = 0.22$; 95% CIs: 0.12, 0.33; $p < 0.001$). In addition, in the case of depression, the coefficient regarding the category “-4/-2 years” was positive and statistically significant (Table 2; $b = 0.14$; 95% CIs: 0.01, 0.27; $p < 0.10$). This change might give a first indication of how the process evolves: at the beginning, there is fairly noticeable stress that impacts the parent's health, and towards the child's marital decision the stress decreases. These processes might take years. We did not observe any statistically significant association between children's separation and parents' grip strength (GS), as the level of statistical significance remained at 10%.

While, on the one hand, it is worth noting that the effect sizes were relatively small, on the other hand, the size of the coefficients suggests that parent's health outcomes worsened before child's separation to an extent similar to the effect of widowhood (Table 2, Depression: $b = 0.27$; 95% CIs: 0.05, 0.48; $p < 0.05$; GS: $b = 0.03$; 95% CIs: -0.12, 0.18; $p > 0.1$; FI: $b = 0.05$; 95% CIs: -0.11, 0.20; $p > 0.1$). This suggests that the intergenerational effects of a child's marital breakup on parents' health were substantively significant. In addition, the observed pattern for the FI was found comparable to that of depressive feelings, potentially suggesting that the effects on frailty might mostly be due to the mental health dimension of the index. However, the results hardly changed when we used an alternative measure of the FI which excluded all the items related to mental health ([Supplementary Table A3](#)).

Furthermore, we tested whether legal divorce was more detrimental to parents' health than the end of cohabitation, by including an interaction term between the variable “legally divorced” and the period dummies for the years before and after children's union dissolution ([Supplementary Table A4](#)). Although one category was statistically significant for GS, a Wald test on the joint significance of the interaction terms did not reject the null hypothesis of equality of the coefficients ($P > 0.05$), indicating that the interaction terms were not jointly different from zero.

Table 2: Fixed-effects linear regression models on parents' health (z-scores), whole sample. High values indicate poor health.

	Depression	Grip Strength (GS)	Frailty Index (FI)
<i>Time before/after child's union dissolution (ref.: no separation, < 4 years pre-separation)</i>			
-4/-2 years	0.14* (0.01 - 0.27)	0.06 (-0.03 - 0.15)	0.06 (-0.04 - 0.15)
-2/0 years	0.21** (0.08 - 0.34)	0.09+ (-0.01 - 0.19)	0.22*** (0.12 - 0.33)
0/2 years	0.07 (-0.06 - 0.21)	0.04 (-0.06 - 0.13)	0.03 (-0.06 - 0.12)
2/4 years	0.04 (-0.09 - 0.18)	0.09+ (-0.00 - 0.18)	0.04 (-0.06 - 0.13)
4/6 years	-0.04 (-0.16 - 0.09)	0.03 (-0.05 - 0.10)	0.07+ (-0.01 - 0.14)

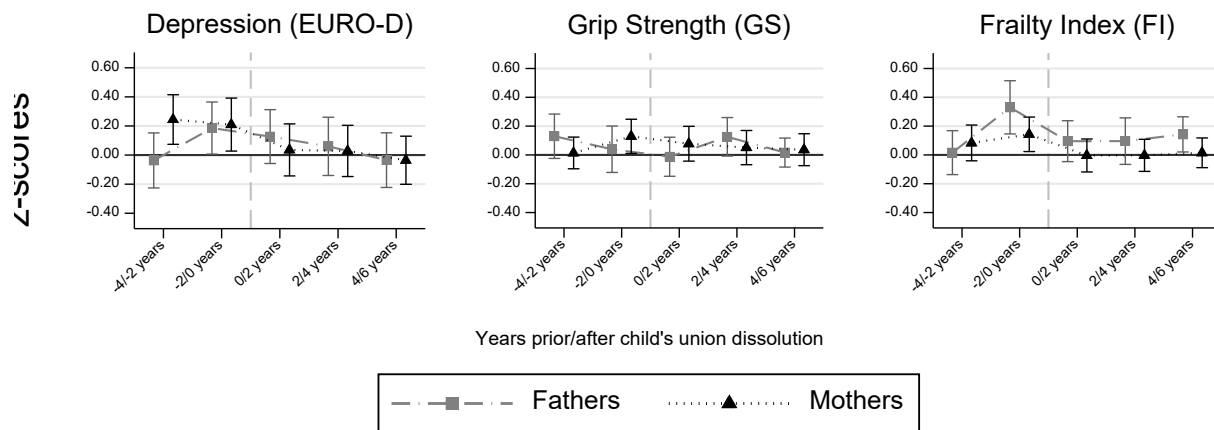
Table 2: Fixed-effects linear regression models on parents' health (z-scores), whole sample. High values indicate poor health (continued)

	Depression	Grip Strength (GS)	Frailty Index (FI)
Parents' characteristics			
<i>Number of children (ref.: 1)</i>			
2	-0.14 (-0.60 - 0.31)	0.06 (-0.19 - 0.31)	0.02 (-0.42 - 0.45)
3+	-0.14 (-0.61 - 0.32)	0.06 (-0.19 - 0.31)	0.00 (-0.45 - 0.44)
<i>Age (centered)</i>			
	0.00 (-0.01 - 0.01)	0.06*** (0.05 - 0.07)	0.05*** (0.04 - 0.06)
<i>Marital status (ref.: Married)</i>			
Never married	-0.35 (-1.02 - 0.32)	-0.19+ (-0.40 - 0.02)	-0.16 (-0.83 - 0.50)
Divorced	-0.28 (-1.10 - 0.53)	-0.21 (-0.47 - 0.05)	0.03 (-0.53 - 0.59)
Widowed	0.27* (0.05 - 0.48)	0.03 (-0.12 - 0.18)	0.05 (-0.11 - 0.20)
<i>Level of education (ref.: Low)</i>			
Middle	-0.12 (-0.55 - 0.30)	0.04 (-0.23 - 0.30)	-0.17 (-0.59 - 0.26)
High	-0.24 (-0.67 - 0.18)	0.15 (-0.15 - 0.45)	-0.28 (-0.84 - 0.28)
<i>Income quartiles (ref.: 1st)</i>			
2nd	0.06 (-0.03 - 0.16)	-0.04 (-0.11 - 0.02)	0.04 (-0.04 - 0.11)
3rd	0.04 (-0.06 - 0.15)	0.01 (-0.06 - 0.08)	0.02 (-0.06 - 0.10)
4th	0.12* (0.00 - 0.23)	0.00 (-0.07 - 0.08)	0.09* (0.00 - 0.17)
Children's characteristics			
<i>Legally divorced (ref.: No)</i>			
Yes	0.00 (-0.16 - 0.15)	0.07 (-0.03 - 0.17)	0.01 (-0.11 - 0.12)
<i>Time since cohabitation (ref.: 0-2 years)</i>			
2-4 years	-0.07 (-0.16 - 0.02)	-0.05 (-0.11 - 0.02)	-0.06* (-0.12 - -0.00)
4-6 years	-0.07 (-0.16 - 0.03)	-0.04 (-0.11 - 0.04)	-0.12*** (-0.19 - -0.05)
6-8 years	-0.13* (-0.24 - -0.02)	-0.11** (-0.19 - -0.04)	-0.17*** (-0.25 - -0.09)
8+ years	-0.07 (-0.20 - 0.06)	-0.15** (-0.23 - -0.06)	-0.23*** (-0.34 - -0.12)
<i>Geographic distance between parent and child (ref.: 0-2 km)</i>			
2-5 km	0.08 (-0.06 - 0.22)	-0.02 (-0.10 - 0.06)	0.02 (-0.07 - 0.12)
5-10 km	-0.03 (-0.22 - 0.16)	-0.01 (-0.12 - 0.11)	0.01 (-0.13 - 0.15)
10-60 Km	-0.02 (-0.18 - 0.14)	-0.04 (-0.13 - 0.05)	0.06 (-0.06 - 0.19)
60 Km+	-0.06 (-0.24 - 0.12)	-0.01 (-0.13 - 0.10)	0.07 (-0.08 - 0.23)
Co-Residence	0.09 (-0.20 - 0.37)	0.09 (-0.05 - 0.23)	0.20 (-0.06 - 0.46)
Constant			
	0.15 (-0.33 - 0.63)	5.48*** (5.21 - 5.76)	0.10 (-0.39 - 0.59)
Observations	10,872	10,872	10,872
Number of parent-child dyads	4,985	4,985	4,985
Number of parents	2,511	2,511	2,511
Number of imputations	30	30	30
sigma_e	0.687	0.453	0.522
sigma_u	0.882	0.793	0.943
rho	0.622	0.754	0.765

Notes: 95% confidence intervals in parentheses. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10. Positive values of Depression, GS, and FI indicate poor health. For consistency of interpretation, GS scores have been reversed.

Figure 1 shows gender differences in the consequences of children's separation for the three health outcomes (depression, grip strength, and frailty), separately for mothers and fathers. Full model estimates in tabular form are shown in [Supplementary Table A5](#). Consistent with the results shown in Table 2, the findings from Figure 1 indicate that there were anticipatory effects for both fathers and mothers. For fathers, the first two years before a child's union dissolution are related to increased depression (Figure 1; $b = 0.19$; 95% CIs: 0.01, 0.36; $p < 0.05$) and frailty (Figure 1; $b = 0.33$; 95% CIs: 0.15, 0.51; $p < 0.001$). Importantly, in the case of the FI, health effects are longer lasting for fathers and extend from 4 to 6 years after a child's union dissolution (Figure 1, $b = 0.14$; 95% CIs: 0.02, 0.26; $p < 0.05$). For women, anticipatory effects on depression are stronger and occur earlier, starting 4 years before the separation (Figure 1, $b = 0.24$; 95% CIs: 0.07, 0.41; $p < 0.01$) and 2 years before the union dissolution (Figure 1, $b = 0.21$; 95% CIs: 0.03, 0.39; $p < 0.05$). For mothers, the impact on the FI is about half that of men (Figure 1, $b = 0.14$; 95% CIs: 0.02, 0.26; $p < 0.05$). Contrary to fathers, a child's marital breakup is also associated with mother's physical health, i.e., GS, 2 years before separation (Figure 1, $b = 0.13$; 95% CIs: 0.01, 0.25; $p < 0.05$). This corresponds to a 0.88-point change in the GS score, which is not substantively significant compared with a clinically important difference of 5.0 kilograms (Bohannon, 2019).

Figure 1: Fixed-effects linear regression models on parents' health (z-scores), by parent gender.

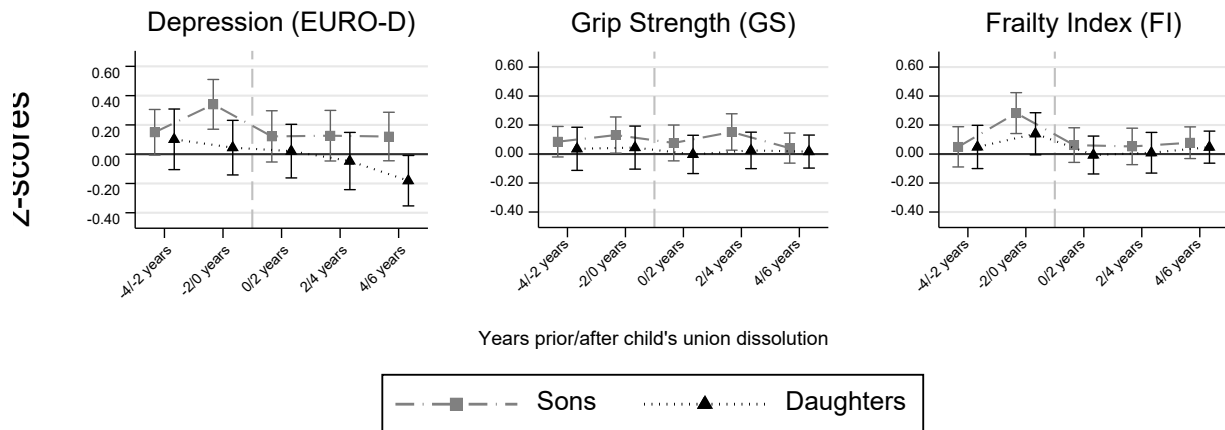


Notes: Observed/predicted z-scores for each health outcome: 95% confidence intervals. Category of reference: parents who do not experience a child's union dissolution or have experienced it more than 6 years before. Differences in health conditions are expressed in standard deviations. Positive values of Depression, GS, and FI indicate poor health. For consistency of interpretation, GS scores have been reversed. The models behind the plots are detailed in Tables A5 of the [online appendix](#).

The models reported in Figure 2 test the hypothesis that a daughter's union dissolution has a stronger influence on parental health than a son's union dissolution. Full model estimates in tabular form are shown in [Supplementary Table A6](#). Contrary to our expectations, the results suggest that parents' health conditions worsened as their sons, but not their daughters, became divorced or separated. For instance, our results show an anticipation effect on all three health outcomes in the two years before a son's separation (Figure 2, *Depression*: $b = 0.34$; 95% CIs: 0.17, 0.51; $p < 0.001$; *GS*: $b = 0.13$; 95% CIs: 0.01, 0.26; $p < 0.05$; *FI*: $b = 0.28$; 95% CIs: 0.14, 0.42; $p < 0.001$) unlike the case of daughters, where the results were not statistically significant ($p > 0.05$). In addition, parents whose sons experience the union dissolution have their GS worsen 2 to 4 years after the separation (Figure 2, $b = 0.15$; 95% CIs: 0.03, 0.28; $p < 0.05$).

To substantiate these findings, we tested for gender differences in these associations by estimating fully interacted time-distributed fixed-effects models. This allowed assessing whether children's divorce-related changes in parental health differed significantly for fathers and mothers ([Supplementary Table A7](#)), daughters and sons ([Supplementary Table A8](#)), and across all the combinations of father-son, father-daughter, mother-son, and mother-daughter dyads ([Supplementary Table A9](#)). In addition, we conducted a Wald test on the joint significance of all the interaction terms between gender and the union dissolution variables. The Wald tests did not reject the null hypothesis of equality of the coefficients ($P > 0.05$), indicating that the interaction terms were not jointly different from zero among the gender constellations.

Figure 2: Fixed-effects linear regression models on parents' health (z-scores), by child's gender.



Notes: Observed/predicted z-scores for each health outcome: 95% confidence intervals. Category of reference: parents who do not experience a child's divorce or have experienced it more than 6 years before. Differences in health conditions are expressed in standard deviations. Positive values of Depression, GS, and FI indicate poor health. For consistency of interpretation, GS scores have been reversed. The models behind the plots are detailed in Tables A6 of the [online appendix](#).

5. Discussion and conclusion

In this study, we investigated how adult children's union dissolution can impact the health of ageing parents and how its impact differs by gender in a sample of parents aged 50 and above living in the Netherlands. Using a combination of prospective panel data (i.e., the Survey of Health, Ageing and Retirement in Europe [SHARE]) and administrative data (i.e., the System of Social-statistical Datasets [SSD]), we adopted a fixed-effects approach to investigate the links between children's separation and a number of parental health outcomes (i.e., depression, grip strength, and frailty). Unique in this study is that we could link longitudinal information on the marital and cohabiting history of all adult children of parents that were interviewed at least twice.

In line with recent longitudinal studies on the mental effects of children's divorce (e.g., Kalmijn & de Graaf, 2012; Ko & Sung, 2022; Tosi & Albertini, 2019), we found that a child's union dissolution is generally associated with increased parental depression, frailty, and grip strength weakness. These results lend support to our first hypothesis (**Hypothesis 1**). However, it is important to note that the main detrimental consequence of children's union dissolution was on parents' mental health. For example, the effect sizes for physical functioning (i.e., grip strength) were smaller than that of frailty status and depression and were found only among women. Similarly, the observed pattern for the Frailty Index was found comparable to that of depressive feelings. However, the results were robust when we used an alternative measure of the Frailty Index which excluded all the items related to mental health. All in all, these findings suggest that children's union dissolution might mainly affect the mental health component of parents' health (Ko & Sung, 2022; Tosi & Albertini, 2019) and that detection and evaluation of frailty may require multidomain evaluation (Bielderma et al., 2013).

The findings indicated that the negative consequences of children's divorce on parental health start to manifest in the period immediately preceding the child's separation itself (**Hypothesis 2a**). These results agree with the idea that union dissolution is a long-term process, often involving conflict years before the actual separation or divorce (Amato 2000), and with consequences that can extend to other family generations and health measures (Elder et al. 2003; Pearlin 2010; Pearlin et al. 1981; Pearlin & Skaff 1996). In addition, parental health reverted to pre-divorce levels in the period two years after separation. This result implies that the health consequences of children's divorce are only temporary (**Hypothesis 2b**). The only exception to this pattern was the case of men's frailty, which was still compromised even after 4 years after the children's union dissolution.

In line with some (Ko & Sung, 2022; Milkie et al., 2008; Tosi & Albertini, 2019) but not other studies (Kalmijn & de Graaf, 2012), we did not find any conspicuous gender differences in the health consequences

of children's separation. In contrast with our theoretical expectations, there were hardly any significant interaction effects between parental gender and children's marital break-up (**Hypothesis 3a**), as well as between the gender of the offspring and marital break-up (**Hypothesis 3b**). The only exception that emerged from our study concerned a stronger effect of a child's separation on depressive symptoms for mothers than for fathers in the period from 2 to 4 years before the marital break-up. This might indicate that mothers anticipate more effectively as they are better informed about children's problems beforehand, and this would reflect on their mental health years preceding the marital break-up. This result agrees with the idea that mothers are the main family kinkeepers (Kalmijn, 2007; Rosenthal, 1985) and therefore more aware than fathers of events, activities, and tensions in their extended family.

Related to this, whereas mothers seem to cope more easily and anticipate better, fathers appear to be more caught by surprise and more hit by their children's union "failure" over time. This was particularly true for our measure of general health (i.e., the Frailty Index), where fathers experienced a decline in health due to children's separation similar to that of mothers and even longer-lasting. This result is consistent with previous findings indicating that gender differences in how parenting is experienced and impacts on parental health are narrowing (Daly et al., 2013; Milkie et al., 2019; Nomaguchi & Milkie, 2020). Our study reasserts that the deleterious effects of child marital break-up on parental health are not a purely maternal phenomenon.

Similarly, and contrary to our expectations, our study showed somewhat stronger consequences in the case of the divorce of a son than of a daughter. This result is in line with recent evidence indicating that a son's distressing marital circumstances exert a stronger burden on parental psychological distress than that of a daughter (Chen & Tong, 2021; Ko & Sung, 2022). This could be due to the fact that divorcing men are more vulnerable to short-term consequences of divorce for subjective measures of well-being (Leopold, 2018), and parents might experience a decline in their health when children are facing those problems in their well-being (Knoester, 2003). Alternatively, this could be explained by the fact that if there are young grandchildren involved in the union dissolution, they are, in most cases, delivered to the custody of their mother. If this is the case, with the union dissolution grandparents may partly lose contact with their grandchildren and this could be a great cause of additional stress. Further research is needed to investigate this potential causal mechanism.

Although this study advances knowledge in multiple ways, some important limitations should be considered for future studies. First, it was not possible with the available data to measure directly the precise mechanisms that generate the effects of children's marital break-up on their parents' health. Rather, we can only evaluate the theorized mechanisms based on their consistency with our empirical findings. For example, we were not able to measure the levels of conflictive relationships between partners before and after their union dissolution (Tosi & Albertini, 2019). Marital break-up might not affect health or even imply some benefits for both adult children and their parents when the relationships between (ex-)partners are highly conflictual. It would be worthwhile to consider in future studies the levels of conflict between the (ex-)spouses, as well as other potential mechanisms.

Second, and related to the preceding point, some observed changes in parental health (and the gender differences therein) might be too early in the life course to be attributed to anticipation effects. This may suggest that parents whose children eventually separated experienced a worsening of their health earlier in their lives for reasons other than their child's divorce. Reverse causality could also run from a decrease in parental health to strains in the child's relationship, and subsequently to an increase in the risk of the child's marital breakup. This might potentially be an alternative interpretation of why parental health worsens before the actual dissolution happens. However, we find it highly unlikely that decreasing parental health is the direct driving force behind an actual union dissolution of an adult child, especially because mostly it seems temporary. Our research recommends that future studies should investigate these and other potential pathways.

Third, the relatively small sample size for those subgroups of parents whose children experience divorce and the demands of fixed-effects models may have limited our ability to find significant sources of variation. Finally, our study did not consider the possibility that multiple children might experience (or not) family dissolution in starkly different ways. All things considered, future research should consider more rich data that might better capture the complexities of children's union dissolution and its consequences on parental health.

Despite these limitations, our study extends previous research in several ways. First, we analysed dyadic data linking parents with all their adult children's marital histories and distinguishing between short-term

and longer-term effects of children's separation on parents' health. Second, this study examined how the effect of a child's separation may vary according to the parental health outcome considered. Our study showed how previous findings can be extended to more objective measures of general physical health, such as grip strength and frailty. Third, one of the main contributions of this study is that it unveils how parental health starts to deteriorate in the years preceding a child's union dissolution, suggesting that this period is often marred by high levels of marital distress and episodes of crisis and conflict (Amato, 2000). In addition, our study does not show remarkable gender differences, indicating that both fathers and mothers are similarly influenced by their sons' and daughters' union dissolution.

Our study highlights the need for prevention of union dissolution and support for those who are separating, as well as their ageing parents. Professional care and family support providers should be attentive to the needs of divorcees and their older parents, not only during the moment of separation but also in the lead-up to it. This is because the strain of separating spouses is often higher during this time, and the consequences for the health of their parents are more intense during this period. Our findings call for policies that support both fathers and mothers equally, taking into account gender of the adult child going through the union dissolution.

Data availability

The System of Social-statistical Datasets (SSD) microdata can be accessed via the following link: <https://www.cbs.nl/en-gb/onze-diensten/customised-services-microdata/microdata-conducting-your-own-research>. The SSD microdata was analysed via a secure internet connection (Remote Access) (<https://www.cbs.nl/en-gb/our-services/customised-services-microdata/microdata-conducting-your-own-research/rules-and-sanctioning-policy>) after receiving authorization from Statistics Netherlands (CBS). For further details regarding CBS microdata access, please send an email to: microdata@cbs.nl.

The Survey of Health, Ageing and Retirement in Europe (SHARE) data are distributed by SHARE-ERIC (Survey of Health, Ageing and Retirement in Europe – European Research Infrastructure Consortium) to registered users through the SHARE Research Data Center. The official SHARE Research Data Center website (<https://releases.sharedataportal.eu/users/login>) is the sole online access point to the SHARE data. Here SHARE users can download the SHARE data after a successful registration. For further details regarding SHARE microdata access, please visit <http://www.share-project.org/data-access.html>.

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Conflict of Interest

The authors declare that there are no potential conflicts of interest.

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Information in German

Deutscher Titel

Die Strapazen der Kinder, die Schmerzen der Eltern? Wie sich die Auflösung der Partnerschaft erwachsener Kinder auf die Gesundheit älterer Eltern auswirkt

Zusammenfassung

Fragestellung: Diese Studie untersuchte die geschlechtsspezifischen Unterschiede in den längsschnittlichen Zusammenhängen zwischen der Auflösung der Partnerschaft erwachsener Kinder und dem Gesundheitszustand der älteren Eltern.

Hintergrund: Die Perspektive des familiären Lebensverlaufs und Theorien zu sozialem Stress legen nahe, dass die Auflösung der Partnerschaft erwachsener Kinder Auswirkungen auf die Gesundheit der Eltern haben kann. Das Ausmaß, in dem sich die elterliche Gesundheit vor und nach der Trennung eines Kindes verändert, ist jedoch noch kaum untersucht.

Methode: Daten aus vier Wellen der niederländischen Komponente des Survey of Health, Ageing and Retirement in Europe (SHARE) wurden mit Panel-Registerdaten aus dem System of Social-statistical Datasets (SSD) verknüpft. Wir verwendeten einen Fixed-Effects-Ansatz für 4.985 Eltern-Kind-Dyaden, die in 2.511 Eltern unterteilt waren, um den Einfluss der Auflösung der Partnerschaft der Kinder auf drei verschiedene Maße der elterlichen Gesundheit (Depression, Griffstärke und Gebrechlichkeit) zu bewerten.

Ergebnisse: Die Ergebnisse deuten darauf hin, dass sich der Gesundheitszustand der Eltern verschlechtert, wenn eines ihrer Kinder sich trennt. Darüber hinaus fanden wir antizipative Auswirkungen der Auflösung der Partnerschaft der Kinder auf die Gesundheit der Eltern. Bei den Eltern ergaben sich keine klaren geschlechtsspezifischen Unterschiede. Die Trennung eines Sohnes belastet die elterliche Gesundheit stärker als die einer Tochter.

Schlussfolgerung: Diese Untersuchung trägt zu neuen Erkenntnissen bei, indem sie die vorhandene Literatur sowohl auf die körperliche als auch auf die psychische Gesundheit ausweitet. Außerdem unterstreicht sie, wie wichtig es ist, sich sowohl auf die Zeit vor als auch nach der Trennung eines Kindes zu konzentrieren. Geschlechtsspezifische Unterschiede helfen dabei, die Entstehung eines schlechten Gesundheitszustands im höheren Lebensalter zu verstehen.

Schlagwörter: Administrative Daten, demografische Ereignisse, Scheidung, Fixed-Effects-Modelle, Gebrechlichkeit, Geschlecht, gesundheitliche Ungleichheiten, intergenerationale Beziehungen, Lebenslauf, Linked Lives, Ehe, Niederlande, Paneldaten, Trennung von Partnerschaften

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