

Mental and Physical Health Trajectories of Norwegian Parents and Children before and after Union Dissolution

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The aim was to examine the mental and physical health trajectories of mothers, fathers, and children before and after union dissolution. Register data covering the entire Norwegian population, and including information on consultations with general practitioners in 2006–2018, were used. Constant unobserved characteristics were controlled for with individual fixed effects. As judged by the number of consultations, mothers' and fathers' mental health deteriorates before the dissolution but improves immediately afterwards. In contrast, a worsening mental health among children before the dissolution is followed by an even more adverse development afterwards. There is only modest evidence of predissolution increases in noninfectious physical diseases, but more clearly rising numbers afterwards especially for mothers and daughters. Less adverse trends are seen for infections, although mothers experience a sharp temporary increase at the breakup time. On the whole, mothers' health is more adversely affected by dissolution than that of fathers. Daughters may have a disadvantage compared to sons, but results vary across model specifications. The results suggest that effects on children's health do not operate through parents' health. With respect to union type, the health changes before and after dissolution of a consensual union are not very different from those before and after marital separation.

Introduction

There is much public and scholarly interest in how union dissolution and the underlying reduced relationship quality may influence the well-being of the couple and their children. In particular, the implications for mental and, to a lesser extent, physical health have received attention (see references below). However, existing studies have often relied on small survey samples or quite simple methods, and many have only made a distinction

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between dissolution or not dissolution, without considering the possibly growing problems already before the breakup and the postdissolution development. Furthermore, the findings have been quite diverse, even among the most methodologically advanced investigations (see below).

Our aim is to present a detailed picture of health changes before and after a union dissolution, using models that control for unobserved time-constant individual characteristics that may affect both the chance of breakup and health, and data on couples and their first-born child extracted from registers covering the entire Norwegian population. Studies of dissolution effects have rarely been based on such “trio” data (Umberson and Thomeer 2020). The annual number of consultations with general practitioners (GPs) for various broad categories of diseases is used as health indicators.

More specifically, we start by checking whether the theoretically plausible predissolution worsening of adults’ mental health seen in some studies is confirmed with the Norwegian data. Next, we consider the postdissolution development, for which the theoretical expectations and existing empirical evidence are less clear. We then consider physical health trajectories before and after dissolution, which there is even more uncertainty about, with a special eye on whether there is a more adverse development after the breakup than for mental health, as one might expect. Physical diseases are divided into two main categories: noninfectious and infectious. One might expect the effects on the latter (which have rarely been studied) to be more similar to those on mental health, as further explained below. We consider one group of noninfectious physical diseases—the musculoskeletal diseases—in particular. These are common among adults and partly a result of psychological burdens. Effects for mothers and fathers are compared in all these steps. There is little agreement in the literature about how health effects differ between the two partners.

Subsequently, the same types of analysis are done for children—with a daughter–son distinction. There is just as much uncertainty about the children’s health outcomes before and after dissolution as about the parental outcomes. The results are compared with those for parents, which is a novel contribution that requires data such as ours^[1]. While some (cross-sectional) research on children’s health response to dissolution has taken parental health responses into account, the responses have not been compared (e.g., Cavanagh and Huston 2006; Størksen et al. 2006; Osborne and McLanahan 2007). Additionally, we take a simple step to shed light on whether health effects on children may be mediated by parents’ health. Note that mental illnesses are not very common among children, while infections occur more frequently than other physical diseases (in contrast to the smaller proportion of infections among adults). We do not consider children’s musculoskeletal diseases.

Different model specifications are used. First, we address the mentioned issues by controlling only for age. Second, potential selection factors (i.e., characteristics that may affect health as well as relationship quality and, ultimately, breakup probabilities^[2]) are taken into account, although they may also be consequences of the dissolution process. Third, the attention is turned towards the postdissolution development, in particular, to find out whether repartnership may be a mediator. Fourth, it is checked whether the dissolution–health relationships vary by union type (i.e., cohabitation vs. marriage), which there is little knowledge about.

Brief description of the setting

The Norwegian setting resembles that of many other European countries with respect to divorce prevalence (Prioux 2006). For example, couples who hypothetically experience the marital-duration-specific divorce rates in 2021 throughout their marriage have a 37 percent chance of ever divorcing (Statistics Norway 2022). Consensual unions, which have become an increasingly popular alternative to marriage^[3], are more likely to be dissolved—also when couples with children are compared (Poortman and Lyngstad 2007). It should be noted, though, that the nature of consensual unions and marriages varies between countries. In Norway and other Nordic countries, consensual unions are at least as fragile as in other high-income countries (the United States being one exception), and couples who do not split up are relatively hesitant to marry: A large proportion never marry, or marry after several years (Andersson, Thomson, and Duntava 2017; Holland 2013).^[4] This contributes (along with the few direct marriages) to a quite high average age at marriage and high proportion never marrying in the region. In contrast, there is a higher transition rate into marriage among cohabitants in, for example, the United States, which in combination with widespread dissolution means that people live relatively few years in consensual unions (Andersson et al. 2013). This cross-country variation fits well with Nordic cohabitants' notion about their partnership being almost the same as a marriage (Hiekel, Liefbroer, and Poortman 2014), which may partly be a result of relatively small difference in legal rights (Gassen and Perelli-Harris 2015).

Background

General ideas about crisis, chronic strain, accumulative disadvantages, and their health implications

There are many gains from marriage and cohabitation, such as emotional closeness, companionship, support in everyday life and periods of illness, and economy-of-scale advantages. However, there are also negative aspects

of living together, such as reductions in the individual freedom. After some time in the union, the net gains (including the expected future ones) may be perceived less positively than at the outset, at least by one partner, who, for example, may feel there is too little companionship and mutual understanding or too much conflict. Life alone or with another partner may eventually be seen as more attractive, and an initiative to breakup may be taken.

Several life changes may take place soon after the dissolution, some for the better and some for the worse. For example, reduced contact with the partner may be seen as a great relief if the relationship had turned rather sour. On the other hand, earlier fighting grounds may be substituted by new conflicts about redistribution of property or child arrangements (Kalmijn 2016; Radetzki, Deleurme, and Rogers 2022), there may be a severe economic setback (which for the partner who earns least or has the main responsibility for the children may go beyond the lost economy-of-scale advantage), and there may be distress because of changes in the relationships with friends and family members, or because of migration to another area (Kalmijn and van Groenou 2005). From the child's perspective, less contact with at least one of the parents may be an additional problem (although the child may have got less attention already before the breakup, while the parental relationship became increasingly troubled).

As time passes, some of these burdens may become smaller. For example, disagreements with the former partner may be solved, one may get used to living in another area, or a child's reduced contact with a parent may be compensated for by other supportive adults. In addition, the economic situation may improve because of increased work activity, more maintenance payment from the noncustodial parent, or better use of the welfare support system (Andreß et al. 2006; Tamborini, Couch, and Reznik 2015). Thus, the overall situation may be better than shortly after the dissolution, and perhaps not much worse than in the early years of the union. This idea of temporary trouble is often referred to as a "crisis model" in the divorce literature (Amato 2000).

However, it is also possible that important problems persist, which has been referred to as "chronic strain" (Amato 2000). It may, for example, be difficult for some people to escape from a low-income situation. That said, life may nevertheless be considered as overall better than at the time of the breakup or than it might have been if the union had remained intact—as also at least one of the parents typically expects when the decision to split up is taken.

There may even be accumulating disadvantages, in the sense that trouble in certain life dimensions may lead to other types of problems, which perhaps also may intensify the original challenges. This may be referred to as "accumulative disadvantages" and seen as consistent with

a negative version of the “marital resource model” (Raley and Sweeney 2020). If there is improvement in some aspects of life after a dissolution, and otherwise lasting or worsening problems, the total life quality could develop in any direction, depending on the relative strength of these trends at various postdissolution stages.^[5] In principle, one may even observe improvement in life quality followed by an opposite development.

Obviously, people’s health is likely to be affected—partly through health behavior—if there is a conflict with the partner, economic problems, or other life changes such as just mentioned (Bourassa, Ruiz, and Sbarra 2019; Ding et al. 2021). When it comes to mental health, in particular, it is commonly believed that it may respond rather quickly to the life situation (Leonard and Rothbard 1999; Reczek et al. 2016), although the chance of having poor mental health at a certain point in time also is influenced by the exposure to stressful events over many previous years (Shields and Slavich 2017). To the extent that there is an immediate response, one may expect to see an adverse development in the partners’ mental health prior to the breakup, as a result of the deteriorating union quality, with perhaps less mutual support and more conflicts (Proulx, Helms, and Buehler 2007; Robles et al. 2014), while there would be improvement after some time if the “crisis model” holds, or any other trend if there are also contributions from the processes described as chronic strain or accumulative disadvantage.

The life situation in earlier years is thought to be relatively more important (compared to the current or quite recent life situation) for physical than for mental health, although with some variation across the various physical diseases (Ben-Shlomo and Kuh 2002; Hughes and Waite 2009). If so, one may argue that reduced union quality some time before a dissolution may have a weaker immediate impact on physical health than on mental health, as physical health to larger extent also reflects health behavior and other aspects of life when the relationship was better.^[6] Also, in such a situation the trend in physical health may be adverse even in periods long after the dissolution when mental health improves, so that there, on the whole, may appear to be a delayed physical health response to dissolution.^[7] That being said, immediate effects on physical health through neurohormonal stress mechanisms (i.e., not involving health behavior) have also been suggested (Gaydosh and Harris 2018; Kiecolt-Glaser 2018). Note also that, even if mental health improves or stabilizes, the physical health may, in principle, keep getting worse in the long term, as opposed to there being just a delayed improvement and stabilization. This would happen if there is a more adverse development (because of accumulative disadvantages) in the factors that are particularly important for physical health than in those of special importance for mental health. Making this even more complex, both mental and physical health likely feed back on the earnings and other factors that have just been assumed to be among their determinants (and on each

other). This “snowballing” most likely strengthens the changes suggested above.

It is possible that effects on infectious diseases are less delayed than those on most other physical diseases: Mental health problems (or distress or sleep deprivation without a mental health diagnosis) may immediately enhance the susceptibility to infections, social interaction patterns with acute implications for the infection risk (including dating) may change rapidly around the time of dissolution, and overwhelming changes in life circumstances at this stage may make people more careless in terms of hygiene. In the longer term, weaker physical health may also have implications for the infection risk.^[8]

The two partners may experience the dissolution quite differently: The rewards from the union (compared to living alone) have not necessarily been the same at the outset, there may have been different views about how badly the relationship has developed, and the quality of life alone or with another partner after a dissolution may be perceived differently. There may well be a systematic gender variation in this, especially if the couple has children, whom the mother often takes special responsibility for after a breakup (Lyngstad, Kitterød, and Nymoen 2014). In particular, the women may be more likely than men to have economic problems after a dissolution (Leopold 2018) and to feel parental role strain (Simon 1992). However, the breakup initiative is often taken by the female partners (Kalmijn and Poortman 2006). Assuming that they are aware about the possible economic challenges, this implies that they may expect, and perhaps also actually experience, outcomes that are *otherwise* better compared to those for men, and that may more than outbalance the economic disadvantage. For example, it is possible that men suffer more from social isolation, partly because of less contact with the children, or because their partner has been the engine in their social activity. In practice, comparison of health effects is difficult because women and men may have different types of responses, which are covered to varying extent by the available data. For example, men may be more likely than women to respond with externalizing (rather than internalizing) behavior (Simon 2002).

Similar types of arguments apply to children. They may sense their parents’ relationship problems before the breakup and be worried, or they may be influenced by these problems anyway because parents in such a situation may not be able to provide as adequate care for their children as they would otherwise do (Amato 2000, 2010). After the dissolution, the children may have less contact with at least one of the parents and be affected by economic problems and various other life changes, partly through the parents’ response to the new situation. In addition, children may be drawn into the parental conflict. (See review of mechanisms in Auersperg et al 2019; Cavanagh and Fomby 2019; Sands, Thompson, and Gaysina 2017.) As is the case with the parents, however, children may

nevertheless, on the whole, be better off after a parental breakup compared to if the union had remained intact (Booth and Amato 2001; Musick and Meier 2010; Strohschein 2005).^[9]

Obviously, the children's mental and physical health may be affected by the life changes before and after a dissolution, just as described for the parents. It would seem reasonable to expect a predissolution deterioration of mental health, although perhaps less markedly than for the parents, as they may not notice the situation and be more indirectly affected. As with the parents, theoretical predictions regarding mental health after the dissolution are ambiguous. There are no clear theoretical reasons why the time profile in children's postdissolution life strains—and the implications for the development in mental health—should differ from that of parents, although parents may try to shield their children from some burdens. Similarly, it is far from obvious theoretically how their physical health may develop compared to that of the parents. Finally, it should be noted that sons and daughters in principle may be affected differently, as a result of different types of attachment to their parents, different roles in the family, and perhaps being socialized into responding differently to problems.

As mentioned, the effects on children may operate in part through the parents' situation, including their health: Parents' poor health may reduce the quality of their supervision, with implications for the child's health, and there may be direct transmission of infections.^[10]

Empirical evidence of how union dissolution influences the partners

Several cross-sectional studies have shown lower well-being, poorer mental or physical health, or more infections among divorced than married people, net of various control variables (Joung et al. 1994; Liu and Umberson 2008; Nielsen et al. 2014).^[11] Excess mortality has also been reported (Shor et al. 2012).^[12]

Obviously, the availability of *longitudinal data* allows for better research designs. For example, one may control for an earlier measurement of the outcome variable^[13] or estimate growth curve models. In one longitudinal study, it was concluded that marital dissolution increases the depression risk more among women than men (Horwitz, White, and Howell-White 1996, Simon 2002)^[14], while others have reported a similar adverse effect of dissolution on psychological well-being for the two sexes (Waite, Luo, and Lewin 2009) or a similar predissolution rise and subsequent reduction in depression (Lin et al. 2019). Furthermore, an investigation of fathers showed increased depression risk after divorce (Shapiro and Lambert 1999), and an investigation of mothers showed decreases in social support and increases in material hardship and depression after divorce (Osborne, Berger, and Magnuson 2012). Metsä-Simola and Martikainen (2013) and Monden et al. (2015) reported more use of psychotropic medication among

the divorced of both sexes, compared to the married, with a peak shortly before divorce (possibly around the time of the actual breakup). Another analysis showed a deteriorating physical health after a dissolution that was entirely due to poorer mental health (Canady and Broman 2003). Some authors have also analyzed lifestyle changes possibly contributing to mental and physical health effects.^[15]

Some of the longitudinal analyses have involved *individual fixed-effects models*, which essentially means that one checks whether a change in an individual's family situation is linked to a change in their health. In some of these studies, distinction has only been made between before and after dissolution, and because there are likely to be changes within these two periods, one would expect results to depend on the chosen length of the periods. Such studies have shown reduction in mental health or subjective well-being among those experiencing union disruption—of the same size for women and men (Chen and van Ours 2018) or with a special disadvantage for men (Wade and Pevalin 2004; Næss, Blekesaune, and Jakobsson 2015).

Other researchers have included *time since dissolution* (negative before dissolution) as the key variable in their *individual fixed-effects models*.^[16] The conclusion in one such investigation from Germany was that mental health deteriorated for some years before the breakup and then improved, with small differences between the sexes (Leopold 2018). A similar conclusion was reached in studies of mental health in the United Kingdom (Blekesaune 2008; Tosi and van den Broek 2020) and Norway (Kravdal, Wörn, and Reme 2022), as well as in studies of sickness absence in Norway (with a somewhat more favorable development for men; Dahl, Hansen, and Vignes 2015) and life satisfaction in Germany (with the most adverse development for men; Andreß and Bröckel 2007). Also Soons, Liefbroer, and Kalmijn (2009) reported improvement in well-being with increasing time since the breakup. Kalmijn (2017) found an increase in depression and reduction in life quality immediately after a dissolution (especially for men), which was followed by a period with improvement. In contrast, Johnson and Wu (2002) found increasing stress levels up to divorce in the United States, but no subsequent improvement unless a new union was formed—with small differences between the sexes. To sum up, some investigations support the idea that mental health deteriorates before a dissolution, while none points in the opposite direction. In contrast, findings about the post-dissolution period are more mixed, which may be considered as consistent with the theoretically plausible opposing mechanisms mentioned above.

The relatively few fixed-effects studies of *physical health* have provided less evidence of a favorable development after the breakup, which would seem reasonable in light of the mentioned ideas. For example, an investigation of men suggested an adverse trend, at least among those not forming a new relationship (Couch et al., Tamborini, and Reznik 2015). Similarly, an

analysis of German data revealed a development that was opposite to that for mental diseases, that is, a worsening after the breakup (Leopold 2018). Kalmijn's (2017) analysis, which indicated improvement in mental health from shortly after a breakup, showed no effect on physical health.

On the whole, the evidence about *sex differences* is rather mixed. However, most studies have compared effects for women with those for men, and while many couples who split up are parents, it is possible that a comparison of mothers and fathers (as in our study) would have shown a clearer female disadvantage. In support of that idea, Dahl, Hansen, and Vignes (2015) observed more adverse postdivorce trends among women with children than among childless women, while parenthood had less impact on men. The same pattern was found by Williams and Dunne-Bryant (2006) with regard to alcohol problems and overall happiness, although not for depression. Others have reached a different conclusion, however: Monden et al. (2015) reported that children had the same impact on the two partners, and Blekesaune (2008) found that the presence of children actually was particularly *beneficial* for women. Leopold and Kalmijn (2016) reported that having children reduced postdivorce family and overall life satisfaction more for men than for women, while the opposite pattern was seen for income satisfaction.

Empirical evidence of how union dissolution influences children

According to a recent review, several American studies have shown adverse effects of dissolution on children's socioemotional behavior and mental health, as well as on cognitive and educational outcomes, with boys being more likely to respond with externalizing behavior than girls (Cavanagh and Fomby 2019). Two meta-analyses also showed adverse mental health implications although, on the whole, outcomes did not differ between the sexes (Auersperg et al. 2019; Sands, Thompson, and Gaysina 2017).^[17] A review more focused on methods concluded that effects of union dissolution tend to be smaller when more rigorous research designs are used (McLanahan, Tach, and Schneider 2013). However, even the methodologically more advanced studies that were considered supported the idea that dissolution may have implications for children's socioemotional behavior, substance use, and mental health. A more recent cross-sectional analysis showed that family disruptions are associated with poor mental health, especially in the longer run (Tullius et al. 2022).

Some studies of behavior or mental health have been based on *individual fixed-effects models* and shown adverse effects (Amato and Anthony 2014; Cherlin, Chase-Lansdale, and McRae 1998), while effects have not appeared in others (Foster and Kalil 2007). In an analysis where time since dissolution was considered, an adverse trend in children's behavior problems appeared only before the dissolution, while there was stability afterwards

(Aughinbaugh, Pierret, and Rothstein 2005). This is interesting in light of the studies that have shown a postdissolution decline in mental health among adults, although as mentioned, it is not theoretically obvious that the effects should be the same for parents and children.

Some attention has also been given to children's *physical health*. For example, two cross-sectional investigations indicated an adverse impact (Bzostek and Beck 2011), also in the long term (Thomas and Högnäs 2015). More interestingly, a fixed-effects analysis of overweight showed a stable level before divorce and shortly afterwards, followed by an increase (Goisis, Özcan, and Van Kerm 2019)—in line with the idea that an adverse development for some time after a dissolution perhaps is particularly likely with respect to physical health. In contrast to these findings, the conclusion from another type of longitudinal analysis was that, although there are adverse behavioral and socioeconomic outcomes, there is no effect on four biomarkers of young adult physical health (Gaydos and Harris 2018).^[18]

The importance of parents' health as a mediator has been addressed in a few cross-sectional studies but with divergent results. For example, while Størksen et al. (2006) found that parental mental health responses to dissolution contributed almost nothing to the adolescents' health response, Osborne and McLanahan (2007) reached the opposite conclusion in a study of young children.

Cohabitation versus marriage

Cohabitants may not feel the same expectations from others about stability as the married, since it is widely known that disruption rates in consensual unions are higher (Musick and Micheltore 2018; Poortman and Lyngstad 2007). This might lead to smaller health problems if a breakup takes place. Additionally, couples who are concerned about the quality of the relationship may be particularly likely to cohabit rather than marry (although there are also other reasons for preferring cohabitation; Kravdal 1999), and some studies indeed suggest lower quality of consensual unions than marriages (Brown, Manning, and Payne 2017; Wiik, Keizer, and Lappégard 2012). Also, doubts about the stability may undermine the willingness to make investments in the relationship—further reducing the quality perhaps—and may be a motive for living relatively separate lives without, for example, a joint economy (Eickmeyer, Manning, and Brown 2019; Thomas and Mulder 2016). One may argue that, when the quality is low or the partners live more separate lives, there may be less to lose when the relationship is about to break up and finally dissolves.^[19] On the other hand, distribution of property after dissolution of a consensual union is typically not regulated by law such as in case of divorce, which may leave a parent who has spent much time at home with a child in an economically poorer position, with potentially adverse implications for both generations.^[20]

Few investigations have addressed how union type modifies the effects of a breakup, and the findings have been mixed: While sharper health effects of divorce have been found in some fixed-effects analyses (Blekesaune 2008; Kalmijn 2017), a cross-sectional analysis of physical health showed no difference between divorce and dissolution of consensual unions (Bzostek and Beck 2011).^[21]

Data and methods

Data sources

The key data sources are the Norwegian Population Register and the KUHR register, the latter with information about GP consultations from 2006.^[22] The data extractions made for this analysis cover the period up to January 1, 2019.

All persons who have ever lived in Norway after 1964 have been included in the Population Register and assigned a personal identification number (PIN) that allows linkage to other registers. The Population Register includes information about the person's year of birth and death (if any), and from 2005 there is information on marital and cohabitation status as of 1 January for everyone (Falnes-Dalheim 2009). PINs of spouses and cohabiting partners are also included. Additionally, PINs of parents are included for almost everyone born in Norway after 1953, which means that there are almost complete birth histories for women and men born after 1935. Furthermore, there is annual information on whether and in which municipality the person lived in Norway on 1 January.

The outcome variable in this study is the annual number of face-to-face GP consultations for three main types of disease: mental diseases, non-infectious physical diseases (excluding pregnancy-related), and infections—except that distinction is made between musculoskeletal and other non-infectious physical diseases in some of the analysis.^[23] Note that, although GPs do not themselves treat the most severe diseases, the use of specialized health care is usually contingent on referral from GPs, so the indicators reflect a combination of severe and less severe conditions.

In addition to the information from the two mentioned registers, some of the analysis is based on annual information on income^[24], school enrolment, and the highest educational level achieved so far. These data were provided by Statistics Norway.

Analytical setup

In a first step, all couples who had their first child (i.e., both partners were previously childless) in 1987–2017, and who were spouses^[25] or cohabiting partners on January 1, 2005, or (if the child was born in 2005 or later)

1 January the year after the child's birth, were selected from the data. Then, couples whose first child was a twin were excluded, and they were also excluded if one of them or their child did not live in Norway on 1 January each year from 2005, or from the year after birth, up to 2019.^[26] Two subgroups were defined, for reasons given below: The first included those who experienced dissolution between 2005, or the year after birth, and 2018—and whose child was then no older than 18.^[27] For married couples, dissolution refers to the formal separation, except in the few cases with direct divorce. The second group included those who did not experience dissolution. However, because there is information about GP consultations only from 2006, the first year of the analysis was 2006 (when some had already experienced union dissolution) or the year after birth (if the birth took place in 2006 or later). Finally, couples who reunited after a dissolution were left out (although supplementary analysis showed that the estimates would have been very similar if this step had not been taken).

Statistical model

The following model (1) was estimated, for example, for the mental health of mother i in year t :

$$Y^{(MeMo)}_{it} = \sum_{k=-10,10} \beta_k D_{it}^{(k)} + \gamma A_{it} + v_i + \varepsilon_{it} \quad (1)$$

where $D_{it}^{(k)}$ are dummies corresponding to year k since dissolution (negative before the dissolution), and $k = -10$ and $k = 10$ represent ≤ -10 years and ≥ 10 years, respectively. The reference category is $k = 0$. Additionally, a vector A_{it} of age dummies for one-year categories of the mother's age was included to take into account that individuals become older as time since dissolution increases. v_i are mother fixed effects. The regression estimation was done with the `xtreg`-command in Stata, using robust standard errors clustered at the individual level.^[28] Note that a relatively long study period such as this may help us see slow responses, such as one might expect particularly for physical diseases (Raley and Sweeney 2020).

If the D variable had included one category for each possible year since dissolution, that is, from -12 to 13 , it would have been impossible to separate effects of age and time since dissolution (also referred to as duration below). This is because of linear dependence: Current age minus time since dissolution is age at dissolution, which is constant over all observations for a person and can be seen as part of the fixed effect. Having one category for ≤ -10 and another for ≥ 10 means that we assume no impact of duration within these periods, so that all variation in the outcome within the periods is a result of age differences. It is then, in principle, possible to separate the effects of age and duration, although the standard errors are quite large. It would help to expand the category to, for example, ≤ -5 (see further discussion below), but one may doubt whether there actually is no trace

of the coming dissolution in this period. We have therefore instead (as in corresponding analyses by Anusic, Yap, and Lucas [2014] and Kravdal, Wörn, and Reme [2022]) estimated model (1) from data also including families not experiencing dissolution. For them, all the D dummies were set to zero, and they only contribute to the estimation of the age effect, but it is a quite dominating contribution because of the large number of observations. Obviously, the underlying assumption is that the age effect is the same in this group as among those who experienced dissolution (net of time since dissolution).

Similar models were estimated for mothers' physical health and for fathers' and children's mental and physical health. Distinction was made between female and male children.

In addition to estimating separate models for daughters and sons, and for dissolution of consensual union and marriage, the importance of sex ($G_i = 1$ if daughter) or union type ($K_i = 1$ if cohabiting^[29]) as moderators was examined more explicitly by adding the interactions $G_i D_{it}$ and $G_i A_{it}$ or $K_i D_{it}$ and $K_i A_{it}$ to (1).^[30] Similar models including interactions with the parent's sex were not estimated, as the separate analyses revealed so clear differences between mothers and fathers.

However, also the changes in the number of GP consultations relative to how common the respective diseases generally are for mothers, fathers, and children are of interest. Therefore, some models were estimated with standardized outcome variables such as

$$Y_{it}^{(MeMo)} = \left(Y_{it}^{(MeMo)} - AY^{(MeMo)} \right) / SY^{(MeMo)}$$

where AY is the average of $Y_{it}^{(MeMo)}$ across all observations, including those for mothers in stable families, and SY is the standard deviation.^[31]

Time-varying selection factors or mediators

Before the union dissolution, various sociodemographic factors X_{it} (mother's and father's income, education, and educational enrollment, whether a second child is born, and the number of grandparents alive and living not more than 100 km away from the child^[32]) may influence the relationship quality and the chance of dissolving an unhappy relationship, and so be seen as determinants of the time up to union dissolution (D_{it}). The same is the case for parents' health H_{it} (only relevant in the analysis of children's health). These factors may also affect the health outcome (Y_{it}) and thus be selection factors one would like to control for when estimating the effects of D_{it} on Y_{it} . However, they may be mediators as well, because they may be *affected* by D_{it} and influence Y_{it} , and the same is the case after the dissolution (when it, however, is not reasonable to consider them as selection factors).

In addition to this ambiguous direction of causality between H_{it} or X_{it} , on the one hand, and D_{it} , on the other hand, there is not a clear causal direction from H_{it} or X_{it} to Y_{it} : Individuals' health also feeds back on their sociodemographic characteristics, and children's health may affect the parents' health. Lagging the potential mediators does not solve the problem. For example, a child's Y_{it} reflects health some time back in time, which may have influenced H_{it-r} (where r is a lag). That said, the influences of socioeconomic characteristics and others' health on the health outcome under study probably accumulate over time, so it would be theoretically reasonable to include both one-year and longer lags. Finally, there may be joint unobserved determinants of H_{it} or X_{it} (perhaps especially the former) on the one hand and Y_{it} on the other, which are not linked with D_{it} , in which case a control for H_{it} or X_{it} or would introduce a so-called collider bias.^[33]

Nevertheless, to get an idea about selection or mediation, we take a simple step (as in all other earlier studies we are aware of that address mediation) by including H_{it} or X_{it} in the relevant models of type (1), and also the corresponding interactions $S_i H_{it}$ or $S_i X_{it}$, which reflect that the effects of H_{it} or X_{it} may depend on whether the family is stable ($S_i = 1$) or not.^[34]

Indicators of whether the mother or father have moved in with a new partner or had a child with a new partner (Z_{it}) are relevant only after union dissolution^[35] and are thus possible mediators, although their causal direction vis-à-vis Y_{it} may, in principle, be ambiguous such as described above. Z_{it} was added to (1) in a separate step.^[36]

These parts of the analysis were restricted to years when the child was younger than 18 because H_{it} , X_{it} , and Z_{it} are particularly relevant determinants of the child's health at that stage.^[37]

Results

Parents' consultations

Mothers' and fathers' number of GP consultations for mental diseases goes up before the dissolution, especially in the last years (see Figure 1 and Table A1 in the Online Appendix, which show estimates of the β coefficients in model 1, that is, the level compared to the dissolution year). The predissolution increases are quite similar for mothers and fathers in absolute terms but are relatively stronger for fathers (Figure 1, standardized outcomes) because mothers generally have more consultations for mental conditions (Table 1). Immediately after the breakup, the number of consultations for mental diseases declines, most sharply in the first few years and for fathers. The level at the end of the observation period is higher than at the beginning, and most clearly so for mothers.

The predissolution pattern in parents' noninfectious physical diseases is less clear, although the number of consultations is somewhat higher in

FIGURE 1 Effects (with 95 percent CI) of time since union dissolution on the number of GP consultations (including standardized numbers) for mental diseases, noninfectious physical diseases, and infectious diseases among mothers, fathers, daughters, and sons (years 2006–2018)

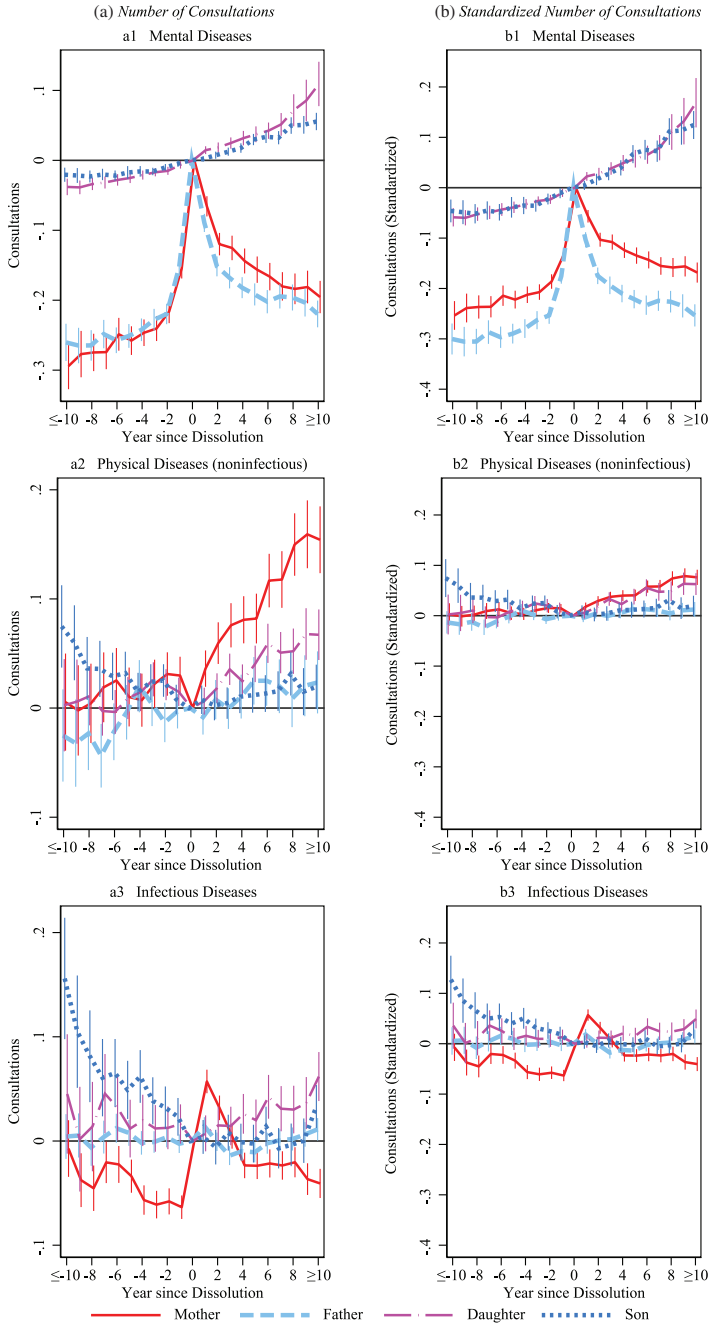


TABLE 1 Summary Statistics

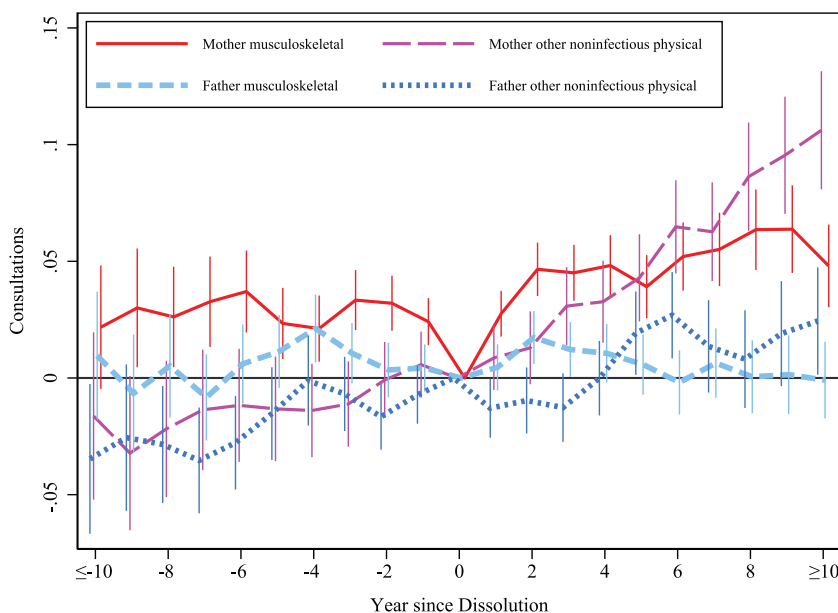
	Mothers	Fathers	Daughters	Sons
Average annual number of GP consultations among those experiencing dissolution, because of				
Mental diseases	0.392	0.256	0.076	0.066
Noninfectious physical diseases	1.282	0.961	0.516	0.486
Infections	0.597	0.348	0.723	0.646
Average annual number of GP consultations among those not experiencing dissolution, because of				
Mental diseases	0.165	0.084	0.064	0.046
Noninfectious physical diseases	1.168	0.915	0.523	0.467
Infections	0.456	0.298	0.663	0.582
Average age among those experiencing dissolution (years)	37.6	40.2	11.1	11.1
Average age among those not experiencing dissolution (years)	40.6	43.0	12.9	13.0
Number of observations in total (million)	4.443	4.443	2.152	2.291
Number of observations among those experiencing dissolution (million)	0.795	0.795	0.391	0.404
Number of observations among those not experiencing dissolution (million)	3.648	3.648	1.761	1.887

the last half decade before the dissolution than even more years before the dissolution. Among mothers, the number of consultations for such diseases falls in the year of the breakup, and then quickly returns to the earlier level, after which there is a sharper increase than prior to the dissolution. However, the upturn is weaker, and in a relative sense much weaker, than the predissolution rise in mental diseases. Fathers experience much less post-dissolution increase in noninfectious physical diseases than mothers.

The breakup dip in noninfectious physical diseases among mothers is driven by musculoskeletal diseases (Figure 2). Consultations for other noninfectious physical diseases increase quite smoothly before and after the dissolution—and more strongly in the latter period (when there is hardly any upturn in musculoskeletal diseases after the first couple of years after the dissolution). Among fathers, there are ups and downs in musculoskeletal diseases, and a weak upward trend in other noninfectious physical diseases both before and after the breakup.

Mothers have slightly fewer consultations for infections in the last four years before the dissolution than in earlier years, during which the number fluctuates. However, they experience an increase in infections in the year of the dissolution and the subsequent year (which is smaller than the predissolution rise in mental diseases), after which there is a three-year decline to the level observed several years earlier. In contrast, there is almost stability in fathers' infections before and after dissolution. Thus, the overall picture

FIGURE 2 Effects (with 95 percent CI) of time since union dissolution on the number of GP consultations for musculoskeletal and other noninfectious physical diseases among mothers and fathers (years 2006–2018)



is that parents do not experience the same long-term postdissolution rise in infections as in other physical diseases.^[38]

Children's consultations

There is an upward predissolution trend in consultations for mental diseases also for children, but it is weaker than for their parents both in absolute and relative sense (Figure 1). In contrast to the pattern among parents, however, this trend continues—and is actually reinforced—after the breakup. The increase is stronger for daughters than sons both before and after the dissolution but not in a relative sense. (See also sex interaction estimates in Table A2 in the Online Appendix).

There are more consultations for noninfectious physical diseases among daughters in the last years before the breakup than in earlier years (as among parents). This is followed by a smaller and broader dip than among mothers. In contrast, sons experience a downward predissolution trend. The number of consultations rises after the breakup, especially among daughters. Their increase is almost as large as that among mothers in a relative (but not absolute) sense. Importantly, there is a more adverse development after the breakup than prior to it both for daughters and sons (as for mothers, but not fathers).^[39]

A somewhat similar pattern can be observed with respect to infections: There is an irregular predissolution pattern among daughters and a clear decline among sons. After the breakup, there is an adverse trend in infections among daughters (but weaker than that in other physical diseases), while there is stability among sons.^[40]

Inclusion of time-varying selection factors or mediators

As mentioned, only observations when the child was younger than 18 were included when various time-varying factors were added. Restricting the above models to that age range has little impact on the results for parents, but there is no longer a sharper rise in consultations for mental diseases among daughters than among sons, while daughters have an even clearer disadvantage compared to sons with respect to infections (compare Tables A3–A5 with A1).

Inclusion of the three indicators of maternal and paternal health in the models for children did not change the key estimates much, although a somewhat sharper predissolution decline could be seen in the model for infections because of a quite sharp link between the parents' infections and the child's infections (Table A3 in the Online Appendix). The latter relationship was much weaker when the indicators of parents' health were lagged one year, so when these lagged variables were added to the models instead, the coefficients for time since dissolution were almost the same as when the parental health indicators were not included (not shown).

In another model, sociodemographic characteristics that may both affect (before the breakup) and be affected by the dissolution process were added. Some associations with the number of GP consultations appeared^[41], but the estimated effects of time since dissolution on consultations changed little (Table A4 in the Online Appendix).^[42] Then, four indicators of formation of new families, which are only relevant for the post-dissolution period, were added. Mothers' repartnering or childbearing with a new partner is linked to fewer GP consultations for them and, to a lesser extent, their children^[43], so in these models a less favorable or more adverse development after the breakup was estimated for all types of diseases for mothers and, less markedly, for children's physical diseases (Table A5 in the Online Appendix). An opposite pattern was observed for fathers, who would have experienced a more favorable or less adverse development in consultations for mental and noninfectious physical diseases if it were not for their formation of new families, which is linked with more consultations for these diseases.

Cohabitation versus marriage

There is less increase in mothers' and fathers' mental health consultations before a consensual union is dissolved than before marital separation, and

a less steep decline afterwards (see Figure 3 and interactions in Table A6 in the Online Appendix), even though the number of consultations is not generally lower among cohabitants (not shown). However, the difference between the end points (≤ -10 vs. ≥ 10) does not vary much by union type. Also, mothers' postdissolution increase in noninfectious physical diseases is less pronounced among cohabitants, and infection trajectories tilt more downwards or less upwards for all family members after a consensual union has been dissolved.

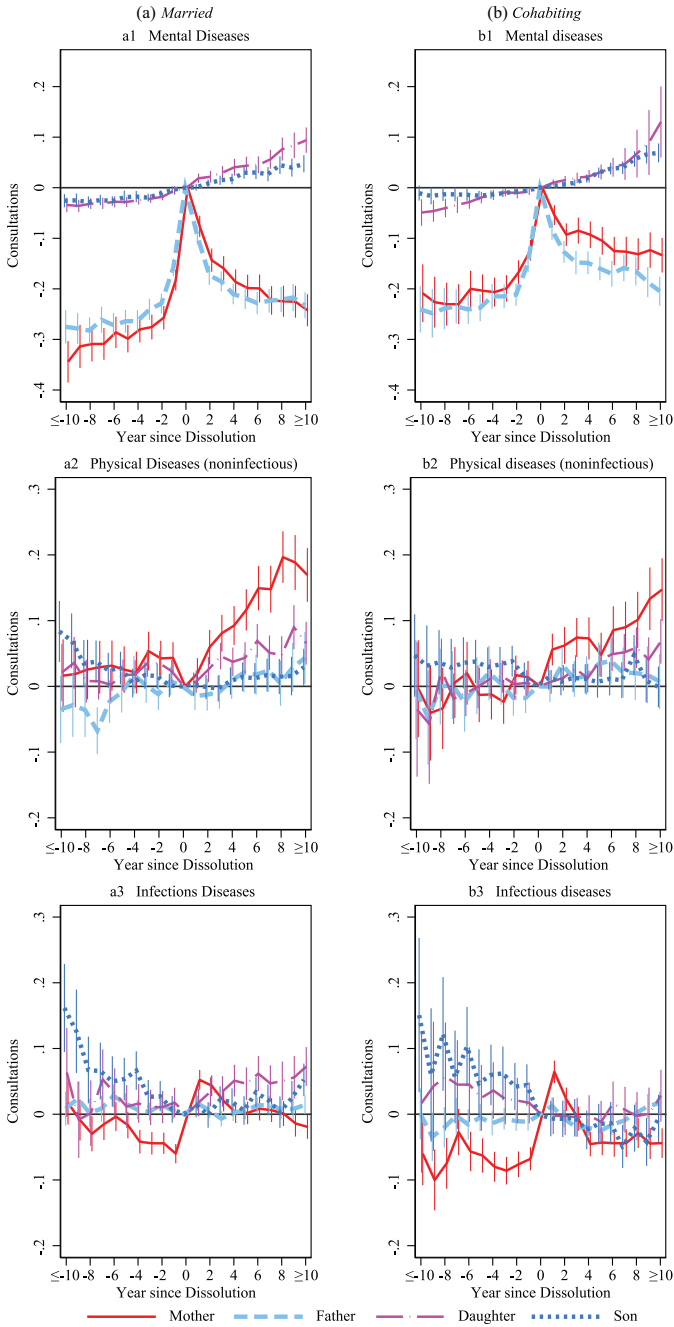
An interaction between age at dissolution and time since dissolution was added in supplementary analysis, but this had little impact on the estimated interaction between cohabitation and time since dissolution (not shown).

Additional robustness tests

As mentioned, the separation of time-since-dissolution (duration) effects and age effects is based on the assumption that differences in time since dissolution have no impact on the health outcome within the periods ≤ -10 years and ≥ 10 years^[44] and, more importantly, that the age effects in the large group of stable families that are also included are the same as among the dissolved families. To avoid making the latter assumption, but maintain relatively small standard errors, one may instead assume that time since dissolution has no impact within the broader category ≤ -5 and exclude the stable families. The results from such a model (Table A1 in the Online Appendix) are different primarily for sons, which is as one would expect from the main analysis. For sons (but not daughters), the main analysis showed a decline in consultations for physical diseases several years before the dissolution, that is, a reduction in consultations compared to what one would expect only as an effect of the higher age, estimated largely from stable families. This means that there are either early favorable effects of the coming breakup or that sons in dissolved families are on a more strongly declining age trend for consultations up to five years before the dissolution compared to sons in stable families. In the alternative setup, the former possibility is excluded, and the age effect is estimated from the variation within the period ≤ -5 . The age effect then becomes, of course, more negative. This obviously also means that the estimated postdissolution increase in consultations for physical diseases becomes stronger. Actually, this increase—and also that for mental diseases—is sharper for sons than daughters according to this alternative specification. Additionally, there is a lower predissolution increase in consultations for mental diseases among children according to this alternative model specification.^[45]

Note that only one child—the firstborn—was included from each family because it is methodologically simpler, and because one might suspect

FIGURE 3 Effects (with 95 percent CI) of time since union dissolution on the number of GP consultations for mental diseases, noninfectious physical diseases, and infectious diseases among mothers, fathers, daughters, and sons, according to the type of union (years 2006–2018)



effects of dissolution to vary by birth order (Sigle-Rushton et al. 2014).^[46] However, supplementary analysis of second-born children showed quite similar patterns, the clearest exception being a dip in infections in the breakup year (Table A7 in the Online Appendix).

Discussion and conclusions

Parents' mental health

Assuming that increases (decreases) in GP consultations reflect poorer (better) health, and not only differences in health care usage (see below), the results suggest that deteriorating relationship quality before dissolution leads to poorer mental health for the parents (see main findings summarized in Table A8 in the Online Appendix). In fact, this predissolution weakening of parents' mental health is stronger than their postdissolution decline in physical health (most clearly seen if it is compared with how common these diseases generally are), and it is also stronger than any of the health setbacks before or after the breakup for children.

The decision to dissolve a relatively poor relationship is typically a result of at least one partner expecting that this, after all, will make life better, at least in the longer run and compared to how the further development of the relationship might have been. Our results indicate that there indeed is an improvement in mental health, which even comes immediately. This is in line with the idea about dissolutions causing a temporary crisis. Also other studies have shown an immediate decline in mental health problems after the dissolution (Andreas and Bröckel 2007; Blekesaune 2008; Dahl, Hansen, and Vignes 2015; Kravdal, Wörn, and Reme 2022; Leopold 2018; Tosi and van den Broek 2020), or from a short period before divorce, which may coincide with the time of the actual dissolution (Metsä-Simola and Martikainen 2013), but there are also researchers who have observed an immediate worsening after a breakup, followed by a decline (Kalmijn 2017), or an adverse predissolution development and no subsequent decline (Johnson and Wu 2002). The apparently poorer mental health in the long run compared to some years before the breakup accords with an earlier study not including fixed effects (Metsä-Simola and Martikainen 2013).

Parents' physical health

The pattern in consultations for noninfectious physical disease, with a dip around the breakup among mothers, may appear rather strange in light of earlier empirical studies and existing ideas about a possible adverse trend before the dissolution and over at least some time afterwards. However, the dip is a result of musculoskeletal diseases. If these are excluded—which may

be a reasonable step to take also in future investigations—the development is more in line with the increase one might expect.

Before elaborating on the latter, let us speculate briefly about the results for musculoskeletal diseases, which have received little attention in earlier studies of dissolution^[47]: One possible explanation may be that physicians relatively often register mothers' musculoskeletal symptoms—which may be a result of not only physical but also mental burdens (Buscemi et al. 2019)—as a mental health problem around the time of a breakup, while they would be more inclined to register the same symptoms as musculoskeletal problems in earlier and later years. If so, this also means that the peak in mental diseases commented on above may be “artificially high” in those years. The fact that the development in musculoskeletal diseases does not, in the same way, look like a mirror image of that in mental diseases for fathers is not easy to understand, though.^[48]

Consultations for other noninfectious physical diseases than those in the musculoskeletal system rise weakly before the breakup, which adds to the more clearly adverse trend in mental health at that stage. Even more interestingly perhaps, mothers experience an even stronger increase in such diseases after the dissolution, which may be considered as fitting with an idea about chronic and even accumulative strain. Fathers, however, do not experience a sharper decline in physical health after than before the dissolution—only a rather weak constant worsening. These features may reflect various postdissolution life challenges for women in particular (further discussed below) and may be taken to suggest that their development in physical health would have been better without a breakup. However, sharp conclusions about this should not be drawn, as one cannot be sure that an extrapolation of the predissolution trend would serve as a reasonable counterfactual.

The difference between the changes in mental and physical health is quite remarkable: There is a predissolution deterioration in mental health, while physical health declines only slightly, and then a somewhat clearer postdissolution weakening of physical health for mothers (like some sort of delayed response), while mental health outright improves for both sexes. It is, of course, possible that physical health improves later, when the time since the breakup increases beyond the window that could be analyzed with the available data, but it is also possible that there is further deterioration of physical health, as part of a continued accumulation of various types of disadvantages. Anyway, also other studies have shown an adverse postdissolution development in physical health—for men (Couch, Tamborini, and Reznik 2015) or both sexes (Leopold 2018) —while Kalmijn (2017) observed constant physical health at this stage.

The pattern in infectious diseases is rather different from that in noninfectious physical diseases, as expected, but also quite different from that in mental diseases. There is, on the whole, quite little change except for

the very weak indications of a predissolution *decline* for mothers and the sharp temporary upsurge they experience after the breakup. One might instead have expected the otherwise poorer health before the dissolution to enhance infection susceptibility, or that a deteriorating parental relationship could lead to a more stressful life situation with less attention to hygiene. Perhaps this is outweighed by less use of health care for infections in particular (but not other diseases). The temporary upsurge may partly be a result of short-lasting exhaustion (not necessarily diagnosed as a mental health problem) or changes in the contact with other people.^[49] The lack of a similar infection response to a breakup among fathers is striking. An earlier cross-sectional analysis showed an increased risk of infections among the divorced in general (Nielsen et al. 2014) not only among the recently divorced women as in this study.

Children's mental health

The weaker predissolution decline in mental health among children (barely visible with an alternative model specification) compared to parents may reflect that they are not so strongly influenced by the parents' relationship problems at this stage. More importantly, children's mental health seems to deteriorate after a dissolution, and actually even sharper than earlier, while parents' mental health improves. In other words, the development of children indicates chronic or accumulative strain, while that among parents indicates a temporary crisis. This postdissolution development among children fits with other research showing more mental health problems after than before a breakup (Amato and Anthony 2014; Cherlin, Chase-Lansdale, and McRae 1998). However, the existing evidence is not consistent: An investigation with a design similar to ours showed increasing behavior problems among children before the dissolution, with no further change afterwards (Aughinbaugh, Pierret, and Rothstein 2005). Anyway, while the results may be taken to suggest that dissolution itself benefits only the parents' mental health, and not that of the children, one should be careful to draw such a conclusion, as extrapolation of the predissolution trend among children may not tell us how they would have fared had their parents not broken up.

Children's physical health

One may say that, on the whole, children's risk of noninfectious physical diseases changes little before the dissolution: There are indications of an increase for daughters (as for parents) and a decline for sons.^[50] Deterioration more definitely sets in after the breakup, however. Especially the daughters experience, like the parents (mothers in particular), a worsening of their noninfectious physical health at this stage, and for both sons and daughters

there is at least a more adverse development after the dissolution than prior to it (as for mothers). Something similar was found by Goisis, Özcan, and Van Kerm (2019), who with a design similar to ours showed that children's body mass index (BMI) was stable before the dissolution and shortly afterwards, and then increased. However, other evidence about children has been rather mixed (Gaydosch and Harris 2018).

The predissolution reduction in infections that appears especially for sons is, like the weak indication in this direction for mothers, not easy to explain.^[51] Likewise, we cannot see any reasons why daughters experience slightly more infections in the long run after a breakup, in contrast to a temporary increase among mothers and no increase among fathers and sons.

Our quite simple mediation analysis suggests that dissolution effects on children's health do not operate through parents' health, but it is, of course, possible that more advanced models that somehow take the ambiguous directions of causality into account—or perhaps allow effects of parents' health on children's health to vary with time since dissolution—might have given other results. One should also keep in mind that parents' health is unlikely to be fully captured by our indicators. In principle, other (unmeasured) aspects of their health situation may play a role as mediators.

Additional comments on gender differences

Union dissolution in Norway appears, on the whole, to be more strongly associated with adverse health outcomes for mothers than for fathers, which is not an obvious expectation from the theoretical ideas or existing empirical literature. In particular, mothers experience a stronger postdissolution deterioration of physical health, as well as a temporary increase in infections that is not observed among fathers.^[52] Admittedly, and in accordance with an earlier study (Metsä-Simola and Martikainen 2013), fathers' mental health seems to be more adversely affected than mothers' in the predissolution period, at least in the relative sense. However, they also experience a stronger decline afterwards, so the long-term development is worse for mothers. Some of these maternal disadvantages may seem reasonable in light of women's often larger responsibility for the children after a dissolution and their lower income (while they may have an advantage in terms of a larger social network). It is also possible that men, in particular, are less inclined to seek help for their health problems when they no longer have a partner, in which case their actual health response to a breakup would be more adverse than suggested by our estimates.

The conclusions about sex differences are less clear for the children. Daughters experience slightly worse development in mental health than sons and a sharper postdissolution increase in consultations for noninfectious physical diseases and infections. It is conceivable that boys tend to be

less influenced by a parental conflict and subsequent dissolution. However, it is difficult to explain why sons' physical health shows outright improvement as a result of a coming breakup, and it is even more difficult given the lack of such a pattern for daughters. The alternative explanation would be that the pattern for sons is not a result of an impending dissolution, but that sons in dissolved families are on a more favorable age trajectory before the dissolution process starts as compared to sons in stable families. Such a difference, and its restriction to sons, would not be easy to understand either. Anyway, if a model in line with that idea is specified instead, the sex pattern is reversed: Sons are doing less well in all three health dimensions than daughters after a dissolution.

Also, the daughter disadvantage over sons in mental health disappears when only observations below age 18 are included, while this restriction gives a particularly strong daughter disadvantage in infections. In other words, the findings are not very robust and rather difficult to explain, so firm conclusions about the gender differences among children should not be drawn.

A problem in all such comparisons between the sexes is that some health responses may not be well captured by the data that are used, and that these responses may be more common among one of the sexes (Simon 2002). In our case, the most relevant concern is perhaps that various types of externalizing behavior (often not resulting in a GP diagnosis) are more common among males, and that their total health burden therefore may be underestimated.

Selection and mediation

One might suspect that parental educational achievements or school enrolment, parental income, the number of grandparents living nearby, or a new child being born to the parents could influence relationship quality and the chance of breakup, as well as health. Additionally, these factors may be on the pathway between relationship quality or breakup and health. It turned out that their inclusion did not change the main results, which is "convenient" because, if there had been a change, one would not know whether some of the selection had been accounted for, or whether part of the causal effect of lower union quality or dissolution had been tapped out.

Maternal and paternal repartnering and further childbearing, which are only relevant factors after the dissolution and cannot be selection factors, also play a quite modest role. However, especially the mothers' health—and to a lesser extent that of their children—had become worse after the breakup had it not been for their tendency to form new relationships and have children in these. One might have expected a new child or half-sibling to contribute to a rise in at least some types of infections, for example, because of disease transmission from that child^[53], but that is apparently outweighed by counteracting mechanisms.

To conclude, this simple analysis of selection and mediation (see qualifications in Methods section) indicates that effects of time since (and before) dissolution on health must operate largely through other time-varying factors than those included, or they may reflect selection because of other factors.

Cohabitation versus marriage

Dissolutions of consensual unions may be expected to be more problematic than marital separations because of other rules for distribution of property. An argument pointing in the opposite direction is that cohabitants may have lower relationship quality or live more separate lives, so that there perhaps is less to lose when the union is dissolved. Some of our estimates suggest that separations are more harmful (even when the higher age of the child and the parents at dissolution is taken into account), and thus indicate that the latter type of mechanism dominates, but other results do not support such a pattern. In particular, while there is less adverse development in mental health among cohabitants (vs. the married) before a breakup, the subsequent decline is also weaker, and the difference between the start- and end-point is roughly the same. Socioeconomic resources, life values, and other factors likely influence the choice of cohabitation rather than marriage, and may also moderate dissolution effects, but whether addition of interactions with such variables could explain some of the observed patterns was not empirically assessed.

Limitations

On the positive side, this study addresses the development over a quite long period before and after the dissolution of a consensual union or a separation and is based on a large dataset. However, one important limitation is that, while unobserved time-constant characteristics are controlled for along with some time-varying variables, there may be additional time-varying confounders. For example, it is possible that certain job characteristics have implications both for health and the likelihood of dissolution (through availability of potential alternative partners or otherwise). Furthermore, reverse causality is not taken into account by the fixed-effects approach (see simulations in Kravdal, Wörn, and Reme 2022): In principle, the observed development may partly reflect that health problems contribute to reduced relationship quality and dissolution. Also, no attempt is made to separate out the effect of the dissolution itself (given relationship quality), which is always difficult; the analysis only shows health changes across what may be referred to as a dissolution process, when effects of the concomitant age increase are taken into account.

An additional concern is that the number of GP consultations reflects not only whether the person has a health problem, as assumed in most parts of the discussion so far, but also whether professional help is sought for that problem.^[54] While differences between individuals in their general inclination to use health services are controlled for through the individual fixed effects, it is possible that a dissolution or a low relationship quality leads to a *change* in this inclination. For example, parents' distress because of such a situation may make them less likely to contact physicians because of their own or their children's health problems (while a worsening economic situation may matter less in the Norwegian public health care setting). Also, no longer having a partner may itself reduce the chance of seeking help, perhaps especially for men. In principle, such factors may have contributed, for example, to the postdissolution decline in GP consultations for mental disease. Similarly, the increase with respect to physical diseases might actually be stronger than indicated by the number of consultations.

Furthermore, the analysis is based on information only about dissolutions after 2005, which means that the follow-up period is a maximum of 13 years and very long-term consequences cannot be analyzed.^[55] Also, no subgroups of mental diseases and only three subgroups of physical diseases have been considered (infections, musculoskeletal diseases, and other physical diseases). This is potentially problematic because the distribution of various categories of these main groups of diseases may vary between adults and children. It is, for example, possible in principle that the development in mental health burdens that are particularly relevant for adults contributes greatly to their improved mental health after a dissolution, while they experience a more adverse development in types of mental problems that they to a larger extent share with children.

An additional weakness is the methodologically very simple analysis of potential mediators and especially how effects on children's health may operate through parental health (although earlier studies have not been more advanced). There is also modest information about potential mediators in the available data. Another limitation is that we have not taken into account that associations between dissolution and health may vary with the family's socioeconomic resources or other family or community characteristics. Also, the data do not include adequate information about custodial arrangements. It might have been informative to, for example, compare outcomes between mothers and fathers who have joint custody, and between maternal and paternal sole custodians (Bauserman 2012). Similarly, effects of custodial arrangements on children's well-being are an important issue (Baude, Pearson, and Drapeau 2016). It should also be noted that we cannot really know when observing a change in health several years before the dissolution whether this is indeed a very early effect of a breakup, or if the individuals are on another age trajectory than the stable families from

whom the age effects are largely estimated. If we assume that the latter is the case, by instead estimating the age effect from the variation in consultations more than five years before (and 10 years after) a breakup, some of the results change, although fortunately most do not. Finally, it is important to keep in mind that health effects of family transitions may vary between countries. In particular, the rather generous social welfare policies in Norway (Baran et al. 2014) may make breakups less burdening than elsewhere. It is also possible that the effects of dissolved marriages would be more different from the effects of dissolved consensual unions in settings where these living arrangements are more different than they are in Nordic countries.

Implications

A key result is that parents' mental health declines before the dissolution and subsequently improves, in line with the so-called crisis model, while children's mental health deteriorates more after the breakup than before. The postdissolution physical health is generally stable or worsening, with clearer differences between mothers and fathers and possibly also differences between daughters and sons. Knowledge about such patterns may be important to friends and relatives who try to be supportive, to health care personnel and others with professional responsibility for providing support, and to politicians and planners involved in setting up and funding such welfare services. In particular, the results may strengthen the probably common view that one should have a special eye on the children, as it seems that they may have increasing mental problems after a dissolution even if parents do not. Awareness of the health trajectories may even benefit couples making decisions about a breakup, although caution is required—not least because their situation may differ much from the average and the analysis is not based on adequate knowledge about how the studied family members would have fared if the unions had remained intact. Finally, our study may serve as an illustration to other scientists that important insights may be gained through a longitudinal joint analysis of mothers, fathers, and children, with attention to multiple health outcomes both before and after the dissolution. It will hopefully be possible in future research along these lines to avoid some of the weaknesses we have pointed out.

Acknowledgments

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Data availability statement

The data used in this study are reckoned as highly sensitive. They can only be used in collaboration with the Centre for Fertility and Health at the Norwegian Institute of Public Health, and to examine how individuals' reproduction and family situation may affect their health.

Conflict of interest

The authors have no conflict of interest.

Ethics approval

Ethical approval for the use of the data was obtained from the Regional Committees for Medical and Health Research Ethics (approval # 2018/434).

Note

The notes [numbers in brackets] refer to “Supplementary notes” that can be found in the Online Supplemental Materials along with an appendix that includes a figure (A1) and some tables (A1–A8).

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