Divorce and the growth of poverty gaps over the life course: A risk and vulnerability approach

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Abstract

Previous research has suggested that divorce drives cumulative inequality between education levels over the life course. Two pathways play a role in this process. One pathway concerns the educational gradient in the risk of experiencing a divorce. The other pathways concerns the educational gradient in economic vulnerability to a given divorce. To date, these pathways have been studied in isolation, and so it remains unclear whether divorce drives inequality. In this study, we simultaneously analyzed both pathways to examine how divorce drives the growth of poverty gaps between education levels over the life course. We used longitudinal administrative data from the Netherlands. These data covered all young individuals who entered their first marital union between 2003 and 2005, over a period of 10 years. We found that lower educated individuals were at higher risk of divorce, and more vulnerable to its poverty consequences. A decomposition analysis showed that both pathways contributed substantially to the growth of poverty gaps between lower and higher educated individuals. However, there were important differences between men and women, and between individuals with and without children. Lower educated childless men, childless women and mothers fell behind due mainly to their greater divorce vulnerability. Lower educated mothers also fell behind due to their higher divorce risk. Lower educated fathers were poor as well, but this was not related to divorce. These findings confirm that divorce acts as a driver of cumulative inequality. They also demonstrate the fruitfulness of a risk and vulnerability approach to social gaps.

Keywords Administrative data; Divorce; Decomposition; Inequality; Poverty

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1 Introduction

Divorce rates in Europe and the United States have increased markedly over the past half century (Amato and James 2010). More recently, divorce rates have stabilized at a high level due to marriage postponement and the rise of cohabitation (Kennedy and Ruggles 2014). These trends are often considered within the context of the second demographic transition (Lesthaeghe and Van de Kaa 1986; Van de Kaa 1987).

Several authors have linked the second demographic transition, and particularly the rise in divorce rates, to increased economic inequality (Haskins 2015; Lundberg, Pollak, and Stearns 2016; McLanahan 2004). Implicit in this work is the idea that higher educated individuals are concentrated in an advantageous life-course trajectory of postponed family formation and marital stability. Lower educated individuals more frequently enter an adverse trajectory of postponed family formation and divorce. The consequence would be that higher educated individuals accrue the continuous economic benefits of a stable marriage, whereas lower educated individuals incur prolonged economic losses from the adversities following divorce.

These arguments suggest that divorce may act as a major driver of cumulative inequality (Dannefer 1987; Ferraro and Shippee 2009). This accumulation consists in lower educated individuals starting off relatively poor, and falling behind further due to the stratified experience of divorce. Two pathways play a role in this process. The first pathway is the educational gradient in the *risk* of divorce, whereby lower educated individuals are more likely to experience a divorce (Härkönen and Dronkers 2006; Martin 2006). The second pathway is the educational gradient in *vulnerability* to divorce, whereby lower educated individuals are more likely to fall into poverty when a divorce occurs (Smock 1994; Vandecasteele 2010).

Surprisingly, however, the degree to which divorce drives the growth of poverty gaps has only been assessed partially. This is because previous research has not analyzed both pathway from divorce to poverty gaps simultaneously. It has either studied the risk gradient, assuming that divorce has equal poverty consequences across education levels; or has studied the vulnerability gradient by conditioning the sample to divorcees, ignoring the differential risk of getting a divorce in the first place.

The present study is the first that empirically assessed how divorce contributes to growing poverty gaps. To accomplish this, we set forth a novel approach that combines both the unequal risk of divorce and the unequal vulnerability to divorce. In this way we were able to examine how educational differences in divorce risk and vulnerability contribute to growing poverty gaps between education levels throughout the early and middle stages of the adult

life course. An advantage of this approach concerns its links to policy. If poverty gaps grow due largely to the risk gradient, this could warrant policies that reduce the divorce risk for the lower educated. If poverty gaps grow due largely to the vulnerability gradient, this could warrant policies that cushion the lower educated against the poverty consequences of divorce. An additional advantage of this approach is that it easily extends to other stratification research and policy.

Analyses were conducted using longitudinal administrative data from the Netherlands. The main benefit of these administrative data compared to survey data was the absence of (selective) attrition. Moreover, the large case numbers and long observation window enabled us to paint a detailed picture across important subgroups. We studied the role of divorce in growing poverty gaps not only for the overall population, but also separately for mothers, fathers, childless women, and childless men. Using decomposition analysis, our results showed that divorce contributes substantially to growing poverty gaps between education levels over the life course. However, the relative importance of the risk and vulnerability pathways differed greatly between subgroups.

2 Theoretical background

2.1 Divorce and poverty gaps

Divorce implies changes in household composition of great economic significance. Perhaps the most important change is the loss of partner income, as most married couples partially pool their incomes (Heimdal and Houseknecht 2003). Access to such pooled income is barred upon divorce. Another change concerns the loss of economies of scale. Couples save almost one third of total expenditures compared to singles (Browning et al. 2013). When there are children involved, divorce poses an additional challenge. Their cost of living are borne by the resident parent alone, and this is often not sufficiently compensated for by child support payments.

A vast literature has demonstrated the economic consequences of divorce for men and women with and without children (e.g. Hoffman and Duncan 1988; Holden and Smock 1991; Jarvis and Jenkins 1999; Kalmijn 2005; Poortman 2000). Men tend to experience little changes in their economic situation. They may be more likely to receive unemployment or disability benefits following divorce, but these effects are short-lived. Spousal alimony and child support typically consume only a small part of their incomes. Women, in contrast, rely heavily on partner income. In most cases they also become the resident parent when children are involved. Hence, they experience sizable drops in household income, per capita income and income-to-needs ratios. As a consequence, many women and especially mothers

fall into poverty.

Especially falling into poverty poses a serious threat to the well-being of families. Poverty during adulthood has been associated with heavy drinking, increases in blood pressure and cholesterol, and higher mortality (Crimmins et al. 2009; Mossakowski 2008). Poverty during childhood has been associated with adolescent obesity, school grade repetition, and lower adult income (Duncan et al. 2010; Lee et al. 2014). These relationships are mostly nonlinear, indicating that falling into poverty is more detrimental than losses higher up the income distribution.

The connection between divorce and poverty is not uniform across education levels, but is stratified along two pathways. The first pathway is the risk gradient, whereby lower education levels are more likely to divorce. The second pathway is the vulnerability gradient, whereby lower education levels are more likely to fall into poverty when a divorce occurs. In the following sections, we discuss these pathways and how they jointly drive poverty gaps over the life course.

2.2 Gradient in risk

Goode (1962; 1963) has provided an explanation as to why the risk of divorce differs between socioeconomic strata. The core premise is that marriages in lower socioeconomic strata experience more internal strain. Such strain could stem from economic hardship, problems in the social network or greater substance abuse (Trail and Karney 2012). Whether the strain of lower socioeconomic strata results in divorce, depends on prevailing social, economic and legal barriers to divorce. As long as these barriers are high, divorce is easier for the higher strata, who are resourceful enough to work around the barriers. Over the past decades, however, societal changes such as increased acceptance of divorce, increased female labor force participation and unilateral divorce legislation have lowered the barriers to divorce. According to Goode, this would allow the higher marital strain of lower strata to express itself in the form of higher divorce rates. The result is a negative gradient in divorce risk, meaning that the lower strata are more likely to divorce.

Empirical findings are in line with Goode's prediction. Social barriers to divorce appear to be an important explanation of variation in the educational divorce gradient across countries and periods (Härkönen and Dronkers 2006; Matysiak et al. 2014). In those countries and periods in which divorce, extra-marital births and cohabitation are more common, the educational gradient in divorce is more negative. Higher female labor market participation entails a more negative educational gradient in divorce as well.

Studies have also shown that, currently, most countries exhibit a negative divorce gradient. Lower educated individuals are at higher risk of divorce in Germany (Cooke 2006), Fin-

land (Jalovaara 2003), Japan (Raymo et al. 2004), the Netherlands (De Graaf and Kalmijn 2006), South Korea (Park and Raymo 2013), the United Kingdom (Berrington and Diamond 1999) and the United States (Martin 2006), among other countries. The negative gradient is substantial in many countries, including the United States. Of all US women married between 1990 and 1994, 14% of those with a master's degree divorced within 10 years, compared to 38% of those who completed high school, and 46% of those without a high school diploma. Although none of these studies distinguished between parents and childless couples, we expect the risk gradient to be stronger among parents, as children put an additional economic burden on strained families. A study that found higher perceived parental strain among lower educated mothers indeed points in this direction (Nomaguchi and Brown 2011).

2.3 Gradient in vulnerability

Divorce vulnerability was expected to follow a negative gradient as well. The lower educated are concentrated at the lower tail of the income distribution, and so the loss of partner income increases their chance of dropping below the poverty line. An important reason as to why we expect that they suffer longer from this, is that their prospects of recovering from divorce are poorer. Two main economic recovery strategies are available, repartnering and (re)employment. Repartnering has been shown to be less common among the lower educated than the higher educated (Wu and Schimmele 2005), leaving them on a single income for a longer time. Employment is also a less viable strategy for the lower educated, since their lower earning capacity yields them fewer benefits from increasing their labor market participation.

Empirical evidence on the vulnerability gradient is scarce. In contrast to the risk gradient, there are no literature reviews on this topic. Table 1 therefore presents an overview of all longitudinal studies that included education level as a moderator in the relationship between divorce and economic well-being. Some studies have confirmed that the economic consequences of divorce are more severe for the lower educated (Brewer and Nandi 2014; Mauldin 1991; McKeever and Wolfinger 2001; Poortman 2000; Smock 1994; Vandecasteele 2010). Others have found no educational differences (Uunk 2004) or have found that they are more severe for the higher educated (Bernardi and Boertien 2016; Jansen et al. 2009; Smock et al. 1999; Tach and Eads 2015; Vandecasteele 2011). A possible reason for these inconsistencies is the use of different outcomes, as vulnerability in terms of losing household income is different from vulnerability in terms of falling below the poverty line. Other possible reasons are selective panel attrition or variation in the observation window. Moreover, all of the studies listed in Table 1 included the vulnerability gradient as a control variable rather than the problem of interest.

Table 1 Overview of longitudinal studies on the educational gradient in divorce vulnerability

Paper	Country	Outcome(s)	Main effect	Gradient	Panel	Comments
Mauldin (1991)	United States	Poverty	-	Stronger for lower education	NLS-YW	Only women.
Smock (1994)	United States	Per capita income	- (women) + (men)	Stronger for lower educated	NLSY79	
Smock et al. (1999)	United States	Income-to-needs ratio, household income	-	Weaker for lower educated	NSFH	Only women.
Poortman (2000)	Netherlands	Equivalized household income	-	Stronger for lower educated (men) No difference by education (women)	SEP	
McKeever and Wolfinger (2001)	United States	Household income, per capita income	-	Stronger for lower educated	NSFH	Only women.
Uunk (2004)	European Union	Equivalized household income	-	No difference by education level	ECHP	Only women.
Jansen et al. (2009)	European Union	Total household income, equivalized household income	-	Weaker for lower educated	ECHP	
Vandecasteele (2010)	Denmark, Germany, Spain, United Kingdom	Poverty	-	Stronger for lower educated	ECHP	
Vandecasteele (2011)	European Union	Poverty entry	- (women) 0 (men)	Weaker for lower educated	ECHP	
Brewer and Nandi (2014)	United Kingdom	Equivalized household income, poverty	-	Stronger for lower educated	BHPS	
Tach and Eads (2015)	United States	Equivalized household income	-	Weaker for lower educated	SIPP	Only women.
Bernardi and Boertien (2016)	United Kingdom	Household income	-	Weaker for lower educated	BCS70	In footnote 9.

The roles of gender and parenthood in the vulnerability gradient have not been explored to date, but it is likely that they are important. Regarding gender, lower educated women specialize more often in unpaid housework than higher educated women (Craig and Mullan 2011). The resulting depreciation of their human capital renders them especially vulnerable to divorce, suggesting that the negative gradient in divorce vulnerability is stronger among women than men. Regarding parenthood, child custody represents a barrier to employment and implies that the post-divorce household income is shared with more household members. The process of custody assignment is also gendered. Child custody is typically granted to women, and even more so among families with lower incomes (Cancian et al. 2014). These differences suggest that the gradient in vulnerability is most negative among mothers, less negative among childless men and women, and least negative among fathers. Empirical evidence on these subgroups is scarce. One study has found a stronger negative gradient

among men (Poortman 2000), yet another study did not find gender differences (Jansen et al. 2009). A study accounting for parenthood has found that mothers are always economically vulnerable to divorce, irrespective of education, whereas fathers and childless men and women are vulnerable only if they are lower educated (Brewer and Nandi 2014).

2.4 The present study

Assessing the role of divorce in the growth of poverty gaps over the life course requires attention to both the risk gradient and the vulnerability gradient. Limiting the study to the risk gradient would assume the divorce consequences to be equal across all education levels, ignoring differential vulnerability. Limiting the study to the vulnerability gradient would condition the sample to divorcees, ignoring differential risk of getting a divorce in the first place. By paying attention to both, we could examine not only whether lower educated individuals are at higher risk of divorce, but also whether they are more likely to fall into poverty when a divorce occurs.

Poverty gaps were defined along educational lines rather than other stratifiers. The main reason is that educational attainment is a stable indicator of social status. Other indicators of social status, such as employment status, income or occupational prestige, are more likely to change during the adult life course. Moreover, some of these changes may be related to divorce, making it difficult to compare these indicators over time.

By examining the contribution of divorce to growing poverty gaps, we grounded this study in the cumulative inequality literature (Dannefer 1987; Ferraro and Shippee 2009). The central tenet of this literature is that individuals in advantaged positions are channeled into a beneficial trajectory, whereas individuals in disadvantaged positions are channeled into an adverse trajectory. Compared to the beneficial trajectory, the adverse trajectory consists in higher exposure to unfavorable experiences (risk) and lower ability to cope with them (vulnerability). Following this trajectory, the relative position of disadvantaged individuals falls further behind, leading to an increase in social inequality over the life course. Translated to the present study, the idea was that lower educated individuals start off their marriage with higher poverty rates than higher educated individuals. As time goes by, the educational gradients in divorce risk and divorce vulnerability result in a growth of the poverty gap. Divorce was thus expected to act as a driver of cumulative inequality.

3 The Dutch context

As we used administrative data from the Netherlands, it is important to describe the specific aspects of divorce in this country context. All divorces in the Netherlands are considered no-fault. Spousal alimony and child support are arranged with or without intervention of

a judge. When there are children, legal custody is by default exercised jointly, although in practice the majority of children reside with their mother (De Graaf 2005). In 2009, approximately 1% of male divorcees and 17% of female divorcees received spousal alimony of on average 1035 EUR per month (Statistics Netherlands 2018a). Approximately 25% of all divorces included a judicial decision on child support of on average 395 EUR per month (Statistics Netherlands 2018b). These figures are fairly comparable to the United States, where in 2009 approximately 0.2% of male divorcees and 3% of female divorcees received spousal alimony of on average 1010 USD per month. Around 36% of US divorcees paid or received child support of on average 465 USD per month (US Census Bureau 2018).

The Netherlands represents a strong one-and-a-half breadwinner model. On the one hand, employment rates are high compared to the United States and most European countries. Employment rates were 75% for single men, 64% for single women, 87% for partnered men, and 71% for partnered women in 2009 (Statistics Netherlands 2018c). On the other hand, only 25% of women work full-time, compared to 77% of men. These differences are larger among individuals with a partner or with children (Statistics Netherlands 2018c).

Educational attainment is an important predictor of employment. The 2009 employment rates were 62% for lower, 81% for middle, and 88% for higher educated individuals (EuroStat 2018). Poverty rates are relatively low in the Netherlands. In 2009, the poverty rate defined as a disposable income below 60% of the national median amounted to 10.3% (EuroStat 2018). This is far lower than the United States (20.7%), somewhat lower than the Germany (15.8%) and the United Kingdom (14.8%), and similar to Iceland (9.9%). However, Dutch poverty rates differ greatly by education level. The 2009 poverty rates were 7.1% among the higher, 11.3% among the middle and 12.2% among the lower educated (EuroStat 2018).

Like in most industrialized countries, the Netherlands has witnessed an increase in the risk of divorce among later cohorts. This increase was almost entirely driven by the lower educated. As a result, the positive gradient in divorce risk that was observed for the 1942-1964 Dutch marital cohorts has reversed into a negative educational gradient for later cohorts (De Graaf and Kalmijn 2006). Marriage and divorce rates are now similar to those in other countries (OECD 2018). The 2009 crude marriage and divorce rates in the Netherlands were respectively 4.4 and 1.9, comparable to Germany (4.6 and 2.3), Iceland (4.6 and 1.7) and the United Kingdom (4.3 and 2.0). They deviate more from the United States, which is characterized by both high marriage and high divorce rates (6.8 and 3.5). Approximately 57% of Dutch divorces involves at least one child, similar to other European countries (UNSD 2009).[1]

Regarding economic vulnerability to divorce, the Dutch welfare state is relatively gen-

[1]There are no official statistics of the United States regarding the number of children involved in divorce.

erous albeit with corporatist features (Arts and Gelissen 2002). Family care activities help to accumulate unemployment benefits and exempt individuals from the work availability condition. No distinction is made between full-time and part-time employment. Statutory child allowances are moderate, and paid parental leave high in amount but very short in duration compared with other European countries (Saraceno and Keck 2010). Both are more extensive than in the United States. Besides social insurance, social assistance provides a safety net at the lower tail of the income distribution. Social assistance is a means-tested scheme that covers all residents in the Netherlands. It tops up income to 70% of full-time minimum wage earnings. Nonetheless, social assistance payments lie below the poverty line.

4 Data and method

4.1 Data

We used individual-level administrative data from Statistics Netherlands, spanning the years 2003 to 2015. These data comprise information about all individuals with a Dutch social security number, which is granted to every citizen at birth and to everyone else with legal residence in the Netherlands. Each individual has one unique social security number, which government agencies use to register individual data.[2] Data for this study proceeded from the municipal resident registers, registers for secondary and tertiary education, public employment service, social insurance bank and tax returns.

Our population consisted of individuals aged 18 to 35 who entered their first marital union. The lower age bound represents the minimum age of marriage in the Netherlands. The upper bound represents the age at which most first marital unions in the Netherlands have formed and in which labor market careers and families are typically established (Mulder et al. 2006). We excluded individuals enrolled in full-time education after union formation. Students are different in terms of nuptial and fertility behavior, due to role incompatibility (Ní Bhrolcháin and Beaujouan 2012). Furthermore, poverty among students is a temporary phenomenon that is not indicative of long-term economic well-being. We focused on marital unions only. Ideally, consensual unions would have been included too, but cohabitation could not be reliably identified in the data. From our population, we selected the marital cohorts of 2003, 2004 and 2005. These cohorts could be followed (at least) 10 years. This yielded an overall population size of 177,083 individuals.

We defined four subgroups within this population, namely childless men, childless women, fathers, and mothers. We distinguished between these subgroups to examine differences

[2]Under certain conditions, these microdata are accessible for statistical and scientific research. For further information: cvb@cbs.nl.

in risk and vulnerability gradients, which are likely to differ by gender and parenthood. The four subgroups were analytically defined as follows. When we speak of childless men or women, we refer to individuals who did not have children before divorce or within 10 years of their first marriage. When we speak of father or mothers, we refer to individuals who had at least one child before divorce or within 10 years of marriage. This included children already born before the moment of union formation (12.9% of the population). The population distribution over these four subgroups was 9,263 childless men (5.2%), 10,701 childless women (6.0%), 73,927 fathers (41.7%), and 83,192 mothers (47.0%). Note that the individual classification depended on the presence of children during marriage, even if they were allocated to the other partner after divorce. These analytic criteria ensured that the composition of the subgroups was stable over time.

4.2 Measures

Marital status was measured as being in a marriage or not. *Divorce* was measured using binary indicators for the year before, the year of and the year after divorce, as well as linear time since divorce (see section 4.3). *Educational attainment* was measured as the highest level of completed education observed in the observation window of a person. The categories were lower secondary education or less (ISCED 0-2; Dutch: *basis, voortgezet, mbo-1*), upper or post-secondary education (ISCED 3-4; *mbo-2, 3, 4*), and tertiary education or higher (ISCED 5-8; *hbo, wo, doctor*). The lowest category comprised individuals who either dropped out, or did not continue beyond compulsory education. The middle category comprised those who completed upper secondary education or vocational post-secondary education, but did not enter college. The highest category comprised those who obtained a professional or academic college degree.

Annual disposable household income was measured as the sum of earnings, business income, property income and spousal alimony after taxes and social security transfers. In less than one percent of the cases this income was negative, because of negative business income or overdue tax payments. It was top-coded and bottom-coded at respectively plus and minus one million euros. Household income was equivalized using the square root equivalence scale. That is, each person in the household got assigned the total household income divided by the square root of the number of household members. Our key outcome of interest, *poverty*, was a binary indicator of having an equivalized income below 60% of the year-specific median of the entire Dutch population. This measure of relative poverty is widely used and consistent with the European Commission's definition of poverty. *Gender* was coded as male or female. The measure of *children* gives the maximum number of biological, adopted or stepchildren present in the household in a given year regardless of age.

The definition of time was chosen in accordance with our analytic purpose. Life-course research typically defines time as age. However, our purpose was to measure growing poverty gaps in the population at risk of experiencing a divorce. The onset of divorce risk differs across individuals as they marry at different ages. To measure time consistently across individuals, we therefore defined time as time since union formation. Time intervals were specified in years because income taxes were filed annually.

4.3 Analytic strategy

We estimated gradients in divorce risk and vulnerability using life tables and regression analysis. Life tables showed the risk of divorce at each time t. They were estimated separately for each education level. Educational differences in divorce risk expressed the risk gradient. Next, linear probability regression analyses showed changes in poverty following divorce. To obtain coefficients for the later decomposition analysis, we tested extensively whether vulnerability followed a functional form and modeled the vulnerability process as

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \boldsymbol{\gamma} \boldsymbol{T}_{it} + \epsilon_{it} \tag{1}$$

where Y_{it} is a binary poverty indicator of individual i at time t, α the intercept, X_{1it}, X_{2it}, and X_{3it} respectively the year before, the year of, and the years after divorce, X_{4it} time since divorce, $\boldsymbol{T}$ time since union formation dummies, and ϵ_{it} a normally distributed error term with mean zero. This means that divorce-related poverty was modeled to start one year before the divorce (due to separations preceding legal divorce). The remaining indicators allowed us to model a divorce peak and a linear trend in the years after divorce. These regressions were also estimated separately for each education level. Educational differences in $\boldsymbol{\beta}$ expressed the gradient in divorce vulnerability.

After estimating divorce risk and vulnerability, we conducted a decomposition analysis to examine how they contributed to the overall poverty gap between education levels. Decomposition analysis has been applied to many phenomena, including city differences in job mobility (Kitagawa 1955), gender and racial wage gap (Blinder 1973; Oaxaca 1973), poverty trends among immigrant children (Van Hook, Brown, and Kwenda 2004) and socioeconomic inequalities in educational attainment (Bernardi and Boertien 2017). It computes the extent to which outcome differences between groups can be attributed to differences in their characteristics (here: unequal risk) and to differences in the associations between characteristics and the outcome (here: unequal vulnerability). In the current study, we applied the Blinder-Oaxaca decomposition to examine how the overall poverty gap between the lower and higher educated was driven by the unequal distributions between education levels in their risk of divorce and in their vulnerability to divorce. The overall poverty gap was defined as

$$
\begin{aligned}
\mathrm{R} &= \bar{Y}_L - \bar{Y}_H \\
&= (\alpha_L + \boldsymbol{\beta}_L \bar{\boldsymbol{X}}_L + \boldsymbol{\gamma}_L \bar{\boldsymbol{T}}_L) - (\alpha_H + \boldsymbol{\beta}_H \bar{\boldsymbol{X}}_H + \boldsymbol{\gamma}_H \bar{\boldsymbol{T}}_H)
\end{aligned} \tag{2}
$$

where the subscript L denotes the lower educated and H the higher educated, $\boldsymbol{\beta}$ the divorce vulnerability coefficients obtained from the regression analyses, and $\bar{\boldsymbol{X}}$ the divorce risk variables with scores obtained from the life tables. Educational differences in $\bar{\boldsymbol{T}}$ were due merely to different observation periods and therefore set to zero. Rearranging this equation, the overall poverty gap could be expressed as

$$
\begin{aligned}
\mathrm{R} &= (\alpha_L - \alpha_H) + (\boldsymbol{\gamma}_L - \boldsymbol{\gamma}_H)\bar{\boldsymbol{T}} \\
&\quad + \boldsymbol{\beta}_H(\bar{\boldsymbol{X}}_L - \bar{\boldsymbol{X}}_H) + (\boldsymbol{\beta}_L - \boldsymbol{\beta}_H)\bar{\boldsymbol{X}}_H + (\boldsymbol{\beta}_L - \boldsymbol{\beta}_H)(\bar{\boldsymbol{X}}_L - \bar{\boldsymbol{X}}_H)
\end{aligned} \tag{3}
$$

where the first row represents the part of the poverty gap that is unrelated to divorce, and the second row represents the part of the poverty gap that is related to divorce. The latter decomposes into respectively a divorce risk (or "endowment") gap, a divorce vulnerability (or "coefficient") gap, and an interaction term that is difficult to interpret and not of substantive interest in the current study (Jann 2008).

In addition to their role in the overall poverty gap, we examined how risk and vulnerability play out as the life course unfolds. To accomplish this, we decomposed the poverty gap at each time point since union formation. We thus applied multiple cross-sectional Blinder-Oaxaca decompositions to longitudinal data. This allowed the size of the poverty gap, the risk and vulnerability gradients, and their contributions to the poverty gap to vary over time. In this way we obtained a detailed picture of how divorce shapes poverty trajectories over the life course.

Following the decompositions, we simulated three sets of counterfactual poverty trajectories for the lower educated. The first set predicted their poverty if they had the same divorce risk as the higher educated. The second set predicted their poverty if they had the same vulnerability to divorce as the higher educated. The last set predicted their poverty if they had both the same risk of and the same vulnerability to divorce as the higher educated. These counterfactual poverty trajectories illustrate the main findings from the decomposition.

Our analyses did not include control variables, in line with our aim of providing population-level evidence on the associations between education, divorce and poverty "as is". To illustrate, consider the possibility that lower educated people marry younger and that younger age at marriage is associated with higher divorce risk. Controlling for age at marriage would cancel out this substantive difference, rendering the remaining "net" risk gradient meaning-

Table 2 Descriptive statistics at union formation[3]

	All	Men			Women		
Variable		Lower	Middle	Higher	Lower	Middle	Higher
Foreign-born							
Age		28.48	28.85	29.72	26.43	27.20	28.32
		(4.01)	(3.66)	(3.14)	(4.51)	(3.87)	(3.28)
Employment rate							
Labor supply (fte)		0.85	0.93	0.96	0.55	0.76	0.85
		(0.30)	(0.18)	(0.14)	(0.39)	(0.28)	(0.21)
Children in hh: 0		0.53	0.59	0.69	0.47	0.59	0.71
		(0.50)	(0.49)	(0.46)	(0.50)	(0.49)	(0.45)
Children in hh: 1		0.27	0.25	0.20	0.29	0.26	0.19
		(0.44)	(0.43)	(0.40)	(0.45)	(0.44)	(0.39)
Children in hh: 2		0.12	0.10	0.07	0.15	0.09	0.06
		(0.32)	(0.30)	(0.25)	(0.36)	(0.29)	(0.24)
Children in hh: ≥ 3							
Disposable hh income		28776	31689	38242	27852	32389	38766
		(14411)	(13235)	(13385)	(12158)	(17053)	(14791)
Equivalized hh income		17979	20557	25615	17128	20975	26034
		(7550)	(7854)	(8633)	(6662)	(11125)	(9619)
Poverty rate		0.12	0.05	0.02	0.14	0.05	0.02
		(0.32)	(0.21)	(0.13)	(0.35)	(0.22)	(0.14)
N	177083	9786	29490	43914	11498	33027	49368

less when it comes to actual differences between educational levels that underlie the gradient. In other words, we were not interested in a scenario in which different education levels were equal on all characteristics relevant to divorce, but rather in the actual, uncontrolled risk gradient resulting from differences in these characteristics. Controlling would also change the vulnerability gradient in an undesired manner. Although the relationship between divorce and poverty might be confounded by characteristics associated with certain education level, these differences were precisely the reason for expecting a vulnerability gradient. Therefore, we deliberately left the distribution of characteristics "as is" to gain insight in the role of divorce at the population level. Control variables would only be appropriate if we were interested in the mechanisms underlying risk and vulnerability gradients. Such underlying mechanisms were outside the scope of this study.

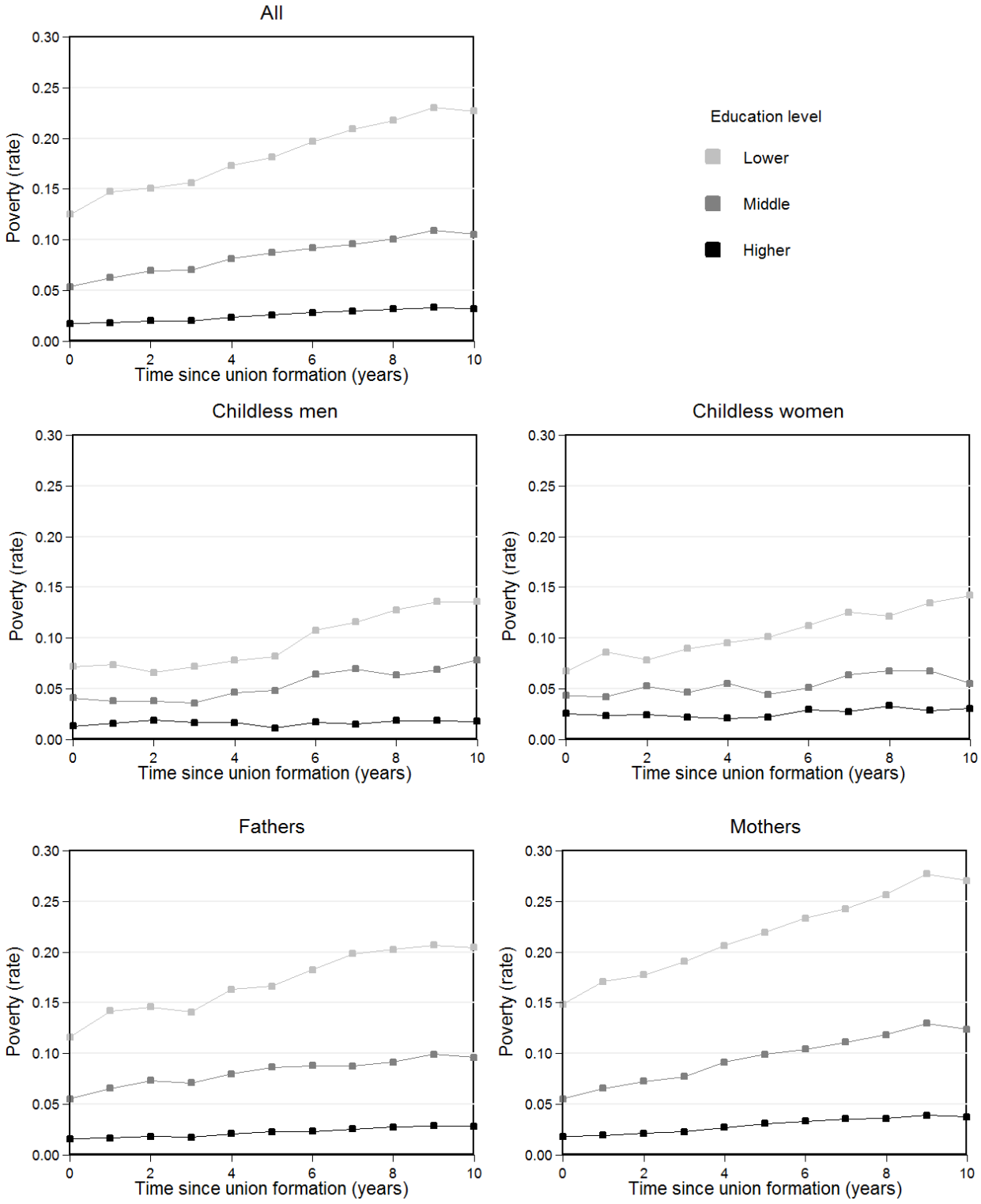
5 Results

5.1 Description

Table 2 presents descriptive statistics at union formation. Educational differences were most pronounced with respect to employment, children and poverty. Lower educated individuals, and especially lower educated women, worked less in paid employment. Lower educated

[3]Some numbers are still missing due to requirements of Statistics Netherlands concerning the publication of administrative data.

Fig. 1 Observed poverty trajectories



Note: The distribution over the four subgroups is 9,263 childless men (5.2%), 10,701 childless women (6.0%), 73,927 fathers (41.7%), and 83,192 mothers (47.0%).

individuals also had more children upon entering their first marriage. Finally, lower education levels had higher poverty rates. Whereas only 2% of the higher lived in poverty upon union formation, this percentage was 5% among the middle educated, and respectively 12% and 14% among lower educated men and women. In other words, the lower educated already started their marriages off with poverty rates six times as high as the higher educated.

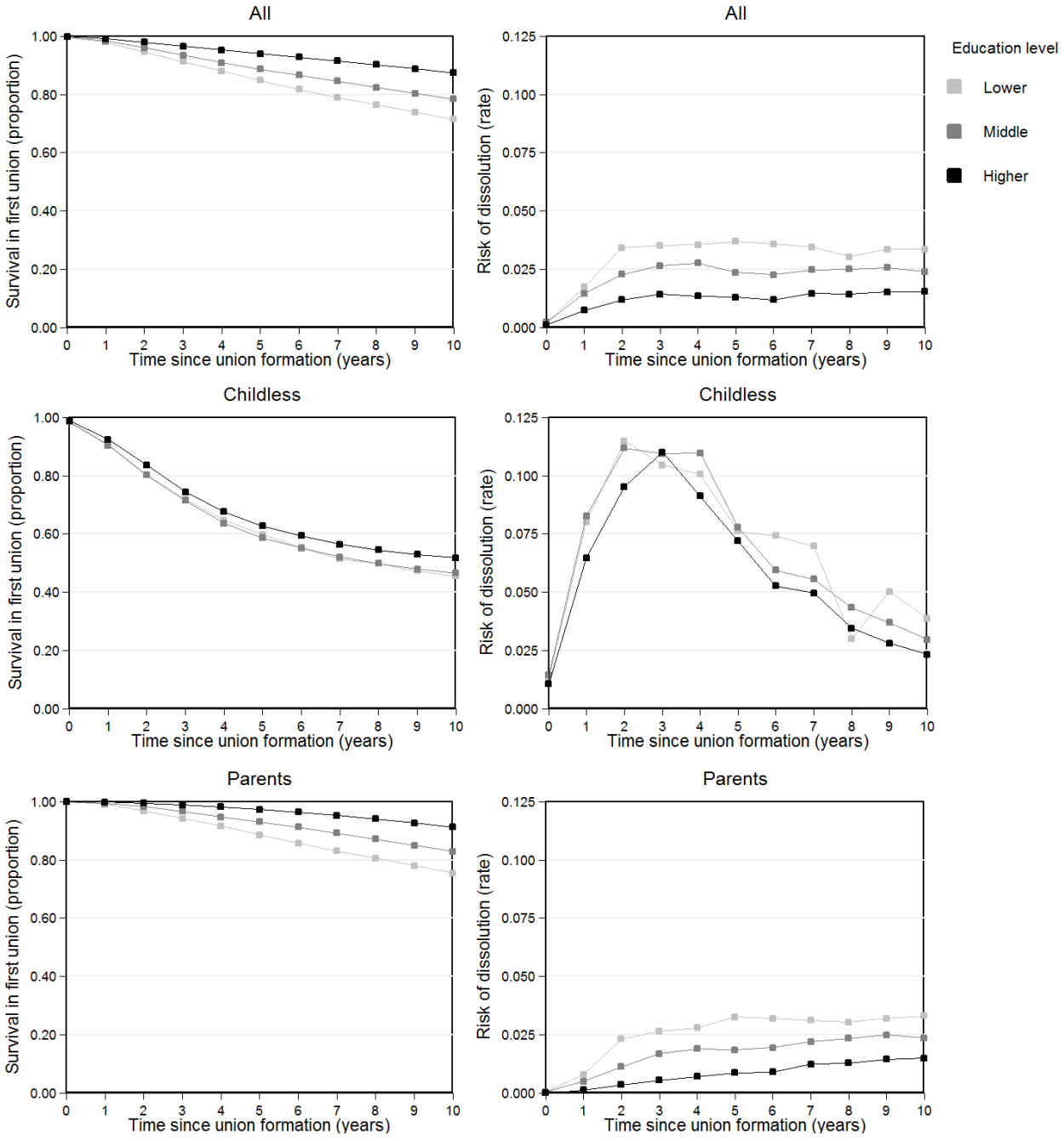
Poverty gaps between education levels grew over the course of time. This is shown in the upper panel of Fig. 1. Lower education levels started off with higher poverty rates. They also experienced steeper increases in poverty rates over time. To illustrate this, note that higher educated individuals had an average poverty rate of 2% in the year of union formation. It increased to 3% ten years later. The corresponding increases were from 5% to 10% among the middle educated, and from 13% to 22% among the lower educated. As a consequence, educational gaps in poverty grew as the life course unfolded.

However, the general pattern masks important differences between subgroups. This is shown in the middle and lower panels of Fig. 1. Lower educated parents started off with higher poverty rates than lower educated childless individuals. Moreover, they followed relatively unfavorable poverty trajectories. This was best visible among lower educated mothers. Their poverty rate increased from 15% at union formation to 26% ten years later, somewhat worse than lower educated individuals in other subgroups and much worse than higher educated individuals in all subgroups. Poverty gaps thus grew among all subgroups and among mothers in particular.

One pathway by which the poverty gaps may have grown is the negative gradient in divorce risk. That is, lower education levels may have fallen behind because they divorced more often. The three left panels of Fig. 2 shows that this was indeed the case. Three findings stand out from the figure. First, lower education levels were more likely to divorce than higher education levels. Second, parents divorced less often than childless couples. Third, the educational gradient in divorce was stronger among parents than among childless couples. After 10 years, 48% of the childless higher educated were divorced, compared to 54% of the childless middle educated, and 56% of the childless lower educated. For parents, these percentages were respectively 9%, 17% and 25%. The timing of divorce differed across subgroups as well. Childless couples divorced sooner and their survival rates stabilized over time. Parents postponed divorce to later years.

This becomes clearer from the right panels of Fig. 2, which depict the risk of divorce conditional on having survived up to that year. Among childless couples, the divorce risk increased rapidly in the first years after marriage to decrease in later years. Among parents, the divorce risk increased slowly over time. In both cases the process exhibited a clear gradient. At any marital duration, lower educated childless individuals were almost one and

Fig. 2 Gradient in the risk of divorce



half times times as likely to divorce as higher educated childless individuals. Lower educated parents were even three times as likely to divorce as higher educated parents.

The other pathway by which poverty gaps may have grown is the negative gradient in divorce vulnerability. That is, lower education levels may have been more likely to fall into poverty when a divorce occurred. Fig. 3 shows that this was true for most subgroups. Childless men and women of all education levels had low poverty rates before they divorce. After divorce, however, poverty increased mainly among the lower educated. For example, the poverty rate of higher educated childless women increased from 3% two years prior to divorce, to 7% in the year of legal divorce. For their middle educated counterparts the increase was from 4% to 12%, and for the lower educated from 8% to 18%. For parents, gender differences were much larger. Fathers experienced very little change in poverty upon divorce, while mothers experienced sharp increases, especially lower educated mothers. For example, the poverty rate of higher educated mothers increased from 6% two years prior to divorce, to 23% in the year of legal divorce. For their middle educated counterparts the increase was from 15% to 49%, and for the lower educated from 28% to an extreme 58%. This indicates that more than half of all recently divorced lower educated mothers lived in poverty.

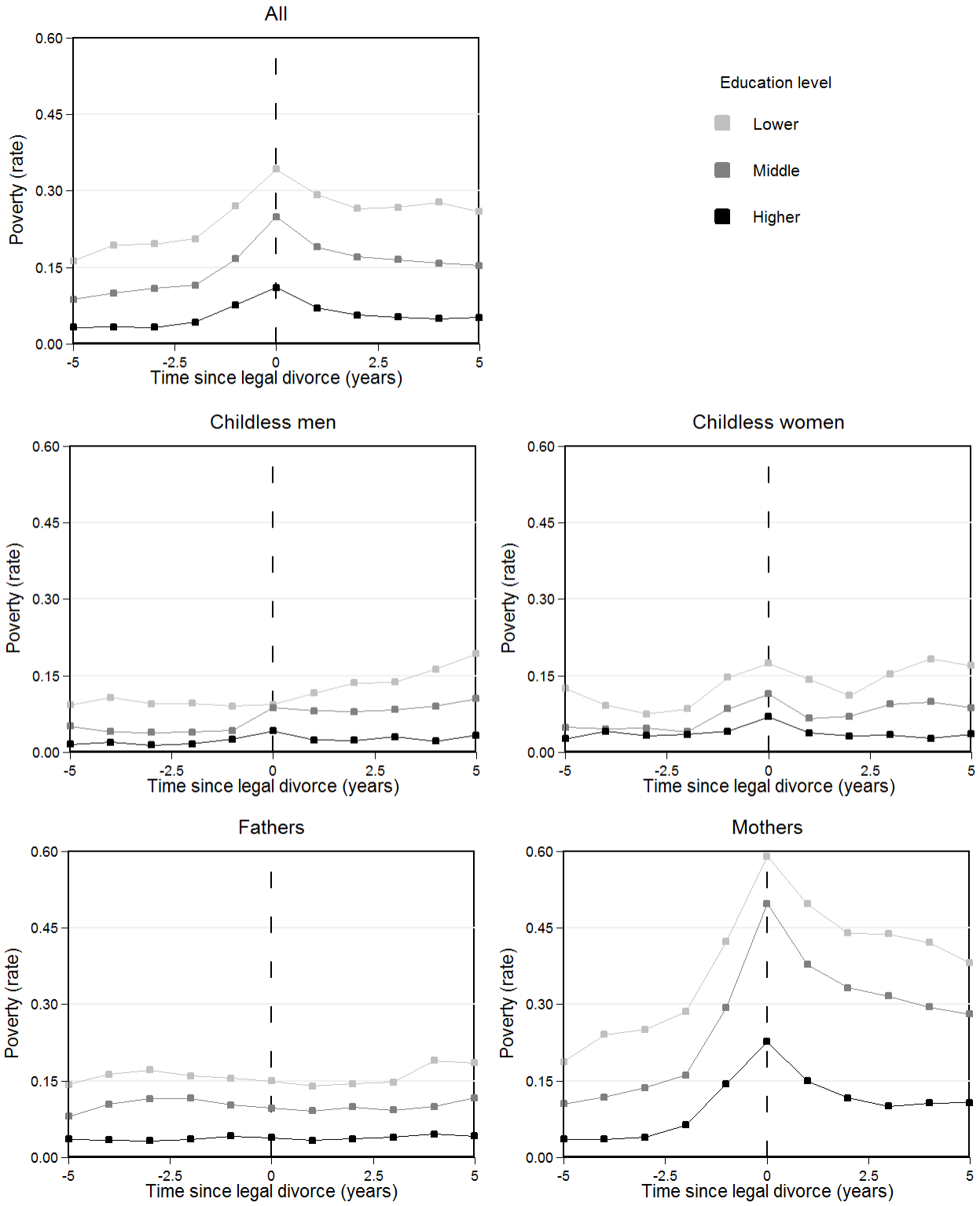
This gradient in direct divorce vulnerability extended through the recovery period. Poverty gaps that opened up at divorce persisted until many years after. If the vulnerability process was well described by Eq. 1 as set out in the methods section, it would take the higher educated five years, the middle educated six years, and the lower educated seven years to fully recover from divorce. These educational differences in recovery applied more to childless men and women than to mothers. Whereas childless men and women witnessed an increase in poverty gaps that remained present up to five years later, mothers witnessed some compression as time went by.

5.2 Formal decomposition

We conducted a decomposition to examine how both pathways contributed to the poverty gaps exposed before.[4] We started by decomposing the overall poverty gap between lower and higher educated over the entire observation period. Lower educated were used as the reference category. Table 3 presents the results of this decomposition. The "risk gradient" line indicates the change in poverty among the lower educated, if they had the divorce risk of higher educated. The "vulnerability gradient" line indicates the change in poverty among the lower educated, if they had the divorce vulnerability of higher educated. The "total divorce"

[4]Divorce vulnerability was modeled using a parameterized specification of time since divorce, as set out in the methods section. This specification proved to approximate the vulnerability process well (see appendix Fig. 5).

Fig. 3 Gradient in vulnerability to divorce



Note: Estimates are obtained from linear probability regressions of the binary poverty indicator on time since legal divorce dummies, holding time since union formation (dummies) constant across education levels.

Table 3 Blinder-Oaxaca decomposition of the overall poverty gap

	All	Childless men	Childless women	Fathers	Mothers
Poverty higher edu	0.025***	0.018***	0.025***	0.022***	0.029***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
Poverty lower edu	0.186***	0.094***	0.099***	0.176***	0.220***
	(0.002)	(0.005)	(0.004)	(0.003)	(0.003)
Poverty gap	-0.160***	-0.076***	-0.074***	-0.154***	-0.190***
	(0.002)	(0.005)	(0.005)	(0.003)	(0.003)
Risk gradient	-0.010***	-0.005***	-0.003*	0.003***	-0.029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Vulnerability gradient	-0.010***	-0.020***	-0.036***	0.006***	-0.025***
	(0.001)	(0.004)	(0.004)	(0.001)	(0.001)
Total divorce	-0.014***	-0.021***	-0.036***	0.005***	-0.036***
	(0.001)	(0.004)	(0.004)	(0.001)	(0.001)
N	114566	5467	6439	48233	54373

$*p < .05$, $**p < .01$, $***p < .001$
Note: By construction, the divorce total is the sum of the gradient in divorce risk, the gradient in divorce vulnerability, and an interaction term. The interaction term accounts for the fact that gradients in divorce risk and vulnerability between the lower and higher educated exist simultaneously. It is not of substantive interest to our study and therefore not shown. For simplicity, time since union formation dummies and group intercepts are not shown either. See appendix Table 4 for a complete overview of estimates underlying the overall decomposition.

line indicates the change if the lower educated had both the divorce risk and vulnerability of the higher educated.

The decomposition shows that risk and vulnerability gradients contributed little to the poverty gap if we consider the overall population. This becomes clear from the left column of Table 3. The poverty rate was 2.5% among all higher educated individuals and 18.6% among all lower educated individuals, amounting to an overall gap of 16.0% points. Gradients in divorce risk and vulnerability played a small role in contributing to this poverty gap. If the lower educated had had the same risk of divorce as the higher educated, then their poverty rate would have been 1.0% points lower. If they had had the same vulnerability to divorce as the higher educated, then their poverty rate would also have been 1.0% point lower. If they had had both the same divorce risk and vulnerability as the higher educated, then their poverty rate would have been 1.4% points lower. In other words, the stratified experience of divorce explained 1.4% points of the poverty gap between all lower and higher educated individuals.

However, the results for the overall population mask important differences between subgroups. Among childless men, the poverty gap was 7.6% points. This was due largely to the gradient in vulnerability. If lower educated childless men had been as invulnerable (i.e. resilient) to divorce as higher educated childless men, the poverty gap would have been 2.0% points smaller. If they had divorced as little as higher educated childless men, the poverty gap would only have been 0.5% points smaller. If they had had both the same divorce risk and vulnerability as the higher educated, their poverty gap would have been 2.1% points

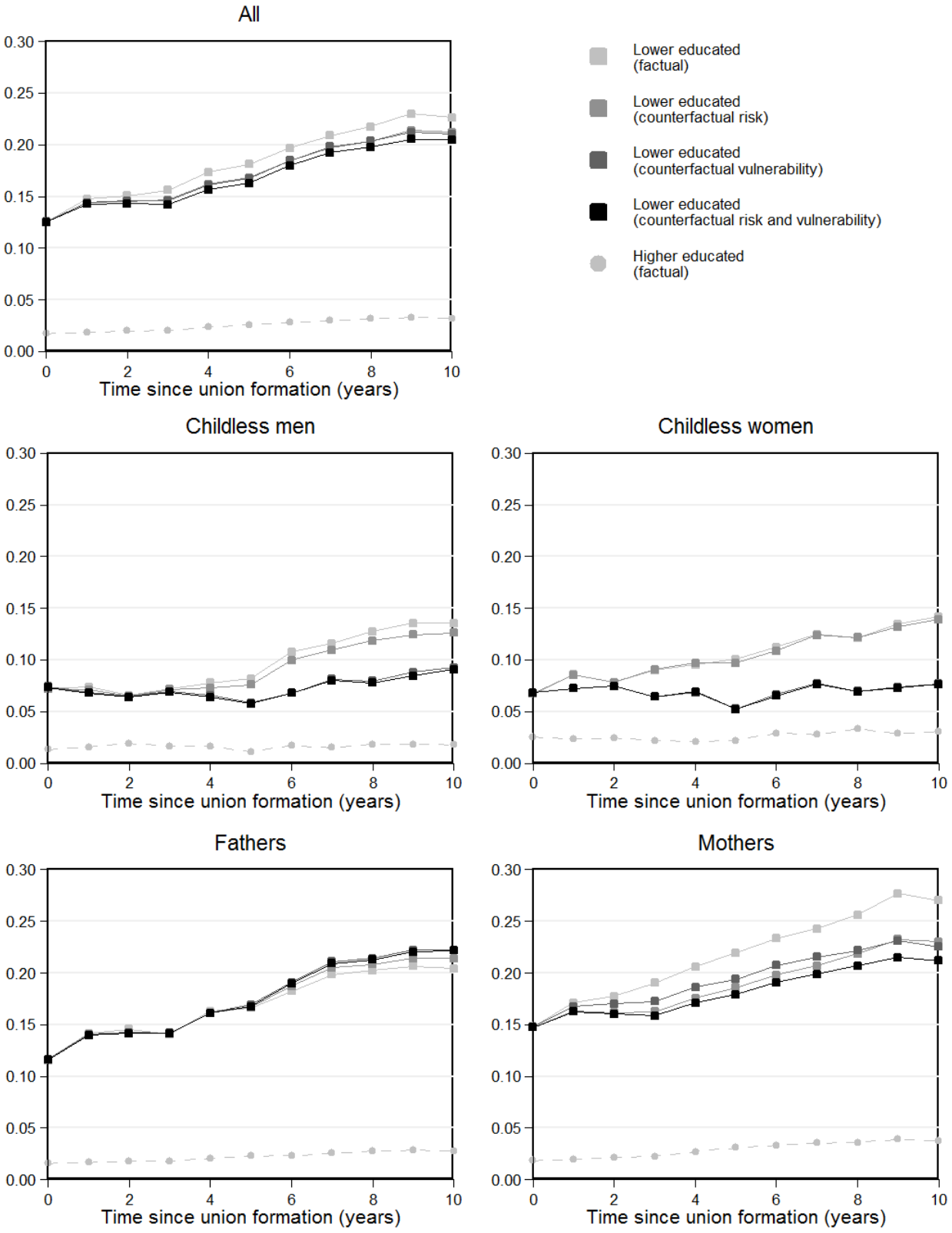
smaller. This implies that almost a third of the poverty gap between lower and higher educated childless men was due to the stratified experience of divorce. Among childless women, the gradient in divorce vulnerability played an even more important role. Their poverty gap of 7.4% points would have decreased by 3.6% points if lower educated childless women had been as invulnerable to divorce as higher educated childless women. This implies that the stratified experience of divorce accounted for almost half the poverty gap among childless women.

A very different picture emerged for parents. Among fathers, divorce played almost no role. If anything, lower educated fathers benefited economically from divorce as compared to higher educated fathers. Among mothers, however, divorce played a serious role in producing poverty gaps. The poverty gap of 19.0% points between higher and lower educated mothers would have decreased by 2.9% points if lower educated mothers had divorced as little as higher educated mothers. It would have decreased by 2.5% points if they had been as invulnerable to divorce as higher educated mothers. If they had had both the same divorce risk and vulnerability as the higher educated, the poverty gap would have decreased by 3.6% points.

As a final step, we decomposed the poverty gaps at each time point to see how divorce risk and vulnerability played out over time (see Appendix Table 5 for exact numbers). These decompositions reaffirmed the previous results. Among most subgroups, the lower educated were more likely to fall into poverty upon divorce, and this gradient in vulnerability contributed substantially to poverty gaps. Among mothers, the higher divorce risk of lower educated contributed to the poverty gap too. The decompositions further show that risk and vulnerability became more prominent over time. That is, their continuous exposure to higher divorce risk and accumulation of its poverty consequences made the lower educated fall behind as the life course unfolded, supporting the idea of cumulative inequality.

To show this graphically, we simulated counterfactual poverty trajectories. Figure 4 presents the factual poverty trajectories of the lower educated, their trajectories if they had had the same divorce risk as the higher educated, their trajectories if they had had the same divorce vulnerability as the higher educated, and their trajectories if they had had the same risk and vulnerability as the higher educated. As mentioned before, setting the divorce risk or vulnerability of lower educated fathers to that of higher educated fathers would hardly have changed their poverty trajectories. This was different for the other subgroups. For lower educated childless men and women, poverty gaps grew mainly because of the gradient in divorce vulnerability. Setting their divorce vulnerability to that of their higher educated counterparts would have substantially diminished the growth of poverty gaps. For lower educated mothers, divorce risk and vulnerability both contributed to the growth of poverty

Fig. 4 Simulated poverty trajectories under counterfactual risk and vulnerability



gaps. They would have benefited equally from having had the risk or the vulnerability of higher educated mothers.

5.3 Robustness checks

We conducted several robustness checks. The first check concerns the focus on legal divorce. It is separation rather than divorce which drives poverty. Nevertheless, we looked at legal divorce because separation is difficult to identify in the data. To see if this decision affected the results, we repeated the analyses using predicted year of separation, based on changes in the number of household members other than children as reported in the tax returns. These analyses confirmed the main findings. The only notable difference was in line with our expectations. Poverty no longer increased in the year prior to the event, as was the case when using the year of legal divorce. Instead, increases in the separation year itself became more pronounced (see appendix Fig. 6).

The second check concerns child support. The Dutch tax office does not register child support payments following divorce. Poverty among mothers may therefore have been overestimated. In the absence of more fine-grained data, we approximated the amount of child support using the norms set out by the Dutch Expert Group on Alimony Norms (2013). Divorcees are advised to make voluntary agreements according to these norms, or may ask the judge to impose them. The norms suggest a monthly payment based on the standard of living, divorcees' ability to pay, and child needs. These are in turn based on the joint income before divorce, separate incomes after divorce, and number of children involved. We calculated notional child support in each year after divorce and added or subtracted this to the divorcees' incomes. We then repeated the analyses using this income correction. This resulted in somewhat lower poverty rates among divorced mothers of all education levels and among lower educated divorced fathers (see appendix Fig. 7). However, the differences were too small to affect our conclusions.

The third robustness check concerns the poverty definition. Although we defined poverty as an income below 60% of the year-specific national median, a threshold of 50% is also common in the literature. We replicated our analyses using a 50% threshold and came to the same conclusions. The only difference was that poverty rates were lower across the board (see appendix Fig. 8 and 9).

6 Conclusion

We considered two pathways to fully understand how divorce drives the growth of poverty gaps over the life course. First, lower education levels may be at higher risk of divorce. The results confirm that this is the case, especially among parents. Second, lower education

levels may be more likely to fall into poverty when a divorce occurs. This is also confirmed. Fathers are the only exception and do typically not fall into poverty upon divorce. The joint contribution of these pathways to the growth of poverty gaps between education levels is substantial. The poverty rates of lower educated childless men, childless women and mothers diverge up to 7% points because of their greater vulnerability to divorce. Lower educated mothers also fall behind up to 6% points because of their higher risk of divorce. These findings hold even after we correct for notional child support receipt, which in reality is often underpaid (Huang, Mincy, and Garfinkel 2005). Divorce is thus a major driver of poverty gaps between education levels throughout the early and middle stages of the adult life course.

These findings have implications for theory and policy. Regarding theory, they show how divorce acts as a driver of cumulative inequality (Ferraro and Shippee 2009). The lower educated start off their marriage with higher poverty rates, and fall further behind as they are exposed to higher divorce risk and greater divorce vulnerability as the life course unfolds. Regarding policy, these findings give insight in how economic inequalities are related to the stratification of family events. Divorce drives economic inequality mainly because the lower educated are more vulnerable its economic consequences. Policies that better cushion the lower educated against the consequences of divorce could therefore reduce inequality.

This study also sets an agenda for future stratification research. Life events are seldom equally distributed over the population and may give rise to a multitude of widening gaps. Our study shows that it is fruitful to conceptualize such gaps as products of social gradients in risk and vulnerability. This is also appealing from a statistical point of view. Since our approach naturally connects to decomposition analysis, the contributions of risk and vulnerability gradients to social gaps are easily quantified.

Several questions remain. First, we conditioned our analyses on the married population. If marriage is a selective state (Thornton et al. 1995), then it remains to be seen whether our results generalize to other consensual unions. Second, this study did not identify the causal effects of divorce. Several mechanisms could underlie such causal effects, including age of union formation, educational homogamy, labor market participation, child custody and residence, and institutional support. Particularly relevant is the rise in complex families (Brown and Manning 2009), which results in family ambiguity that may have profound consequences for economic well-being after divorce, but which is difficult to observe with administrative data. Looking at these mechanisms could give further insight in the stratified experience of divorce. Third, our analysis focused on the Netherlands. This country is similar to other industrialized countries when it comes to the educational gradient in divorce risk. The gradient in divorce vulnerability, however, is likely to depend more on specific

redistribution policies. Some findings will therefore be different in other countries. These questions could be addressed in future research, using the approach that we set forward.

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Appendix

Fig. 5 Gradient in vulnerability to divorce using a parametric specification

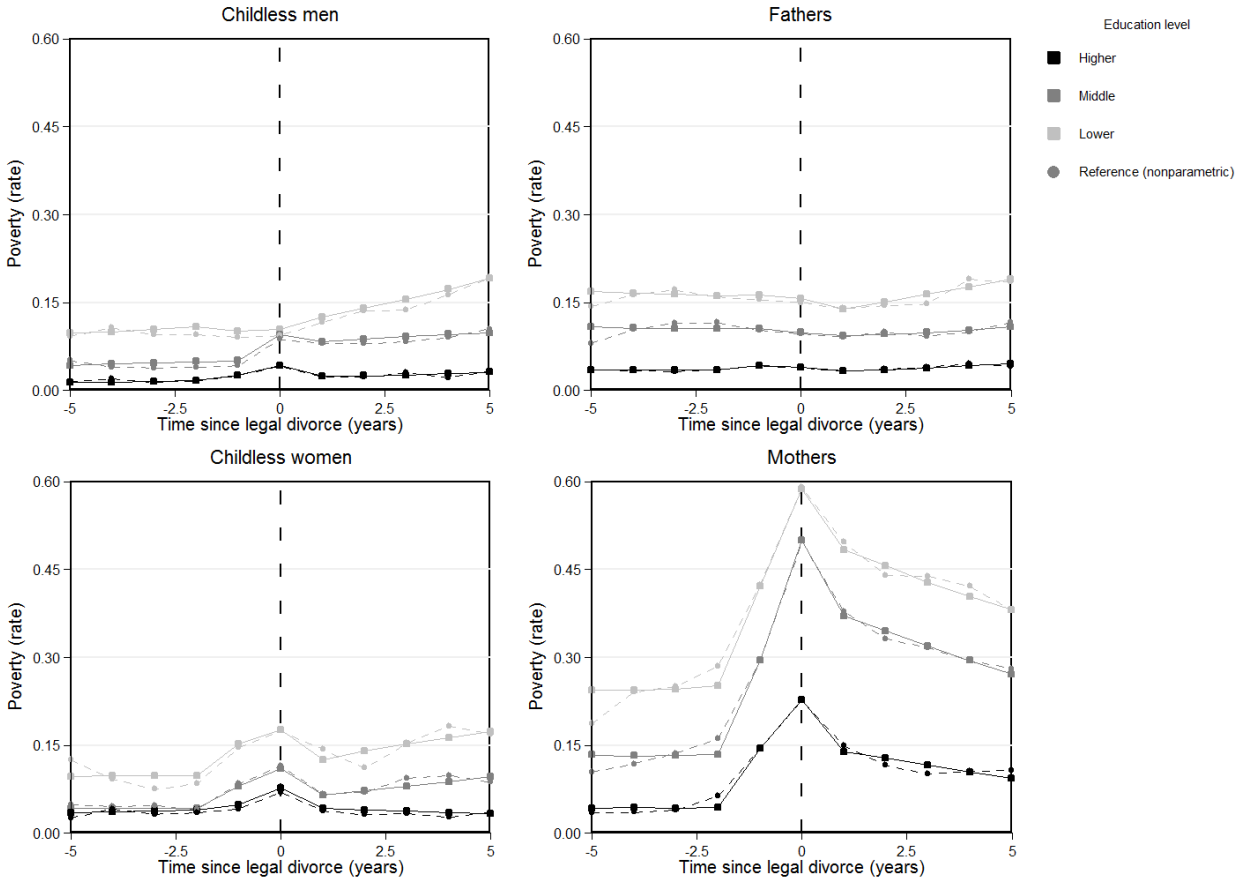

Table 4 Risk and vulnerability estimates underlying the Blinder-Oaxaca decomposition of the overall poverty gap[5]

	Lower educated		**Higher educated**	
Variable	Risk ($\bar{X}$)	Vulnerability (β)	Risk ($\bar{X}$)	Vulnerability (β)
Year before divorce				
Year of divorce				
Year after divorce				
Time since divorce				
T1				
T2				
T3				
T4				
T5				
T6				
T7				
T8				
T9				
T10				
Constant				

$*p < .05$, $**p < .01$, $***p < .001$
Note: T1-T10 are time since union formation dummies.

[5]Some numbers are still missing due to requirements of Statistics Netherlands concerning the publication of administrative data.

Table 5 Blinder-Oaxaca decompositions of the poverty gaps at each time point[5]

	Men						Women					
	W/o children			With children			W/o children			With children		
Time	R	V	T	R	V	T	R	V	T	R	V	T
0	-0.36	-0.11	-0.40	1.93	2.23	2.46						
1	1.60	-2.35	0.92	5.58	5.65	7.02						
2	1.30	-0.40	1.22	9.08	8.73	11.44						
3	-2.21	-4.80	-3.60	12.47	12.44	15.95						
4	-0.84	-1.08	-1.20	13.06	13.90	17.19						
5	-0.73	-3.93	-2.07	12.76	12.72	16.57						
6	-2.96	-6.74	-5.27	14.20	14.48	19.02						
7	-0.80	-3.31	-2.08	13.88	13.25	18.43						
8	-1.23	-2.96	-2.15	15.99	14.99	21.61						
9	-1.75	-3.55	-2.91	20.91	21.66	28.66						
10	-4.38	-9.28	-8.31	18.39	23.22	26.84						

Fig. 6 Gradient in vulnerability to divorce using predicted separation

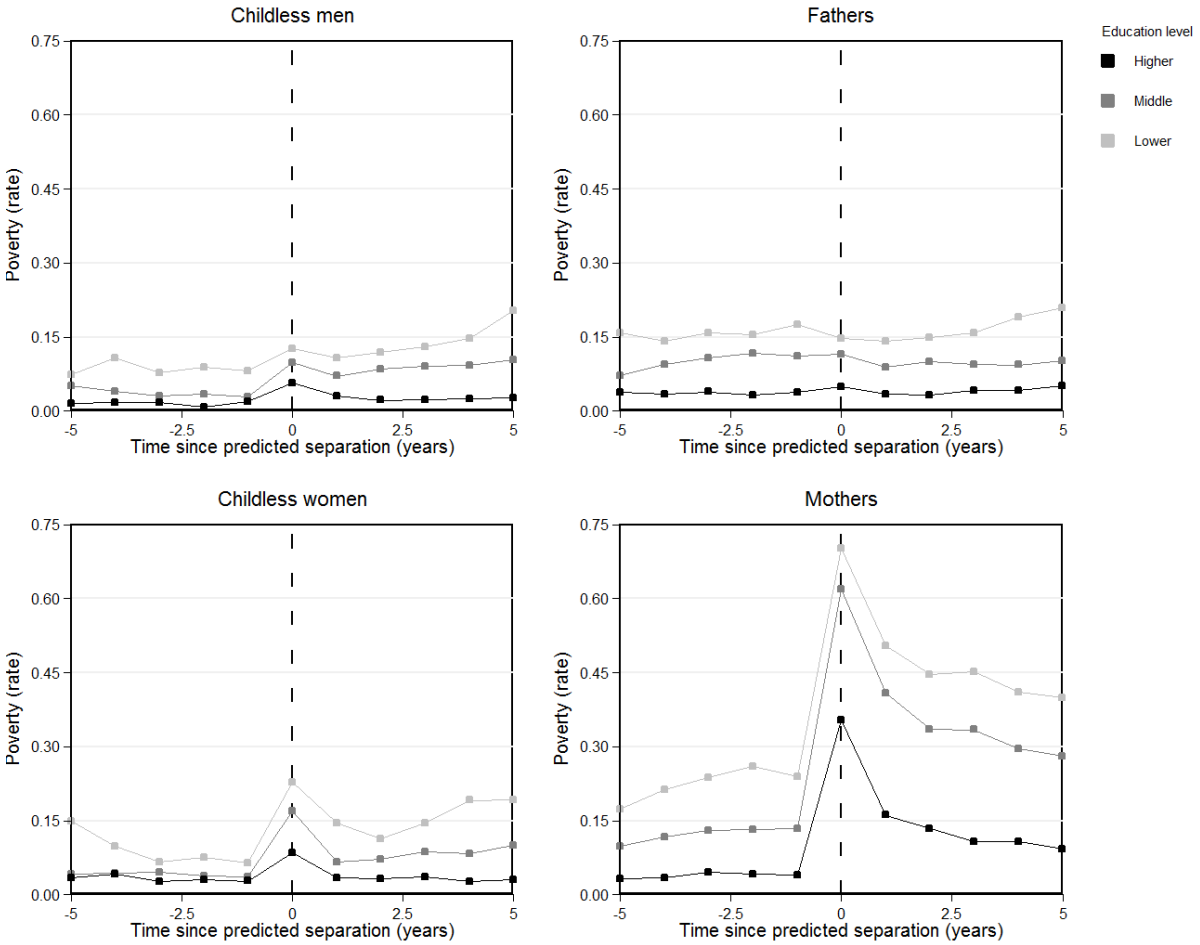

Fig. 7 Gradient in vulnerability to divorce correcting for potential child support

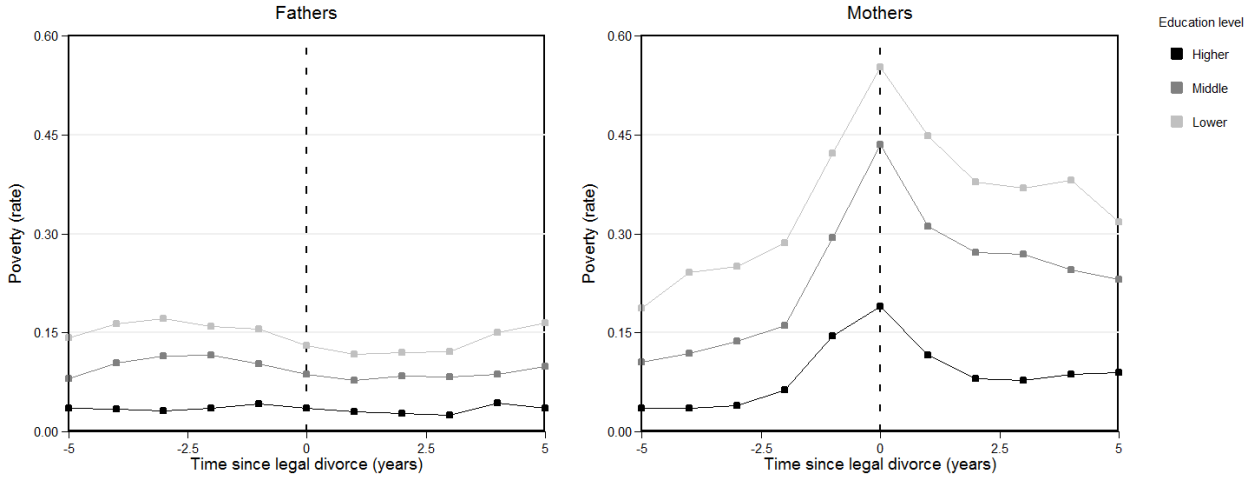

Fig. 8 Gradient in vulnerability to divorce using 50% poverty threshold

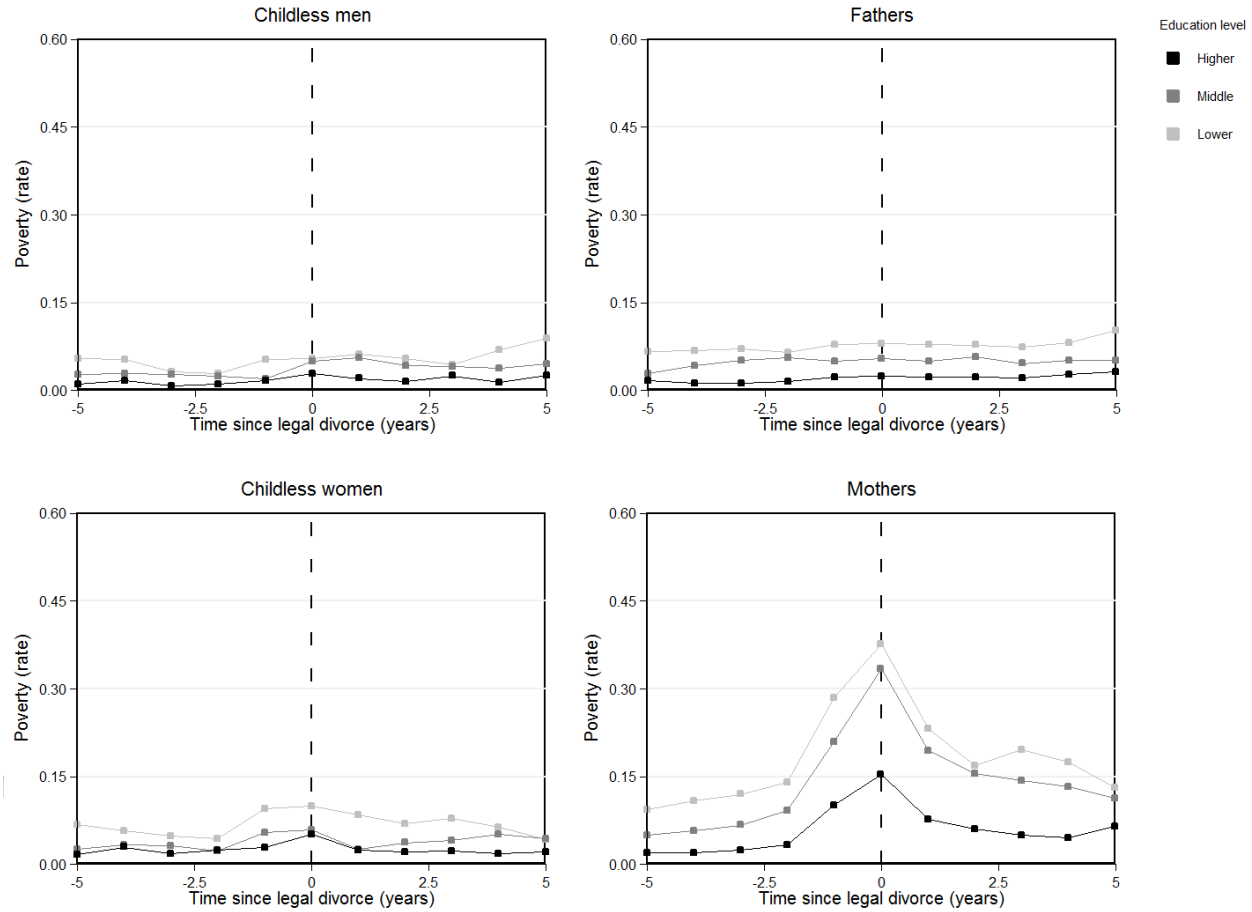

Fig. 9 Simulated poverty trajectories under counterfactual risk and vulnerability using 50% poverty threshold