Parity and men's mortality risks

Abstract

We examine the impact of parity on men's mortality risks, using data from the first wave of the Dutch GLOBE dataset, matched with 2008 register information on vital status. Most studies on associations between parity and mortality focus on women, and find a negative correlation or U-shape pattern. For men, the results are less clear-cut and knowledge about the mechanisms behind the association between parity and mortality is lacking. In our study, we take many social and behavioral factors into account and examine whether they explain the relationship between parity and men's mortality risks. We find higher mortality risks for childless men in comparison to fathers, regardless of their number of parity. However, this effect is reduced to insignificance when we include information on men's health behaviors, their partner status and their educational attainment. This suggests that childless men have higher mortality risks in comparison to men who have fathered two children, because the former lack the informal (indirect) pressures of children and a partner towards health-stimulating behaviors and because of the health benefits that go hand in hand with higher educational attainment.

Background

There is growing recognition that reproductive patterns may have long-term health implications. Most studies on associations between parity and mortality focus on women. This focus is not only based on the reasoning that the impact of parenthood is felt more strongly by women because of the physiological effects of childbirth, but also on the reasoning that being a parent is considered to be more central in the lives of women than in those of men (Bulcroft & Teachman, 2003; Hird & Abshoff, 2000; Letherby, 2002; Veevers, 1980). However, several recent studies have shown that fatherhood has a considerable impact on men's lives. Strong differences are found with respect to health and health behaviors; fathers are less often smokers, drink less and engage more in physical exercise in comparison to childless men (Eggebeen & Knoester, 2001; Kendig, Dykstra, Gaalen, & Melkas, 2007; Knoester & Eggebeen, 2006). This suggests that having children provides an impetus for men to avoid health-damaging behaviors, and the other way around, that children are a stimulus for healthy behaviors. We would expect accumulated effects of such behavioral patterns to be apparent later in life and to be reflected in differences in mortality risks.

Few studies have addressed the impact of parity on men's mortality risks, and when they have, the evidence is mixed. Some Israeli and US-studies find a U-shape pattern, both in contemporary (Jaffe, Neumark, Eisenbach, & Manor, 2009) and in historical populations (Penn & Smith, 2007), in line with the pattern that is most often found for women (see Hurt, Ronsmans and Thomas (2006) for an excellent overview of studies on the relationship between parity and women's mortality risks). Norwegian data show enhanced mortality risks only for childless men and those with one child (Grundy & Kravdal, 2008), whereas American data show a protective impact of childlessness for men's mortality risks (Smith, Mineau, & Bean, 2002). A study in

rural Bangladesh reports a beneficial impact of high parity for men's risks of dying (Hurt et al., 2004). Finally, there are studies that show no impact of parity on men's mortality risks, both in contemporary societies (Friedlander, 1996; Kaplan, Lancaster, Johnson, & Bock, 1995) as well as in historical populations (Doblhammer & Oeppen, 2003; Dribe, 2004; Korpelainen, 2000). We may conclude from this brief overview that results from empirical studies are in many respects confusing and conflicting. Given the complexity of the links that theoretically can be defined between parity and mortality, as we will show below, and the small extent to which the abovementioned studies took confounding factors such as health, socio-economic and marital status into account, the unequivocality should actually not come as a surprise.

The aim of this paper is to improve the understanding of the relationship between men's parity and mortality risks by testing different mechanisms that possibly underlie this association. We should note here that most of these mechanisms described below start from the premise that having children, and not so much the number of children, affects men's lives.

Mechanisms

First of all, having children may affect mortality risks by changing men's behavior. The literature shows that becoming a father is a transforming event (Eggebeen & Knoester, 2001). This transformation may be expressed in two ways. On the one hand, fathers may behave in healthier ways than childless men. Becoming a father entails obligations and responsibilities, and fathers are under social control to behave in accepted ways and to give good examples for their children (Dykstra & Keizer, 2009; Eggebeen & Knoester, 2001; Keizer, Dykstra, & Poortman, 2009; Kendig et al., 2007; Knoester & Eggebeen, 2006). Having children means that people refrain from health-compromising behavior either because they have internalized norms or because they are explicitly admonished by others to do so (Kendig et al., 2007). It may be these health-

promoting changes than account for the relationship between having children and mortality. Prior studies that have assessed the association between parity and men's mortality risks did not control for health behaviors (Dribe, 2004; Friedlander, 1996; Grundy & Kravdal, 2008; Jaffe et al., 2009) or have used indirect measures such as men's previous inpatient histories (Ringbäck Weitoft, Burström, & Rosén, 2004). On the other hand, fathers may occupy better positions than childless men. Being a good father is in most countries still seen as being a good provider (Christiansen & Palkovitz, 2001). Fathers feel responsible for bringing in a substantial and stable amount of income. Research has shown that childless men earn less money in comparison to fathers (Eggebeen & Knoester, 2001; Keizer et al., 2009). As individuals with higher socio-economic status have lower mortality risks (Kunst, Groenhof, Mackenbach, & Health, 1998; Mackenbach et al., 2003), it may be men's occupational characteristics, rather than fatherhood, which explains why fathers may have lower mortality risks.

Second, it may not so much be having children, but rather the associated higher likelihood of having a partner that attributes to lower mortality risks for men. Fathers are more likely than childless men to have a partner, and having is partner is protective against mortality, especially for men (Brockmann & Klein, 2004; Gove, 1973; Joung, 1996). Living with a partner requires regulation of activities and a division of responsibilities and obligations. Sharing a household implies being subject to informal pressures towards regularity of habits. Partner status rather than parental status may therefore account for the relationship between fatherhood and mortality (Dykstra & Keizer, 2009; Keizer et al., 2009). Some of the prior studies on associations between parity and men's mortality have a sample of only married men (Jaffe et al., 2009; Penn & Smith, 2007; Smith et al., 2002), which makes it impossible to determine the relative influence of partner status versus parity, on men's mortality risks.

Third, selection may be at play. Men's educational attainment may select them into parenthood and this factor rather than parental status may have a substantial effect on mortality risks. Educational attainment and having children are positively correlated for men, and higher levels of educational attainment are associated with lower mortality (Ross & Mirowsky, 1999; Ross & Wu, 1995; Schrijvers, Stronks, Dike van de Mheen, & Mackenbach, 1999).

Having children versus the number of children

In contrast to most of the abovementioned arguments, evolutionary models state (Gavrilov & Gavrilova, 2002; Kirkwood & Westendorp, 2001) that the number of children, rather than having had children per se, matters for mortality risks. The argument for men, in contrast to women, is that high parity is related to good genes and therefore to lower mortality risks. To find out whether it is having children or the number of children man have fathered that is informative for men's mortality risks, we compare childless men with three categories of fathers; those with 1 child, those with two or three children and those who have four or more children.

Data and methods

We use the Dutch GLOBE dataset to examine the relationship between parity and mortality among men. The GLOBE study is a prospective cohort study specifically aimed at the explanation of socio-economic inequalities in health in the Netherlands. GLOBE is the Dutch acronym for Health and Living Conditions of the Population of the city Eindhoven and surroundings. This data set is well suited for the purpose of our analyses, as it contains detailed information on social and behavioral factors that possibly explain the relationship between parity and mortality, such as health behaviors, socio-economic status and marital status. The study started in 1991 with a baseline postal survey. 18973 individuals participated and the response

rate was 70.1 %. For detailed information on this dataset, (see (Van Lenthe et al., 2004). Additional waves of data collection were held since 1991. However, for these follow-ups, only respondents in poor health conditions were selected. Therefore, we could only make use of data from the first wave of data collection to answer our research question.

For the present analyses, we restricted the sample to men above 45 at the time of the 1991 postal survey. We chose to omit individuals under the age of 45 at the time of the interview because their parity status may not yet be permanent. Dutch, American and Australian research has shown that the likelihood of having a child at age 45 and over is small (Garssen, Beer, Cuyvers, & Jong, 2001; Landry & Darroch Forrest, 1995; Parr, 2005), especially for the men studied here (born between 1916 – 1946). The age restrictions left us with a total of 4964 respondents.

In 2008, the data of all respondents were matched with register data from Statistics Netherlands. The Netherlands has a population register in which a unique number identifies every resident. Record linkage was performed by means of this unique identification number. Record linkage provided us with information on vital status 17 years after the interviews were held. As all respondents have this unique id number, the matching procedure led to perfect, confirmed matches for 100% of our survey respondents.

Variables

Mortality is our dependent variable of interest, coded 1 when respondent died, 0 otherwise. Both the month and year of death were obtained from Statistics Netherlands. We calculated the number of months respondents were alive until death or until the last month of observation, December 2007.

Parity. In the survey, respondents were asked: “Do you have children? And if so, how many?” Because of the way the question was phrased, no distinctions between biological, step- or adopted children could be made. Three dummy variables were made for the number of children the men in our data set had fathered; Having 1 child, having 2 or 3 children and having 4 or more children. Men who have remained childless are the reference category.

Alcohol use. Alcohol use was measured with questions on the average number of days per week the respondent drinks alcohol and the average number of alcoholic beverages a day. Respondents were coded as total abstainers when they reported to never drink. They were coded as light drinkers, when they reported that in the last 6 months they had had 4 or 5 alcoholic beverages on 1 or 2 days per week at most. They were coded as moderate drinkers when they reported that in the last 6 months they had drunk 4 or 5 alcoholic beverages on 3 or 4 days per week at most. They were coded as heavy drinkers when they reported that in the last 6 months they had drunk 4 or 5 alcoholic beverages on more than 5 days a week. They were coded as extremely heavy drinkers when they reported that in the last 6 months they had drunk 6 or more alcoholic beverages on more than five days a week Because of the low number of respondents who fell into the last category, these respondents were combined with the heavy drinkers. Three dummy variables were created, with light drinkers as reference category.

Smoking. Respondents were asked whether they had ever smoked, whether they still smoke and how many cigarettes/cigars they smoke. Respondents who never smoked were coded 0. Respondents who indicated that they used to smoke but had quit, were coded 1. Respondents who indicated that they smoke pipe or cigars and respondents who reported to smoke less than 20 cigarettes a day were coded 2. Respondents who indicated that they smoked more than 20 cigarettes a day were coded 3. Three dummy variables were created with people who have never

smoked as reference category.

Occupational prestige. We use men's occupational prestige as a proxy for social-economic status. If respondents were employed, they were asked to report on their current occupational status. If they were not employed, they were asked to report on the occupational status of their last job. These received a occupational prestige score according to the Erikson Golthorpe Portocarero classification scheme (Erikson, Goldthorpe, & Portocarero, 1979) and were subsequently divided into sixtiles, with 0 indicating low occupational prestige and 5 indicating high occupational prestige. Although educational attainment is often used as an indicator of social-economic status, we incorporate it in the present study as an indicator of selection (see below).

Live with partner. In order to test whether having a partner rather than having children yields lower mortality risks, we included a dummy variable indicating whether the men in our sample lived together with a partner. In additional analyses we tested whether the inclusion of marital status increased our understanding of mortality to a larger extent than by including the variable live with partner, but this was not the case.

Highest level of education. Respondents were asked about the highest level of education they had finished with a diploma. Respondents were coded as 0 when they had only finished primary school. They were coded 1 when they had finished lower vocational or lower general secondary education. They were coded 2 when they had finished intermediate general secondary education or upper general secondary education and finally they were coded 3 when they had finished higher vocational education or university. Three dummy variables were created, with individuals who have only finished primary school as reference category.

Finally, we include the number of chronic health illnesses, a potentially confounding

factor, to account for health status at the time of interview. *Number of chronic conditions* indicates the number of chronicle conditions respondents report to have (had). They include asthma, myocardial infarction, high blood pressure, stroke, ulcer, gallstones, severe abdominal disorders, kidney stones, severe kidney diseases, prostate enlargements, diabetes, hernia, Ischia, arthrosis, rheumatism, Parkinson, multiple sclerosis, epilepsy, migraine, depression, cancer, chronic skin disease, prolapses, and varicose vains. Because of the low number of respondents who indicated that they suffer from four or more of these chronic diseases, respondents with three or more chronic conditions were combined.

We also control for men's age-group, as with men's age, mortality risks increase significantly. As preliminary analyses revealed that age-group has no linearly effect on mortality risks, we included age-group in our models in terms of dummy variables. The youngest age group (45-50) is the reference category.

Means and standard deviations for our variables by parity are shown in Table 1.

Analyses

Mortality risks were calculated and differences in these rates relative to the reference category, parity = 0, were estimated. Cox proportional hazard regression models that account for censoring were used to assess the relationship between parity and mortality. Several models were calculated. In the base model, parity, the number of chronic illnesses and our 5 age-group dummies were included. In Model 2 up to Model 5 different blocks of variables were included so that each specific mechanism could be tested. Model 2 added the health behaviors smoking and drinking, Model 3 added occupational prestige, Model 4 partner status, and Model 5 added the selection variable educational attainment. Our final model, Model 6, is the model that included all blocks of variables.

Results

Looking at graph 1, we find, for almost all ages, that childless men have higher mortality risks compared to fathers. We turn to Table 2 to found out which mechanisms underlie this association between parity and mortality risks. Our base model in Table 2 shows that fathers with two or three children and especially fathers with four or more children have lower mortality risks in comparison to childless men (the reference category). The hazard ratios for our age-group dummies show that with age, the mortality risks of men increase significantly: men aged 55-60 for example have a more than three times higher mortality risk compared to men aged 45-50 (our reference category). The more chronic illnesses a man has, the higher his mortality risks. In Model 2 we add information on men's health behaviors. We find that men who do not drink and men who are categorized as heavy drinkers have higher mortality risks compared to men who are considered light drinkers. Furthermore, we find that the more men smoke, the higher their mortality risks. With the inclusion of information on men's health behaviors, the impact of parity on men's mortality risks becomes insignificant. In Model 3 we add information on men's occupational prestige to our base model. Higher occupational prestige significantly lowers men's mortality risks. With the inclusion of this factor, men who have two or three children no longer have significantly lower mortality risks compared to childless men. The lower mortality risk of men with four or more children remains significant. In Model 4 we include partner status. Living with a partner significantly lowers men's mortality risks. With the inclusion of this factor, the impact of parity on men's mortality risks is reduced to insignificance. In Model 5 we include educational attainment to our analyses. Compared to men who have only finished primary school, men with higher levels of education have significantly lower mortality risks. With the inclusion of information on men's educational attainment, the impact of parity on men's

mortality risks becomes insignificant. When all our variables are included in the full model, we see that parity no longer has a significant impact on men's mortality risks. Furthermore, in the full model, the impact of occupational prestige and having medium education are reduced to insignificance. Overall, our findings suggest that parity influences men's mortality risks via health behaviors, partner status and educational attainment.

Conclusions

With this paper, we aimed at exploring whether reproductive patterns have long-term health implications for men, and which mechanisms underlie this relationship. Specifically, we studied the impact of parity on men's mortality risks. Our results show that remaining childless is disadvantageous for men's mortality risks. However, once information on men's health behaviors, their partner status and their educational attainment had been taken into account, the positive impact of having children disappeared. This indicates the presence of two mechanisms. First, that having children affects men's mortality risks by missing out on the (indirect) encouragement that is given by children and a partner to follow good health practices (Uchino, 2004). This argument is backed up by studies showing that fathers are less often smokers, drink less and engage more in physical exercise in comparison to childless men (Eggebeen & Knoester, 2001; Kendig et al., 2007; Knoester & Eggebeen, 2006). Second, that parity has a protective impact on men's mortality risks partly by the health-advantageous educational attainment of fathers compared to that of childless men.

One limitation of this study is that we have no information on co-residence of fathers with their children throughout the child's life. Research has shown that living with one's children is protective against premature mortality (Ringbäck Weitoft et al., 2004). This suggests that

fathers who never actively fathered their children have a higher likelihood of dying young. This would suggest that in our samples, fathers who ever co-resided with their children are overrepresented. As especially these fathers may have lower mortality risks, differences between childless men and fathers found in this study may be somewhat overstated. The literature would benefit from studies that are able to include detailed information on residence with children throughout the children's lives.

Despite this limitation, this study enhances the understanding of linkages between parity and men's mortality risks. Health behaviors, partner status and educational attainment mediate the relationship between parity and mortality risks among men. In all, this study shows that men's reproductive patterns have long-term health implications.

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Table 1 Distribution of the Samples by Variables used in the Analysis of Parity and Mortality

	0 children	1 child	2-3 children	4+ children
Age-group				
45-50	28%	26%	28%	6%
51-55	17%	20%	22%	11%
56-60	18%	20%	20%	19%
61-65	17%	15%	14%	25%
66-70	14%	14%	11%	26%
71-75	7%	6%	5%	13%
# Chronic conditions	0.81	0.83	0.79	0.83
Drinking				
Total Abstainer	22%	17%	12%	20%
Light drinker	33%	39%	42%	40%
Moderate drinker	24%	26%	27%	24%
Heavy drinker	21%	18%	18%	16%
Smoking				
Non-smoker	16%	9%	11%	10%
Light smoker	40%	48%	49%	50%
Moderate smoker	35%	34%	31%	34%
Heavy smoker	9%	8%	8%	6%
Occupational prestige	2.21	2.21	2.74	2.57
Live with partner	61%	90%	94%	89%
Education				

Only primary school	35%	32%	21%	29%
Low level of education	27%	36%	34%	33%
Medium level of education	19%	21%	21%	17%
High level of education	18%	11%	25%	21%
Mean age	58	57	56	63
No of deaths	36%	33%	29%	43%
No of persons (%)	594 (12%)	596 (12%)	2879 (58%)	893 (18%)

Graph 1: Hazard ratio of parity on mortality by age

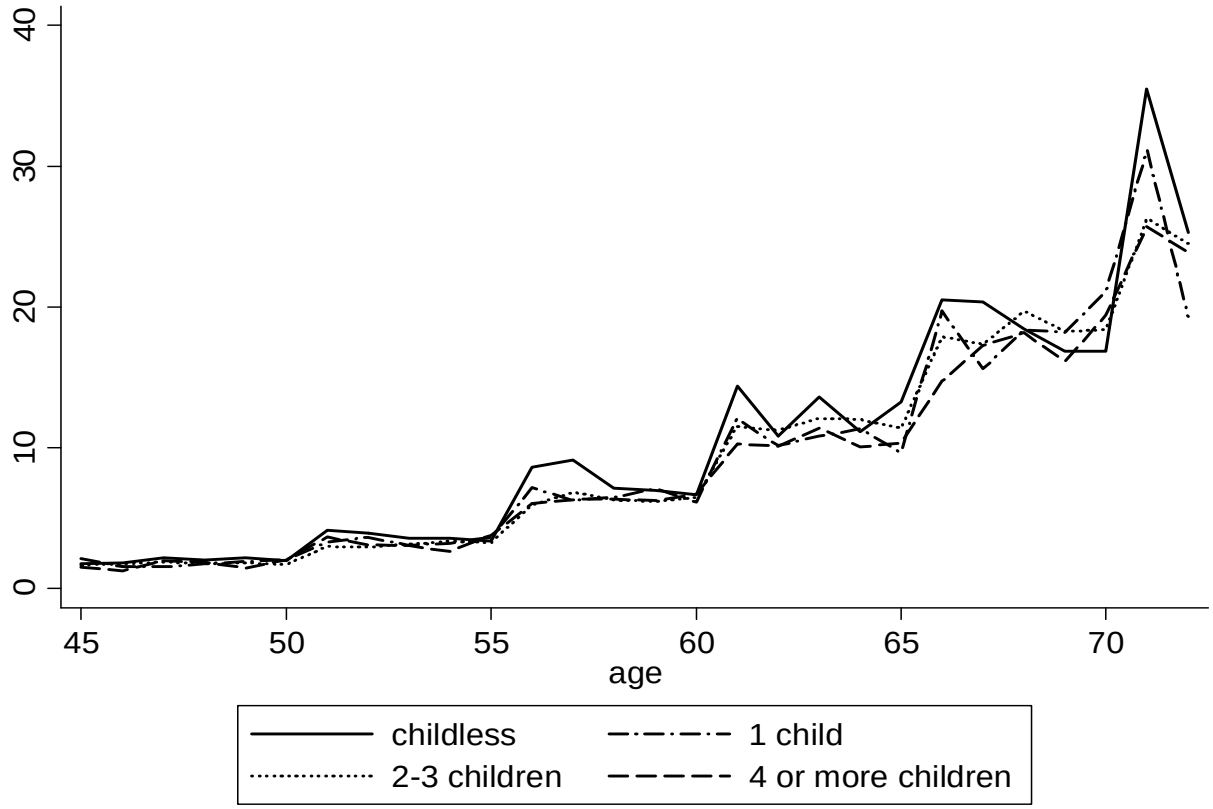

Table 2 Hazard Rate Ratio of Parity and Social and Behavioral Factors on Mortality Risks of Men (*n* = 4964, Person-Months = 657117, Deaths = 1527)

	Base Model	M 2	M 3	M 4	M 5	Full model
1 child	0.87	0.89	0.86	0.94	0.87	0.94
	(0.72-1.05)	(0.74-1.08)	(0.71-1.04)	(0.77-1.14)	(0.72-1.06)	(0.77-1.18)
2-3 children	0.86*	0.93	0.91	0.95	0.94	1.05
	(0.75-1.00)	(0.81-1.08)	(0.78-1.06)	(0.82-1.10)	(0.81-1.09)	(0.89-1.24)
4 + children	0.81**	0.86	0.83**	0.87	0.87	0.94
	0.69-0.95)	(0.73-1.01)	(0.70-0.99)	(0.74-1.03)	(0.74-1.03)	(0.78-1.13)
45-50	1.59***	1.72***	1.62***	1.62***	1.60***	1.84***
	(1.26-2.01)	(1.35-2.17)	(1.27-2.06)	(1.28-2.06)	(1.25-2.03)	(1.43-2.36)
51-55	3.38***	3.52***	3.46***	3.39***	3.31***	3.63***
	(2.75-4.16)	(2.86-4.34)	(2.80-4.28)	(2.75-4.18)	(2.68-4.10)	(2.90-4.53)
56-60	5.76***	6.13***	5.74***	5.87***	5.59***	6.28***
	(4.71-7.05)	(5.00-7.53)	(4.66-7.06)	(4.79-7.20)	(4.54-6.88)	(5.05-7.81
65-70	9.02***	9.93***	9.08***	9.08***	8.68***	10.05***

	(7.41-10.99)	(8.11-12.17)	(7.40-11.13)	(7.43-10.09)	(7.08-10.65)	(8.08-12.49
71-75	12.89***	14.62***	13.10***	12.81***	12.26***	14.31***
	(10.43-15.93)	(11.77-18.15)	(10.52-16.31)	(10.32-15.88)	(9.85-15.25)	(11.33-18.06
# chronic	1.18***	1.21***	1.20***	1.18***	1.19***	1.22***
conditions	(1.13-1.23)	(1.15-1.26)	(1.15-1.26)	(1.13-1.24)	(1.13-1.24)	(1.17-1.29)
Total		1.34***				1.28***
Abstainer		(1.18-1.53)				(1.11-1.47)
Moderate		0.96				0.97
drinker		(0.84-1.08)				(0.84-1.11)
Heavy		1.30***				1.22***
drinker		(1.14-1.49)				(1.06-1.42)
Light		1.50***				1.56***
smoker		(1.22-1.84)				(1.25-1.95)
Moderate		2.57***				2.65***
smoker		(2.09-3.15)				(2.12-3.31)
Heavy		3.30***				3.29***

smoker		(2.58-4.22)				(2.51-4.31)
Occupational			0.92***			0.99
prestige			(0.90-0.95)			(0.95-1.03)
Live with				0.74***		0.78***
partner				(0.65-0.85)		(0.67-0.91)
Low					0.76***	0.84**
education					(0.67-0.85)	(0.73-0.96)
Medium					0.75***	0.87
education					(0.65-0.86)	(0.73-1.02)
High					0.58***	0.68***
education					(050-0.67)	(0.56-0.82)
Log likelihood	-14080	-13432	-12892	-13656	-13456	-11788

1 Note * p<0.05; ** p<0.01; *** p<0.001. 95 % confidence intervals in parentheses.