

PARITY AND MORTALITY AMONGST BIOLOGICAL AND ADOPTIVE PARENTS IN CONTEMPORARY SWEDEN

KIERON BARCLAY & MARTIN KOLK

INTRODUCTION

This study builds upon a growing literature investigating the relationship between parity and mortality in both historical and contemporary populations by looking at the mortality of women and men who adopt children. Overall, the results of previous studies are mixed (Hurt et al., 2006). Some data reveal a positive relationship between parity and longevity, others show a negative relationship (Doblhammer and Oeppen, 2003; Gagnon et al., 2009), whilst some show a U-shaped relationship where parity-two women have the lowest mortality, and parity-one and parity-three-plus women have higher mortality (Grundy, 2009). Mixed results have also been found for men; some studies show that there is no association between parity and mortality for men (Smith et al., 2002; Hurt et al., 2004), while others show that childless men and parity-one men have higher mortality than parity-two and parity-two-plus men (Grundy and Kravdal, 2008). Studies that have conducted separate analyses by class have shown that the relationship between parity and mortality differs between groups, suggesting that the results of studies that do not adequately adjust for socioeconomic factors suffer from confounding (Dribe, 2004).

This study offers a new contribution to this literature by study the mortality of mothers and fathers who adopt children but who have no biological children of their own. By this approach we hope to partially adjudicate between the various biological and social theories that have been proposed for the relationship between parity and mortality. More specifically, we argue that since theories based on the physiological drain of childbearing concerning the hypothesised parity-mortality relationship do not apply to adoptive parents, we will be able to look at the relative contribution of the posited social mechanisms relating parity to post-reproductive mortality. In this study we use the term parity uniformly for both women and men, and for both biological and adoptive parents. While we are aware that parity refers to the number of times a women has given birth, we use it uniformly across these different groups to avoid clumsy prose and because we believe it is clear that by parity, we mean the number of children that the individuals within these different categories has been involved in rearing and/or bearing.

Broadly speaking there are five different explanatory models concerning the relationship between parity and mortality, which are biomedical models, evolutionary models, maternal depletion models, social support models, and selection models (Alter et al., 2007). The first two groups of explanations, biomedical, and evolutionary models, may be categorised as biological explanations for the hypothesised parity-mortality relationship, whereas the social support and selection models can be classified as social explanations. Maternal depletion models describe depletion by both physiological and social mechanisms, and are thus a combination of the two. Biomedical models address the complex physiological processes that are triggered by pregnancy, childbirth, and lactation, which have been linked to increased risks of suffering from certain health problems, and a diminished risk of suffering from others, such as breast cancer. A dominant theory within the

group of evolutionary models is the disposable soma theory (Kirkwood and Holliday, 1979) which posits a trade-off between childbearing and longevity. The maternal depletion model bears similarities to disposable soma theory in emphasising that childbearing is costly to the mother in terms of the direct physiological drain of childbearing. However, the maternal depletion model also emphasises the emotional and social stress that childrearing has the potential to incur, and also reasonably includes the indirect costs of childbearing in lost earnings and the potential impact that may have on health. While termed the *maternal* depletion model, this social depletion mechanism certainly also has the potential to apply to fathers, and particularly in contemporary Sweden.

The two groups of models that more exclusively emphasise social mechanisms, though those are also somewhat touched upon by maternal depletion theory, are the social support, and selection models. The social support model emphasises the potential support, both social and financial, that children can provide to parents in their post-reproductive years, which has support in contemporary Swedish data (Torssander, 2013). The selection model addresses the fact that both limited childbearing and longevity may be confounded by factors such as education, class, and income, as well as numerous unmeasured characteristics. Selection effects are also important to consider when studying the mortality of nulliparous men and women. It is possible that for these individuals the lack of children can be explained by either shortcomings in health such as infertility, or in low social desirability that may also be related to longevity.

For this study it is important to consider how biological and adoptive parents differ, and the reasons why parents may choose adoption. In Sweden, as in many other countries, individuals seeking to adopt need to go through a rigorous process to assess their perceived suitability as parents by the various adoption authorities. Among other factors, the adoption authorities preferentially select couples in a stable relationship, beyond a certain income threshold, and who have a lifestyle and home environment that is perceived as conducive to the successful upbringing of children. In all likelihood this means that adoptive parents are on average healthier and more occupationally and financially stable and secure than the average biological parent. Nevertheless, we should consider that adoptive parents may have chosen to take that route because of infertility, which may indicate a lower level of underlying health. While this process of assessment can take several years to complete, Sweden has one of the highest rates of adoption in the world alongside Norway.

DATA AND ANALYSIS

In this study we used contemporary Swedish register data to analyse the relationship between parity and mortality for men and women. We look at birth cohorts born between 1910 and 1950. Our mortality data extends from 1960 to 2007. As we are studying the relationship between parity and mortality, it is necessary to study post-reproductive mortality so that the individuals under analysis will have reached completed fertility. This means that women enter the analysis at age 45, and men enter the analysis at age 50. These ages are the 99th percentile in terms of the ages at which the last child is born for women and men in Sweden in these birth cohorts. For the earliest cohort, born in 1910, we are able to follow them to age 97, while for the latest cohort, born in 1950, we are able to follow them to age 57. Although Sweden has one of the highest rates of adoption in the world - presently around 1,000 children are adopted each year, equivalent to approximately 1% of live births per year - this still means a relatively low absolute number of adoptions. This is compounded by looking at women and men who adopt *and* have no biological children of their

own. As result we only study parents who adopted up to four children. Our data includes some parents who adopted five children, but insufficiently many to produce reliable estimates for that category. We conduct piece-wise constant survival analyses, with age as the baseline hazard. We also adjust for period. Our final study size is 1,667,413 women experiencing 480,210 deaths, and 1,661,816 men experiencing 627,308 deaths. In the models presented in this extended abstract we also adjust for socioeconomic status measured between the ages of 30 and 40, to attempt to account for the fact that adoptive parents undergo a screening process that biological parents are not subject to.

RESULTS

As can be seen in figures 1(a) and 1(b), the relative risks of mortality for adoptive mothers and fathers are always lower than those of biological mothers and fathers, though the difference is not statistically significant for parity-four parents; this is most likely due to the fact that relatively few parents adopt as many as four children, leading to more variance in our estimates. For adoptive mothers, we can see that the parameter estimates show that the relative risk of mortality declines further with each adoptive child. Adoptive mothers with two or three children have significantly lower relative risks of mortality than adoptive mothers with one child, but there is no significant difference between parity-two and parity-three adoptive mothers. Again, the pattern is largely the same for men, except that the parameter estimate for parity-four adoptive fathers is higher than that of parity-two and parity-three adoptive fathers.

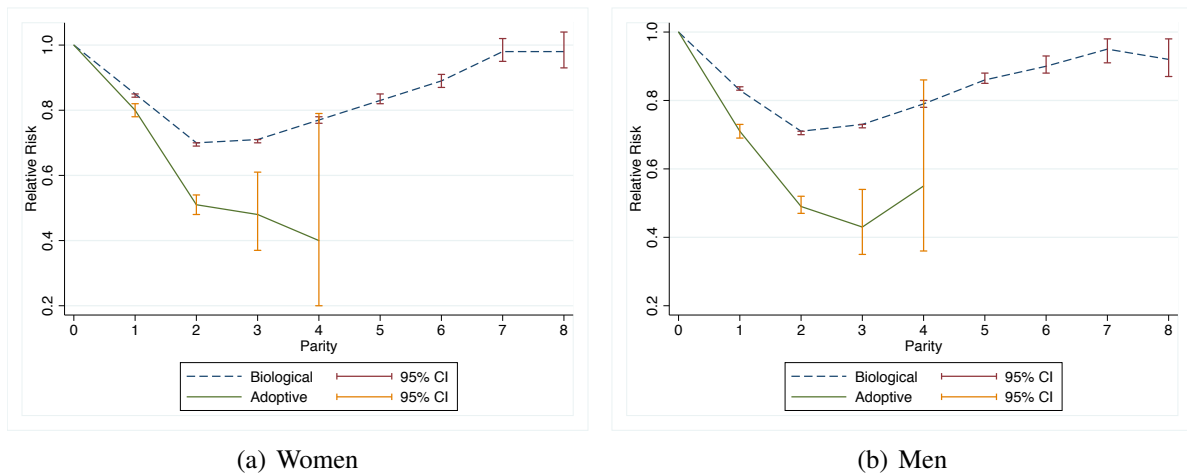


FIGURE 1. Parity and Mortality for Biological and Adoptive Women and Men, Adjusting for Adult SES

Regarding the results for biological parents, we see that the mortality of parous women and men is consistently lower than that of nulliparous women and men. We can also see that the patterns are remarkably similar for women and men, although not exactly the same. The results for biological mothers show that parity-one women have lower mortality than the nulliparous, and parity-two and parity-three women have lower mortality still. Relative to parity-two and parity-three women, mortality begins to increase for parity-three-plus women, but the relative risks remain lower or

equal to parity-one women for parity-four and parity-five women. It is only after the sixth child that mortality increases above the levels seen for parity-one women. The mortality of parity-seven and parity-eight women is not statistically distinguishable from nulliparous women. The pattern for men is very similar, except that childless men always have the highest mortality. These results from the models where we do not adjust for socioeconomic status are very similar to those shown here.

PRELIMINARY CONCLUSIONS AND PLANNED EXTENSIONS

The main finding from this analysis is that adoptive parents have substantially lower mortality than biological parents. The results for adoptive parents show that their mortality decreases with increasing parity, but that there is no significant difference after the second child. As our data does not include any parents who adopted more than four children, we cannot reasonably speculate about whether mortality would also increase at higher levels of adoptive parity. For the most part it can be argued that the results for adoptive parents indicate the relative importance of social mechanisms over physiological mechanisms in explaining the relationship between parity and mortality. The lower mortality levels for adoptive mothers and fathers who have adopted two or more children, relative to one child, suggests the possibility that additional children provide more social support in later life that has a positive effect on the longevity of the parents. After all, while we could expect that adoptive parents should have lower mortality than biological parents due to having faced a rigorous screening process, our adoptive parents will all have faced that process. However, there may be some selection processes operating regarding the choice of adopting multiple children. We also find that in contemporary Sweden there is a non-linear relationship between parity and mortality for biological mothers and fathers, with mortality decreasing up to parity two or three, before rising again, though remaining below the mortality of the nulliparous.

However, unlike the results for adoptive parents, the results for biological parents are not consistent with a social support argument, and are likely to reflect a combination of depletion and selection effects. One alternative interpretation of the difference in mortality that we observe between biological and adoptive parents could be a relative difference in the experience of depletion; *ceteris paribus*, it could be argued, women who have two children but do not have to experience the rigours of pregnancy and childbirth would have the same lower mortality as adoptive mothers. One argument against this theory is that we observe the same pattern for men, who do not experience the physiological depletion of pregnancy and childbearing, though they may suffer through post-birth depletion mechanisms. Nevertheless, we have to acknowledge that studying the relationship between family size and any outcome is subject to myriad complex endogeneity problems. In previous research plural births have often been used as an instrument to study the impact of family size on outcomes for both the child and the parents, but as the key novel contribution of this study is our analysis of adoptive parents, we cannot use twinning as an exogenous shock. At the moment we argue that our results reflect complex selection mechanisms which we intend to pick apart by careful analysis and adjusting for additional factors. In particular we intend to adjust for the educational attainment levels of the parents, so as to more fully adjust for other factors that distinguish parents who choose to adopt from parents who choose to have biological children of their own.

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