Economics and Human Biology 11 (2013) 371–381

Contents lists available at SciVerse ScienceDirect

Economics and Human Biology

journal homepage: http://www.elsevier.com/locate/ehb

Maternal bereavement: The heightened mortality of mothers after the death of a child

Javier Espinosa [a,*], William N. Evans [b,1]

[a] Department of Economics, Rochester Institute of Technology, 92 Lomb Memorial Drive, Rochester, NY 14623, USA
[b] Department of Economics, University of Notre Dame du Lac, 437 Flanner Hall, Notre Dame, IN 46556, USA

ARTICLE INFO

Article history:
Received 4 August 2011
Received in revised form 30 March 2012
Accepted 15 June 2012
Available online 23 June 2012

Keywords:
Bereavement
Mother mortality
Child death
Cox proportional hazard
National Longitudinal Mortality Study

ABSTRACT

Using a 9-year follow-up of 69,224 mothers aged 20–50 from the National Longitudinal Mortality Survey, we investigate whether there is heightened mortality of mothers after the death of a child. Results from Cox proportional hazard models indicate that the death of a child produces a statistically significant hazard ratio of 2.3. There is suggestive evidence that the heightened mortality is concentrated in the first two years after the death of a child. We find no difference in results based on mother's education or marital status, family size, the child's cause of death or the gender of the child.

1. Introduction

Inquiry into the health outcomes of bereavement has been conducted over the past decades by researchers from a variety of disciplines, including psychology, epidemiology, economics, sociology, and other social and medical sciences.[2] Researchers have examined the physical health (e.g., mortality, onset of cancer) and mental health consequences (e.g., depression, anxiety), as well as the possible pathways linking the grief of bereavement to health outcomes (Gerra et al., 2003; Gündel et al., 2003; Kiecolt-Glaser et al., 2002; Schleifer et al., 1983; Stroebe et al., 2006). Most commonly, studies have addressed the issue of spousal bereavement and health, finding that bereft spouses experience a variety of poor outcomes including excess mortality, a result referred to as the "spousal bereavement effect".[3] Empirical results have also demonstrated negative relationships between bereavement and measures of health for grandparents,[4] parents,[5] children,[6] and siblings,[7] but there remains a paucity of research addressing the bereavement effect for non-spousal relationships.

A child's death is a horribly tragic event for parents, and the mental repercussions are generally thought to be grave. Yet research on parental health after the death of a child represents only a small portion of the health-outcomes research on bereavement (Stroebe et al.,

* Corresponding author. Tel.: +1 202 415 5094; fax: +1 585 475 2510.
E-mail addresses: javier.espinosa@rit.edu, jxegse@rit.edu (J. Espinosa), wevans1@nd.edu (W.N. Evans).
[1] Tel.: +1 574 631 7039.

[2] For a review, see Stroebe et al. (2007).

[3] For examples, see Elwert and Christakis (2008), Espinosa and Evans (2008), Kaprio et al. (1987), Lillard and Waite (1995), Murray (2000), Rogers (1995), and Smith and Zick (1994).

[4] For examples, see Fry (1997), Ponzetti (1992), and Youngblut et al. (2010).

[5] For examples, see Agerbo (2005), Bohannon (1991), Davies (2006), Levav et al. (1988, 2000), Li et al. (2002, 2003a,b, 2005), Manor et al. (2000), Murphy et al. (1999, 2003), Olsen et al. (2005), Ponzetti (1992), and Schwab (1996).

[6] For examples, see Dowdney (2000) and Worden and Silverman (1996).

[7] For examples, see Birenbaum et al. (1989) and Brent et al. (1993).

1570-677X/$ – see front matter © 2012 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.ehb.2012.06.002

2007). Published research on the relationship between parental bereavement from the death of a child and parental health outcome includes two quantitative studies from Denmark showing evidence of a link between parental bereavement and an increased risk for hospitalization for a mental health reason or for a diabetes-related condition (Li et al., 2005; Olsen et al., 2005). Specifically, Li et al. (2005) demonstrated that parents who experienced the death of a child had a higher risk of first-time hospitalization for a psychiatric disorder than parents who did not lose a child. Moreover, mothers had a higher relative risk than fathers, the effect of which was most acute during the first year and significantly elevated for five years or more. Olsen et al. (2005) showed that mothers who lost a child had a statistically significant increase in risk for first-time hospitalization for diabetes type 2 compared with mothers who did not lose a child. Other works have centered on the relationship between parental bereavement and cancer incidence and survival (Li et al., 2002, 2003a), with results showing a slight increase in overall risk for cancer in bereaved mothers (possibly due to stress-induced adverse life styles) but no difference in cancer survival rates between parents who lost a child and those who did not. Finally, a study using data from Denmark showed that parents who experienced the death of a young child demonstrated a statistically significant increase in mortality (Li et al., 2003b), whereas another study from Israel found that parents who experienced the death of an adult child did not show an elevation in mortality (Levav et al., 1988).

In this study, we investigate whether there is heightened mortality of mothers after the death of a child—i.e., a *maternal bereavement effect*—using a nine-year follow-up of 69,224 mothers aged 20–50 from the National Longitudinal Mortality Survey of the United States Census Bureau.[8] This is the first study to empirically analyze this issue with a large, nationally representative U.S. data set. In this case, we exploit a unique feature of the National Longitudinal Mortality Survey that allows us to track the mortality of children even after they leave the household. We find evidence that a mother's mortality is heightened after the death of a child and that the excess mortality is greater in the first two years after the death of a child. The latter finding is especially relevant to public health policy and the timing of interventions that aim to ameliorate the adverse health outcomes mothers experience after the death of a child. In addition to investigating the relationship between maternal bereavement and mortality in the United States, we aim to assess whether there is heterogeneity in the effect based on such characteristics as household income, mother's educational attainment, and the child's cause of death.

2. Data and methods

All the work related to this study has been carried out in accordance with the Uniform Requirements for manuscripts submitted to Biomedical journals, and no human or animal experimentation is associated with this work.

2.1. Data

The primary data source for this analysis is the public-use version of the National Longitudinal Mortality Study (NLMS), a data set constructed by merging person-level responses from the Census long-form data and the Current Population Survey (CPS) with death certificate information on mortality status and cause of death from the National Death Index (NDI). The CPS data provide information on household income, occupation, education, and other demographic variables; for most surveys, the CPS data do not provide detailed information on health status or health behaviors. The public-use version of the NLMS contains data from five monthly CPS samples from 1979 through 1981, and in this version the mortality follow-up is set to nine years from entry into the CPS and captures the number of days from initial survey until death or the end of nine years. The linking of the cross-sectional data to the NDI provides a time-series component to the static CPS data; namely, there is a variable that captures the number of days a respondent is alive after entering the survey. All other NLMS variables, like household income and mother education, are measured only once and that is at the time respondents enter the survey.[9]

The CPS is a household-based survey, and it contains data on all household members. Using household identification numbers and variables in the NLMS that identify a respondent's relationship to the head of household, we are able to link mothers to their children.[10] Because the vast majority of children live with the mother regardless of the family living arrangement, the match of the CPS to the NDI allows us to observe deaths of children even once they leave their original household. A limitation of the household survey is that a household sample that includes older mothers with older children will, by construction, not include children who left the household before the initial interview. Thus, we cannot identify these children or their mortality information.

This limitation in using the NLMS data set to address the maternal bereavement question is illustrated in Fig. 1. The 1980 Census 5-Percent Public Use Micro Samples (PUMS)[11] asks mothers how many children they have had, and using the detailed relationship codes in the census, we can calculate—by age of mother—the fraction of children ever born to the mother who are still living in the household. This number is reported in Fig. 1. Note that through age 35, roughly 90% of children ever born to a mother are in their mother's household at the time of the survey. However, this number drops precipitously after that. The fraction of children still in the mother's household falls to 73% at age 40, 50% by age 45, and 33% by age 50.

[8] We use the nomenclature "mother mortality" instead of "maternal mortality" to avoid confusion, as the latter term is commonly employed by researchers to denote deaths of women due to causes associated with pregnancy (Hill et al., 2007).

[9] See Rogot et al. (1988, 1992) for more information on the NLMS.

[10] We cannot identify if a child is adopted in the NLMS.

[11] We access the data using the Integrated Public Use Microdata Samples, see Ruggles et al. (2010).