Parental Loss and Children's Well-Being

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A B S T R A C T

This paper identifies the effects of parental death on children's well-being using six administrative data sets from Taiwan. Information collected at different points in children's lives and detailed parental mortality records are used to show that parental death has significant long-term implications for human capital accumulation: the quality of education of high income children is significantly reduced; the impact of a father's death on his son's probability of acquiring higher education increases with income; children are more likely to substitute an income earning occupation in place of higher education; low-income girls are also more likely to marry during their teenage years.

I. Introduction

The latest estimates from UNICEF show that there are approximately 153 million orphans worldwide, a figure that includes children who have lost a mother, a father, or both parents.[1] Although the majority of orphans are from African and Asian

1. Source: www.childinfo.org/hiv_aids_orphanestimates.php (accessed on August 2012).

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[Submitted January 2011; accepted November 2012]
ISSN 0022-166X E-ISSN 1548-8004

countries, no country is immune to this woe. The loss of a parent has the potential to be particularly devastating for a child's future because it directly affects two important resources used in the production of human capital: income, if the deceased parent was the main income earner of the household; and time, if the deceased parent was an important source of mentorship, nurture, and stability.

Most of the empirical evidence that looks at the relationship between parental loss and children's welfare validates the existence of a negative association. This association is known to depend on the gender of the child and the gender of the deceased parent. For example, a World Bank (2002) report finds that losing a parent to the HIV-AIDS pandemic affects girls disproportionately more than boys, suggesting that policies aimed at helping bereaving children should be gender-based. Several studies echo this report (Kobiané, Calvès, and Marcoux 2005; Gertler, Levine, and Ames 2004; Fronstin, Greenberg, and Robins 2001). The studies that look for a causal pathway between childhood bereavement and children's outcomes often find that losing a parent is detrimental to children's educational attainments and health, in particular after the death of a mother (Evans and Miguel 2007; Beegle, De Weerdt, and Dercon 2006; Case and Ardington 2006). In terms of the persistence of the effects of bereavement there is less of a consensus because most studies focus on short-term outcomes.[2] Indeed, the empirical literature is vast; yet, because the primary focus of this literature has been Sub-Saharan African countries, its implications may be limited to children losing a parent in a country struck by the HIV-AIDS pandemic.[3]

Understanding the significance of losing a parent during childhood in a more general setting is difficult for at least three interconnected reasons. First and foremost, a large body of empirical evidence from the epidemiological literature has shown that certain causes of death are strongly correlated with the socioeconomic status (SES) of the deceased (Link and Phelan 1995; Howard et al. 2000; Weires et al. 2008). Similarly, human capital research suggests that SES affects both parents' health (Grossman 2006) and children's educational attainments and health outcomes (Chou et al. 2010; Lin, Liu, and Chou 2007; Currie and Moretti 2003). The implications of these findings are that omitted variables (for example, parental behavior, family genetics, or environmental characteristics) are associated with both parental death and children's well-being, making orphanhood status highly endogenous. For example, it is possible that the omitted variables that make parents more likely to die also make a child more likely to experience adverse outcomes. Similarly, it may well be that the same omitted characteristics make a child better adapted to cope with various biological and environmental risks. In the former case, the bereavement effect is overstated; in the latter case, it is understated.

Second, studies assessing the existence of long-term bereavement effects are as rare as data sets that include measures of long-term outcomes. As a result, even if most of the studies suggest that parental loss has a negative impact on children's outcomes, it is often only the short-term impact that is being analyzed. This is a key issue when

2. Two important exceptions are the works of Beegle, De Weerdt, and Dercon (2006) and Fronstin, Greenberg, and Robins (2001), both of which find significant long-term negative implications from losing a parent.
3. See Evans and Miguel (2007); Ainsworth and Filmer (2006); Beegle, De Weerdt, and Dercon (2006); Case and Ardington (2006); Kobiané, Calvès, and Marcoux (2005); and Case, Paxson, and Ableidinger (2004). For exceptions, see Gertler, Levine, and Ames (2004); Fronstin, Greenberg, and Robins (2001); and Lang and Zagorsky (2001).

trying to understand whether losing a parent has an effect on important lifelong decisions that children make later in their lives, for example, during their late teenage years or when they reach adulthood. Unaware of these later outcomes, we are unable to know whether losing a parent has in fact long-lasting implications for children's well-being. Finally, the fact that early parental death is a relatively rare event may lead to imprecise estimates of the bereavement effect.[4] A small sample of bereaved children also makes it difficult to capture differences between long, medium, and short-term bereavement effects and, as is the case of nearly all studies available to date, to explore the possible interactions between experiencing the death of a parent and different SES levels.

In this paper, our goal is to identify and measure the effect of parental death on children's well-being. Using confidential identification information, we are able to assemble a large and detailed sample that links six administrative data sets from Taiwan. Our sample contains information collected at different points in children's lives and includes detailed cause-of-death and mortality records of all the deceased parents. Using this information, we first identify the causes of death that represent an exogenous shock to children's outcomes. Specifically, conditional on personal characteristics of the deceased we classify causes of death into two groups: those that are strongly correlated with measures of socioeconomic status (termed informative cause-of-death, or ICOD) and those that are erratic in nature (termed uninformative cause-of-death, or UCOD). This strategy from Espinosa and Evans (2008) allows us to introduce a source of exogenous variation because UCODs are, by construction, orthogonal to a child's socioeconomic characteristics.

We identify differential bereavement effects related to the gender of the deceased parent by separating the analysis into death of a mother and death of a father. We ask first whether losing a parent has an effect on a child's likelihood of acquiring higher education and, if so, whether the effect of losing a parent has short-term or long-term implications for the child's educational attainments or the quality of education he/she receives. We investigate whether boys and girls are equally affected by the loss and whether there is an interactive effect between bereavement and income. Finally, we also examine other potential channels through which parental loss may curtail children's well-being. In particular, we ask whether children experiencing the loss of a parent are more likely to substitute an income earning occupation in place of higher education, or whether they are at a higher risk of teenage marriage.

Our findings show that losing a parent is detrimental to children's prospects of acquiring higher education and to their well-being. We also find that children's educational attainment is, on average, more affected by the death of a mother than the death of a father. In terms of the persistence of the bereavement effect, while the effect of losing a parent is significant regardless of when in the child's life the death takes place, the short-term effect of a father's death is particularly deleterious for girls. Studying other channels through which the death of a parent may affect children's well-being, we observe three patterns. First, the quality of education of middle- and high income

4. For example, Fronstin, Greenberg, and Robins (2001), who make use of a relatively small sample of bereaved children (about 8 percent of the total sample of approximately 4,166 females, and 3,662 males), are unable to precisely identify the disruption effect by type (that is, death versus divorce) or by age. It is worth noting that their study is also one of the few that analyze the long term bereavement effects in a non-Sub-Saharan setting.

children is significantly reduced, with the high income girls being the most severely affected following a father's death. Second, the negative effect of a father's death on his son's probability of acquiring higher education increases with income. And finally, irrespective of their income, children that have lost either parent are more likely to substitute an income earning occupation in place of higher education, whereas low-income girls are also more likely to marry during their teenage years.

II. Data and Sample

We use six administrative data sets from Taiwan to construct our sample. As a first step, we merge three sources: (1) the Annual Birth Certificate Records (BCR); (2) the Annual Death Certificate Records (DCR); and (3) the College and University Joint Entrance Examination files (CUJEE). The first two sources contain records for the entire population of Taiwan and were assembled by Taiwan's Ministry of Interior Affairs. The third source covers the examination years 2000–2003 and was gathered by the College and University Entrance Examination Center of Taiwan's Ministry of Education.

The birth certificates have detailed information on a variety of personal and demographic characteristics including age, date of birth, gender, and parent's age at the time of the child's birth, parental schooling, and county and town of residence at birth. From the death certificates, we can identify not only whether either parent is deceased but also the timing of death, as well as the medical diagnosis of the deceased (as coded by the International Classification of Diseases or ICD-9). The latter information is crucial for the construction of our cause-of-death classification. The CUJEE data provide college or university enrollment information for each student who gained admission. The data also allow us to identify whether the students took the entrance exam (CUJEE), the scores they obtained in every area tested, and whether they were offered admission to attend a private or a public college or university.

To construct our sample, we restrict children's cohorts to those students who were born between 1981 and 1985 to parents that were between 16 and 50 years of age. In other words, we only consider students who would have turned 18, the age of taking the CUJEE, in 2000–2003. We construct five child cohorts from birth certificates based on both the children's date of birth and the official cutoff date for school enrollment.[5] We use the parents' personal identification numbers found in the children's BCR (1981–85) to merge the sample of deceased parents to their respective DCR (1981–2003). This merge allows us to match the deceased parents to their individual mortality records (cause of death, time of death, and place of death). From the Government Employee Insurance and Labor and Farmer Insurance files we obtain information on the wages of all insured parents. This information allows us to create a proxy for the aggregate monthly income of the child's family.[6]

5. The cohorts include children who were 18 years old on September 1 of each of the years 2000 through 2003 (that is, children born between September 2, 1981 and September 1, 1985).

6. The uninsured in Taiwan are often low-SES unemployed individuals. Still, it is possible that some high SES individuals simply have opted out of the labor insurance. For this reason, we check whether those who have no insurance records also live in the poorest areas. We use the township income-tax data for each of the 359 towns in Taiwan. These data are collected by the Financial Data Center of Taiwan's Ministry of Finance.

Table 1
Descriptive Statistics I—Mortality Variables

Variable	Death of a Father		Death of a Mother	
	(N = 1,402,196)		(N = 1,402,196)	
	Percent	Standard Deviation	Percent	Standard Deviation
Parent died before child was 20 years old	4.9	21.6	1.6	12.6
Parent died before child took CUJEE	4.7	21.1	1.6	12.4
	(N = 68,363)		(N = 22,918)	
	Mean	Standard Deviation	Mean	Standard Deviation
Parent's age when deceased[a]	43.2	8.2	38.6	7.1
Child's age when parent died[a]	12.2	4.9	12.0	5.0

Note: This table shows the summary statistics for all the mortality-related variables. Observations are at the child level. N = 1,402,196.
a. Statistics include all children who have lost a parent before turning 20 years of age.

In the next step, we merge this sample with the CUJEE (2000–2003) by the students' ID and the year in which each cohort was scheduled to take the CUJEE. We then use the personal identification number of each child to merge this sample to: (4) the National Military Enrollment (NME) records, 1998–2003; (5) the Labor Insurance (LI), Farmer Insurance (FI), and Government Employee Insurance (GEI) files, 1998–2003; and (6) the National Marriage Certificate records (NMC), 1998–2003. Data Sets 4 and 6 are maintained by the Ministry of Interior Affairs. The LI and FI files come from the Bureau of Labor Insurance and GEI files are obtained from the Central Trust of China.

A. Sample Statistics

Our final sample contains 1,402,196 observations.[7] Among these, 65,220 (21,886) children become paternal (maternal) orphans before taking the CUJEE. 68,363 (22,918) children become paternal (maternal) orphans before turning 20 years of age. Table 1 shows the descriptive statistics of the mortality variables found in our final sample. Using the

We find that all the uninsured individuals live in the lowest income towns (the towns belonging to the lowest income-tax quartile).
7. The sample sizes for the death of a mother and the death of a father differ slightly because observations having invalid or missing values in any of the variables used in the cause of death classification were dropped from the final sample, separately for mothers and fathers.

Table 2
Descriptive Statistics II—Explanatory Variables

Variable	Mean	Standard Deviation	Variable	Mean	Standard Deviation
Child Variables			Father's Education		
Eldest daughter	0.186	0.389	Junior high school	0.239	0.426
Eldest son	0.199	0.399	High school	0.298	0.457
Male	0.516	0.499	College without a degree	0.082	0.275
Twin	0.008	0.094	College with a degree	0.066	0.248
Out of wedlock	0.005	0.075	More than college education	0.002	0.049
Abandoned	0.000	0.002			
Birth year 1981	0.092	0.289	Mother's Education		
Birth year 1982	0.262	0.440			
Birth year 1983	0.251	0.433	Junior high school	0.246	0.431
Birth year 1984	0.246	0.430	High school	0.273	0.445
Birth year 1985	0.147	0.354	College without a degree	0.045	0.208
Family income[a]	32,719	22,422	College with a degree	0.030	0.173
			More than college education	0.000	0.020

Note: This table shows the summary statistics for all the explanatory variables. N = 1,402,196.
a. 1994–95 average exchange rate: US$ 1 = NT$ 26.462.

BCR of each child we create indicator to control for child-level characteristics including first-born son or daughter, gender, whether the child was one of a pair of twins, whether the child was born out of wedlock or was abandoned by his/her biological parents, and the child's year of birth. These controls help us capture any differences in educational attainment and other outcomes that may arise from children's ascribed characteristics.

We obtain information on the parents' education from the child's birth certificate. We divide parental education into six categories: illiteracy to primary school attainment (0–6 years); junior high school level (7–9 years); high school level (10–12 years), college level without a degree (13–14 years); college and university with a degree (15–16 years), and higher education (16+ years). The illiteracy to primary school was the omitted category in all the regressions. Table 2 presents the descriptive statistics for the explanatory variables.

We measure children's outcomes using six binary variables and a set of continuous variables. First, we look at educational attainment and the quality of education that children receive. To measure educational attainment we use an indicator of college or university enrollment. To measure the quality of education we rely on an indicator for public college or university enrollment, versus enrollment at a less prestigious private college and university, or no enrollment at all.[8] The top panel of

8. While it would be ideal to focus on a broader range of outcomes, we do not have information on children's completed years of schooling.

Table 3 presents the descriptive statistics for all of the binary dependent variables corresponding to the educational outcomes, separately for bereaved and nonbereaved children. We also analyze whether parental loss affects the probability of taking the CUJEE exam and, for the subsample of children who undertook this examination, whether bereaved children have a systematically different test performance (measured by children's standardized test scores) relative to nonbereaved children in the same cohort. The subjects we considered are Chinese, English, Math for Engineers, Math for Social Sciences, Chemistry, Physics, Biology, and History.[9]

In addition to educational outcomes, we also analyze three noneducational outcomes (see bottom panel of Table 3). First, the NMC files allow us to identify children who married and the date of their marriage. Combining this information with the child's year of birth, we can construct an indicator variable that equals one if the child got married before turning the age of 20 (that is, during the child's teenage years). Second, the LI files contain information on enrollment into Labor Insurance, which covers most of the workers in the country's private sector.[10] Using the enrollment date and the child's year of birth, we can proxy the date the job began to construct an indicator variable that equals one if the child participated in the labor force before turning the age of 20. Finally, the information contained in the NME files allows us to identify the boys who decided to enlist in the military, their date of enlistment, and the date of release. We use the date of entry into the military, combined with the exam year, to investigate whether bereaved boys are more likely to enlist in the military shortly after high school (within one, two, three, or four years following high school graduation) rather than deferring their enlistment until after obtaining higher education (that is, more than five years after high school graduation).

III. Empirical Model

The empirical literature proposes different methods for identifying bereavement effects. Some authors treat death as an exogenous shock (Corak 2001; Lang and Zagorsky 2001; Ainsworth and Semali 2000; Lloyd and Blanc 1996), ignoring its potential endogeneity at the risk of biasing the estimated bereavement effect. Many of the more recent studies that do address the endogeneity of death use panel data to control for household or individual level fixed effects (Evans and Miguel 2007; Beegle, De Weerdt, and Dercon 2006; Case and Ardington 2006; Fronstin, Greenberg, and Robins 2001). However, when using panel data researchers face other important challenges. First, very few panels follow children long enough to capture long-term bereavement effects. Second, there is a disproportionately higher probability of attrition among the bereaved compared to the nonbereaved, because families that have recently experienced the death of a mother or father may be more likely to relocate and hence to drop out of the survey (Ford and Hosegood 2005). An alternative empirical method is to use unexpected deaths, such as accidents, as exogenous causes of death

9. Descriptive statistics, as well as regression results, on each test subject are available upon request.

10. Self-employed workers could obtain labor insurance if they were members of an occupational union. It is very unlikely that teenagers would work for the government sector because government workers who are civil servants must pass very demanding examinations.

Table 3
Descriptive Statistics III—Binary Dependent Variables

Variable	Death of a Father (N = 1,397,538)			Death of a Mother (N = 1,402,196)		
	Bereaved	Non-bereaved	Difference[a] *(p-value)*	Bereaved	Non-bereaved	Difference[a] *(p-value)*
	Educational Outcomes[b]					
Attended college	0.102	0.182	0.079 (0.000)	0.111	0.179	0.068 (0.000)
Attended high-quality college	0.031	0.062	0.030 (0.000)	0.036	0.061	0.024 (0.000)
Took CUJEE	0.153	0.260	0.106 (0.000)	0.165	0.256	0.091 (0.000)
	Other Outcomes[c]					
Teenage marriage	0.034	0.015	–0.018	0.032	0.016	–0.015

			(0.000)			(0.000)
Teenage work	0.252	0.184	–0.067	0.247	0.187	–0.059
			(0.000)			(0.000)
Military enrollment[d]						
1 year	0.102	0.080	–0.022	0.099	0.080	–0.018
			(0.000)			(0.000)
2 year	0.251	0.194	–0.057	0.245	0.196	–0.048
			(0.000)			(0.000)
3 year	0.302	0.236	–0.066	0.293	0.238	–0.054
			(0.000)			(0.000)
4 year	0.332	0.266	–0.066	0.320	0.269	–0.050
			(0.000)			(0.000)
+5 year	0.054	0.052	–0.001	0.051	0.053	0.001
			(0.265)			(0.429)

a. Difference in outcome means between bereaved and nonbereaved children (*p*-value).
b. Bereaved includes children that have lost a father (mother) before the CUJEE.
c. Bereaved includes children that have lost a father (mother) before turning 20 years of age.
d. Sample only includes boys: N = 721,304 for the death of a father and N = 723,635 for the death of a mother.

(Chen, Chen, and Liu 2009). However, certain unexpected deaths, including those from motor vehicle or job-related accidents, often are correlated with SES (Beaver 2003; Whitlock et al. 2003; Baker et al. 1992; Loomis 1991). That is, it is not clear whether this approach is satisfactory, given that the ultimate decision to include a particular cause-of-death is determined arbitrarily by the researcher.

We follow the procedure proposed by Espinosa and Evans (2008) to classify causes of death as either Informative or Uninformative. First, we regroup the ICD-9s using the Clinical Classification Software (CCS) developed by the Agency for Healthcare Research and Quality (AHRQ 2010).[11] We then use ordinary least squares estimation (OLS) to categorize each of the ICD-9 groupings according to their degree of correlation with family SES. The linear probability model (OLS) we estimate for each COD group is as follows:

$$(1)\quad COD^{d}_{ict} = \alpha^{d}_{0} + \Sigma^{4}_{k=2}[I(INCk^{d}_{ict}=1)\beta^{d}_{k} + I(EDUk^{d}_{ict}=1)\gamma^{d}_{k} + I(EDUSk^{d}_{ict}=1)\eta^{d}_{k}] + \delta^{d}_{c} + \tau^{d}_{t} + X^{d}_{ict}\theta^{d} + \varepsilon^{d}_{ict},$$

where COD^{d}_{ict} is an indicator for parent i who resided in county c and died from cause-of-death d in year t; α^{d}_{0} is a constant; δ^{d}_{c} and τ^{d}_{t} represent county and year of death fixed effects, respectively. $I(INCk = 1)$ equals one when the family income of parent i falls in the k^{th} income quartile; $I(EDUk = 1)$ is an indicator for the educational level k attained by the deceased parent i, $I(EDUSk = 1)$ is an indicator for the educational level k attained by the spouse. X includes four dummies of age at the time of death and an indicator for urban residence. Finally, ε^{d}_{ict} is an idiosyncratic error term.

We estimate Equation 1 using all the parents in our sample, but perform the estimations separately for mothers and fathers. The classification of causes of death into informative (ICOD) or uninformative (UCOD) rests on testing whether the coefficient estimates for the income variables, β^{d}_{k}, the education indicators for the deceased, γ^{d}_{k}, the education indicators for the spouse of the deceased, η^{d}_{k}, and all three sets, income, own education, and spousal education indicators, respectively, are jointly zero. If we reject any of the four null hypotheses at the 10 percent confidence level, then the COD is classified as informative; otherwise, the COD is considered uninformative. The resulting dichotomous variables, ICOD and UCOD, are then used in lieu of parental death.

While the ICOD indicator identifies individuals who died as the result of a predictable cause-of-death, the UCOD indicator identifies individuals who died as a result of a likely random cause. Hence, the UCOD indicator constitutes a source of exogenous variation that is orthogonal to the socioeconomic characteristics of both the child and her/his parents. On the other hand, the effect measured by the ICOD is expected to be biased by omitted third variables. A priori, the direction of the bias is not evident. For instance, because low-SES children already are exposed to various biological and environmental risks, the incremental damage caused by parental loss could be smaller for these children. However, children from high SES families may be better prepared to deal with the death financially. In either case, unobservables are likely to cause the ICOD coefficient to be biased towards zero relative to the UCOD coefficient.[12] On

11. The CCS regrouping allows us to collapse ICD-9s into clinically meaningful diagnosis categories: 181 COD groups for deceased fathers and 178 COD groups for deceased mothers.

12. An alternative explanation for this direction of the bias is provided by Fortson (2008), who finds that HIV infection is positively associated with SES in Sub-Saharan Africa.

the other hand, low-SES children are both more likely to experience parental loss and more frequently exposed to risk factors such as medical illness and family stress. These biological and environmental risk factors may interact synergistically leading these children to have worse outcomes. In this case, the adverse effect captured by the ICOD indicator will be overestimated.

A. COD Classification

Table 4 reports the top ten ICODs and UCODs, separately for fathers (top panel) and mothers (bottom panel). These CODs are obtained by estimating Equation 1 separately for each cause of death group. Grouping all of the cancer-related deaths, we observe that cancer is the number one cause-of-death for both mothers and fathers. Given that many of the listed cancers are highly preventable and often related to behavioral risk factors, it is not surprising to find them primarily under the ICOD group. About 76 percent of fathers' deaths are informative. This is slightly greater than the percentage of informative deaths for mothers (73 percent), a pattern that is consistent with the findings from the epidemiological literature.[13] For fathers, we find that about 76 percent of the informative deaths have a statistically significant income gradient, whereas 53 (38) percent have a statistically significant own (spouse's) education gradient. For mothers, 76 percent of the informative deaths have a statistically significant income gradient, whereas 38 (32) percent have a statistically significant own (spouse's) education gradient. That is, income is the most significant SES-predictor of mortality for both fathers and mothers.

As for fathers, we find motor vehicle accidents (6.73 per thousand), other liver diseases (6.18 per thousand), and cancer of liver and intrahepatic bile duct (4.29 per thousand) to be among the three most common ICODs (top left panel of Table 4). The three most common UCODs for fathers (top right panel of Table 4) include acute cerebrovascular disease (3.03 per thousand), superficial injury (1.61 per thousand), and diabetes mellitus (1.25 per thousand). For mothers, the most common ICOD is also motor vehicle accident (1.96 per thousand), followed by breast cancer (1.37 per thousand) and suicide (1.15 per thousand). The three most common UCODs among mothers include cervix cancer (0.70 per thousand), open wounds (0.27 per thousand), and respiratory failure (0.23 per thousand).

While an in-depth analysis of mortality risk factors is beyond the scope of this study, it is worth discussing some of the CODs in detail. Comparing our UCOD list with Table 4 in Espinosa and Evans (2008) we note that there is some overlap. For example, pancreatic disorders for men and rectal and anal cancers for women are UCODs in both cases. Nevertheless, notable dissimilarities exist, including congestive heart failure and diabetes mellitus. Research on these noncommunicable diseases documents a strong negative health gradient where those at the bottom of the economic hierarchy have both higher incidence rates as well as worse adverse outcomes (for example, Hawkins et al. 2012; Kaplan and Keil 1993). However, several review articles also find that,

13. Mustard and Etches (2003) systematically review 136 published papers that look at the gender differences in mortality risk factors and select 58 studies to be included in their analysis. For 90 percent of the selected studies the authors find that, when absolute measures of inequality are used, male mortality is more unequal than female mortality across socioeconomic groups.

Table 4
Top 10 Causes of Death: CCS Classification

Informative Causes of Death

	Mortality Rate[c]	*P*-value on *F*-test that the variables are jointly zero			
		Father Education	Mother Education	Income	All
Death of a Father					
Motor vehicle accident	6.727	0.56	0.58	0.02	0.13
Other liver diseases	6.182	0.00	0.06	0.08	0.00
Cancer—liver and IHB	4.292	0.10	0.02	0.00	0.00
Cancer of head and neck	2.831	0.87	0.68	0.00	0.03
Crushing or internal injury	2.076	0.80	0.48	0.10	0.19
Suicide	1.758	0.03	0.15	0.23	0.07
Cancer—respiratory	1.391	0.01	0.24	0.07	0.00
Open wounds: extremities	1.157	0.03	0.65	0.80	0.01
AMI	1.093	0.14	0.36	0.74	0.01
Respiratory failure	0.943	0.60	0.02	0.00	0.00
Death of a Mother					
Motor vehicle accident	1.956	0.95	0.79	0.03	0.34
Cancer—breast	1.375	0.00	0.00	0.00	0.00
Suicide	1.153	0.35	0.50	0.09	0.20
Acute CVD	0.762	0.40	0.05	0.84	0.01
Cancer—respiratory	0.630	0.12	0.36	0.00	0.00
Other liver diseases	0.581	0.01	0.00	0.00	0.00
Crushing or internal injury	0.537	0.63	0.28	0.01	0.01
Cancer of stomach	0.519	0.11	0.00	0.00	0.00
Superficial injury	0.430	0.34	0.52	0.00	0.00
Cancer—liver and IHB	0.425	0.06	0.44	0.02	0.02

Uninformative Causes of Death

	Mortality Rate[c]	*P*-value on *F*-test that the variables are jointly zero			
		Father Education	Mother Education	Income	All
Death of a Father					
Acute CVD	3.033	0.18	0.13	0.83	0.38

(*continued*)

Table 4 (*continued*)

	Mortality Rate[c]	*P*-value on *F*-test that the variables are jointly zero			
		Father Education	Mother Education	Income	All
Superficial injury	1.614	0.33	0.28	0.69	0.22
Diabetes mellitus	1.247	0.47	0.94	0.85	0.82
Congestive heart failure	0.773	0.95	0.84	0.88	0.99
Myocarditis	0.575	0.24	0.49	0.75	0.54
Acute renal failure	0.436	0.12	0.35	0.96	0.53
Septicemia	0.280	0.62	0.63	0.71	0.74
Pancreatic disorders	0.263	0.89	0.26	0.18	0.42
Coronary atherosclerosis	0.256	0.16	0.78	0.72	0.57
Accidental Fall	0.250	0.80	0.41	0.86	0.89
Death of a Mother					
Cancer—cervix	0.705	0.51	0.81	0.25	0.18
Open wounds: extremities	0.266	0.18	0.21	0.26	0.15
Respiratory failure	0.233	0.33	0.66	0.14	0.39
Acute renal failure	0.222	0.90	0.46	0.19	0.55
Neoplasms—unspecified	0.196	0.89	0.70	0.12	0.66
Myocarditis[a,b]	0.195	0.73	0.47	0.87	0.58
AMI	0.181	0.56	0.42	0.40	0.21
Congestive heart failure	0.176	0.41	0.99	0.29	0.53
Cancer—rectum and anus	0.176	0.97	0.88	0.11	0.75
Poisoning	0.160	0.89	0.61	0.55	0.86

Note: This table reports the top ten CODs' mortality rates and *p*-values for the joint *F*-tests performed after estimating Equation 1. Observations are at the parent level. AMI = acute myocardial infarction. CVD = cerebrovascular disease. IHB = intrahepatic bile duct.
a. Includes peri-, endo-, and myocarditis, cardiomyopathy. b. Except that caused by tuberculosis or sexually transmitted diseases. c. Measured as number of deaths per 1,000 population.

although the negative gradient is consistently strong across high income countries, this association is less evident for middle- and low-income countries.[14] One explanation for our seemingly paradoxical finding is that the epidemiology of disease depends strongly on a country's economic development. For example, rheumatic heart disease is the major cause of heart failure in Asia, while coronary artery disease is the single most common cause of heart failure in Western developed countries (Mendez and

14. For example, see review articles by Manrique-Garcia et al. (2011) for acute myocardial infarction; Agardh et al. (2011) and Chaturvedi (2004) for diabetes; Chang et al. (2002) for stroke; and Mendez and Cowie (2001) and Blair, Lloyd-Williams, and Mair (2002) for heart failure.

Cowie 2001). While the former has a less clear association with socioeconomic status (Steer, Carapetis, and Nolan 2002), the latter has a consistent association with both unhealthy life styles and socioeconomic status. As developing countries undergo the epidemiological transition and socioeconomic development, the etiology of diseases also becomes increasingly similar to that of Western societies. It is the transition to Western lifestyle and the attendant increase in the risk of chronic diseases like diabetes and heart failure, both of which normally occur initially among the more affluent, that may render the SES-health gradient in a society ambiguous (Schooling et al. 2010).[15]

In what follows, a statistically significant UCOD coefficient will be interpreted as evidence of a causal relationship between parental loss and educational outcome; whereas a statistically significant difference between the UCOD and the ICOD coefficients will be interpreted as evidence that the ICOD parameter is subject to omitted variables bias.

B. Parental Loss and Children's Outcomes

Empirical research shows that children growing up in single parent families are at a higher risk of teenage pregnancy, early marriage, dropping out of school, delinquency, adult depression, and other possible negative outcomes (Amato 2005; Kendler et al. 2002; McLanahan and Sandefur 1994). We first study the effects of parental loss due to death on children's educational attainment, measured by the enrollment rate in college or university, and on the quality of education children receive, measured by the type of college or university the child attends (public versus private).

In Taiwan, entrance to prestigious institutions of higher education is highly competitive and the CUJEE is the most important factor in any admission decision. If losing a parent affects children's educational outcomes or the quality of education children's receive, then one of the potential channels is through children's performance on the CUJEE. We investigate this hypothesis by focusing first on an indicator for whether or not the child has taken the CUJEE as the outcome variable. Depending upon how well students perform in the entrance exam, they are then assigned to a major in a particular college or university. Hence, for the subsample of test-takers we explore whether children who have lost a parent perform systematically differently when taking the CUJEE relative to children with living parents.

We also study whether the death of a parent significantly affects other dimensions of children's lives. Specifically, we consider whether children who have lost a parent before turning 20 years of age are more likely to marry or to work during their teenage years, both of which are potential substitutes for higher education. We also consider military enlistment, as this is also an alternative income earning occupation for boys. In particular, while military service is compulsory for all boys 19 years of age, if a boy chooses to attend college or university the draft can be deferred until after obtaining a higher education degree. Hence, we investigate whether bereaved boys are more likely to enlist in the military soon after high school graduation than nonbereaved boys.

15. It is important to point out that Taiwan experienced significant socioeconomic development during our study period (1981–2003). As a result of this and of the attendant epidemiological transition, it becomes difficult to distinguish the informative from the uninformative CODs based solely on the existing epidemiological literature. This issue highlights the relevance of using statistical methods as we do in this study.

After the death of a father (mother), boys (girls) may naturally respond to the loss by assuming the role of the deceased. To better capture the gender-bereavement gradient, we run all regressions by the gender of the deceased parent and separately for boys and girls. Similarly, the bereavement effect may be different depending on the time elapsed between the death and the observed outcomes under study. To study the time-bereavement gradient, we construct time-death interactions that classify the effect of parental loss into three categories: the long-term effect, corresponding to more than nine years between the parent's death and the relevant year;[16] the medium-term effect, corresponding to three-to-nine years between the parent's death and the relevant date; and the short-term effect, corresponding to up to three years between the parent's death and the relevant year. Finally, the bereavement effect is also likely to depend on the socioeconomic status of the family. To analyze the SES-bereavement gradient we use the insured income of parents as a proxy for family income. Using this proxy, we classify children into four income quartiles, with the first quartile corresponding to the lowest income level.

The reduced-form linear probabilty model (OLS) we estimate is as follows:

$$(2) \quad O_{ict} = \alpha_1 + \delta_c + \sigma_t + ICOD_i\theta_1 + UCOD_i\theta_2 + X_{ict}\mu + \varepsilon_{ict},$$

where the dependent variable O_{ict} is the outcome of child i who was born in county c and belongs to the exam cohort t; α_1 is a constant; θ_1 (θ_2) is the estimated effect of parental death on the child's educational outcome given that the cause-of-death is informative (uninformative); respectively, $ICOD_i$ and $UCOD_i$ are defined as in the previous section; X_{ict} is a vector of all other explanatory variables to be included in the estimation, and ε_{ict} is an idiosyncratic error term. These include variables related to the socioeconomic status of the child's family (family income level and five dummies of maternal and paternal education), the type of birth (whether the child was abandoned or born out of wedlock), as well as the ascribed characteristics of the child (gender, year of birth, birth order, and twin status). In all of our regressions, we also control for county-of-child-birth fixed effect, δ_c, and exam-year fixed effect, σ_t.

IV. Results

A. Educational Attainment: UCOD versus ICOD

In Panel A of Table 5, we present the estimated coefficient for the effect of the *death of a father* (first three columns) and of the *death of a mother* (last three columns) on the educational attainment of young adults (age 18–19). Both the UCOD and ICOD coefficients are reported. Comparing the coefficients for each of the subsamples (*All, Boys*, and *Girls*), we find that the ICOD coefficients suffer from ommited variable bias. This bias is particularly evident in the regressions for the *death of a mother*, where the UCOD and ICOD coefficients are statistically different at the 5 percent significance level for the *All* sample and at the 1 percent significance level for the *Boys* sample.[17]

16. For the educational outcomes, the relevant date is the year the child is due to take the CUJEE. For the noneducational outcomes, the relevant date is the year the child turns 20 years of age.

17. For brevity, in the remaining panels of Table 6, as well as in the following tables, we only report the UCOD indicator, which produces the coefficients of interest.

Table 5
OLS Estimates of Parental Death on University or College Attendance

		Death of a Father			Death of a Mother		
	Coefficient	All	Boys	Girls	All	Boys	Girls
Panel A	UCOD	−0.019[a]	−0.021[a]	−0.016[a]	−0.029[a]	−0.035[a]	−0.023[a]
		(0.002)	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)
	ICOD	−0.018[a]	−0.019[a]	−0.017[a]	−0.019[a]	−0.017[a]	−0.021[a]
		(0.001)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)
F-test	UCOD=ICOD	0.898	0.655	0.838	0.024	0.003	0.812
Panel B	UCOD*short term	−0.024[a]	−0.021[a]	−0.028[a]	−0.043[a]	−0.046[a]	−0.040[a]
		(0.005)	(0.006)	(0.007)	(0.007)	(0.009)	(0.011)
	UCOD*medium term	−0.019[a]	−0.022[a]	−0.016[a]	−0.021[a]	−0.024[a]	−0.017[c]
		(0.004)	(0.005)	(0.006)	(0.007)	(0.009)	(0.009)
	UCOD*long term	−0.015[a]	−0.020[a]	−0.009	−0.026[a]	−0.035[a]	−0.017[b]
		(0.004)	(0.005)	(0.006)	(0.006)	(0.008)	(0.009)
F-test	UCOD*short term=UCOD*medium term	0.354	0.896	0.152	0.016	0.076	0.113

	UCOD*medium term=UCOD*long term	0.448	0.844	0.395	0.542	0.378	0.992
	UCOD*long term=UCOD*short term	0.103	0.962	0.025	0.053	0.320	0.097
Panel C	UCOD*quartile 1	−0.012[a]	−0.011[a]	−0.014[a]	−0.026[a]	−0.029[a]	−0.023[a]
		(0.003)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
	UCOD*quartile 2	−0.026[a]	−0.031[a]	−0.020[a]	−0.037[a]	−0.048[a]	−0.024[b]
		(0.004)	(0.006)	(0.007)	(0.008)	(0.010)	(0.012)
	UCOD*quartile 3	−0.025[b]	−0.037[b]	−0.013	−0.030[a]	−0.031[b]	−0.029[c]
		(0.011)	(0.015)	(0.016)	(0.011)	(0.015)	(0.016)
	UCOD*quartile 4	−0.045[b]	−0.058[b]	−0.028	0.006	−0.055	0.061
		(0.019)	(0.024)	(0.031)	(0.032)	(0.040)	(0.048)
F-test	UCOD*quartile 1=UCOD*quartile 2	0.009	0.004	0.395	0.233	0.106	0.938
	UCOD*quartile 2=UCOD*quartile 3	0.935	0.739	0.659	0.642	0.373	0.812
	UCOD*quartile 3=UCOD*quartile 4	0.361	0.450	0.658	0.291	0.590	0.077
	UCOD*quartile 1=UCOD*quartile 4	0.091	0.055	0.644	0.332	0.523	0.084
Observations		1,397,538	721,304	676,234	1,402,196	723,635	678,561

Note: We include five indicators corresponding to the level of parental education of each parent, child's gender, year of birth, birth order, type of birth, twin status, family income level, and both county and exam-year fixed effects. Superscripts a, b, and c denote the significance at 1 percent, 5 percent, and 10 percent levels, respectively. UCOD = Uninformative cause of death. ICOD = Informative cause of death. Standard errors are in parentheses. *P*-values on *F* tests are reported.

These results have interesting implications. The unobserved factors that are present when a mother dies are more likely to be negatively correlated with children's adverse outcomes than those that are present when a father dies. In the latter case, the sources of bias either offset one another or the unobserved factors are simply not correlated with children's educational outcomes. One possibility is that, when a mother dies from an ICOD, the father who is left in charge of the child is better able to mitigate the negative impact from the loss relative to both the case when the mother dies from a UCOD as well as to the case when the mother is left in charge of the child after the father dies. While we are unable to describe the nature of the unobservables, in order to shed light into why this is so, we test whether the income and education of widowers and widows who had lost their spouses due to an ICOD is different from that of those who has lost their spouses due to and UCOD. These simple tests reveal that while ICOD widowers have both higher education (they are more likely to have a high school to college education and less likely to have less than junior high school education) and higher income (a difference of NT$ 576) relative to UCOD widowers, the ICOD widows also have higher education than UCOD widows (they are more likely to have a junior high school to college education and less likely to have less than junior high school education) yet their income is not significantly different from that of the UCOD widows. Moreover, both the education and the income of the ICOD widowers are on average higher than those of the ICOD widows (the income difference is NT$ 1,540). Because education and income are generally positively correlated with ability, aptitude, perseverance, good parenting, etc., the resuls from these simple tests help to explain the patterns of the bias that are captured by the ICOD coefficients.

We pool the mother and father samples and test whether the bereavement effect is independent of the gender of the deceased parent. The results for all children show that the effect of maternal bereavement has a significantly larger negative impact on the probability of acquiring higher education than the paternal effect. When testing the difference between these coefficients using separate regressions for boys and girls, we find that the maternal bereavement effect is generally larger than the paternal bereavement effect but the difference is statistically significant only for boys.[18] This finding provides some support to those of Evans and Miguel (2007) and Ainsworth, Beegle, and Koda (2005), who suggest that losing a mother has on average a more significant effect on scholastic performance of children than losing a father.

In Panel B of Table 5, we report the coefficient estimates for the short-, medium-, and long-term effects of the *death of a father* (first three columns) and of the *death of a mother* (last three columns). For boys, the negative impact from losing a father is robust across time, ranging from –0.020 to –0.022. For girls, the negative impact from losing a father is significant only for the short- and medium-term interactions, whereas the short-term effect is significantly larger than the long-term effect. For the *death of a mother*, the short-term effect is larger than the medium- and long-term effects for all three samples. However, the effects are significantly different at the 5 percent level only for the whole sample.

In order to ascertain whether the effect of parental loss varies with family income, we fully interact the death of a father (mother) with each of the income quartiles. These results are reported in Panel C of Table 5. We find that the death of a father has

18. The results from these tests are available from the authors upon request.

a highly significant negative effect on the educational attainment of all children (*All*) from families falling in the two lowest-income quartiles (–0.011, –0.031, respectively for boys, and –0.014, –0.020, respectively for girls). For the two highest-income quartiles, although the coefficients are only significant at the 5 percent level for all children (*All*) and boys, the death of a father has a significantly (10 percent level) larger impact on high-income children than on low-income children. In the case of girls, while the impact of the death of a father is significant only for the two lowest-income quartiles, we are unable to the reject the null hypothesis that the paternal bereavement effect is the same across all income levels.[19] Following the death of a mother, children from families in the three lowest-income quartiles see significant declines in their educational attainment whereas children in the highest-income quartile remain relatively unaffected.

B. Quality of Education: UCOD versus ICOD

We measure quality of education with a binary indicator of whether or not the child is enrolled in a national college or university. Both the UCOD and ICOD coefficients are reported for the average effect (Table 6). Relative to the regressions corresponding to the probability of acquiring higher education, the ommited variable bias captured by the ICOD coefficients is less pronounced in this case.

The time-bereavement gradients for the quality of education received are reported in Panel B of Table 6. *Boys* (*Girls*) experience significant and negative medium- and long-term effects (short- and medium-term effects) after the death of a father. *All* children experience a significant short-term effect after the death of a mother. In terms of income, the results suggest that a mother's presence is most relevant for determining the quality of education received by girls from low-income families and by boys from high-income families, whereas a father's presence is so for children from middle- to high-income families. In particular, the most detrimental effect is experienced by girls (boys) in the highest-income quartiles after the death of a father (mother), followed by all children (*All*) in the middle-income quartiles after the death of either parent. In addition, while the death of the mother is also significant for girls in the lowest-income quartile, the magnitude of the effect is relatively small in this case. That is, the reduction in the quality of education children receive is primarily driven by the reductions suffered by children from middle- to high-income families.

C. Avenues for the Bereavement Effect

Looking for potential avenues for the bereavement effect, we first investigate whether losing a parent causes a change in children's probability of taking the CUJEE (Table 7). In Panel A, we observe that parental loss significantly reduces the probability of taking the CUJEE, regardless of the gender of the deceased parent. We also note that, similar to the college enrollment outcome, the bereavement effect is underestimated for the death of a mother when measured by the ICOD indicator. The difference be-

19. Later in the text we verify that the size of the coefficient corresponding to the effect of the loss of a father on the education of high income girls is driven primarily by the decline in the quality of education these girls receive (see Table 6, Panel C, column 3).

Table 6
OLS Estimates of Parental Death on High Quality College Attendance

		Death of a Father			Death of a Mother		
	Coefficient	All	Boys	Girls	All	Boys	Girls
Panel A	UCOD	−0.008[a]	−0.007[a]	−0.008[a]	−0.008[a]	−0.010[a]	−0.007[b]
		(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
	ICOD	−0.006[a]	−0.008[a]	−0.005[a]	−0.006[a]	−0.007[a]	−0.005[b]
		(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
F-test	UCOD=ICOD	0.351	0.886	0.132	0.347	0.415	0.610
Panel B	UCOD*short term	−0.010[a]	−0.006	−0.015[a]	−0.020[a]	−0.020[a]	−0.020[a]
		(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
	UCOD*medium term	−0.008[a]	−0.009[a]	−0.008[b]	−0.003	−0.003	−0.003
		(0.002)	(0.003)	(0.003)	(0.004)	(0.006)	(0.006)
	UCOD*long term	−0.005[b]	−0.007[b]	−0.003	−0.008	−0.009[c]	−0.002
		(0.002)	(0.003)	(0.003)	(0.004)	(0.005)	(0.005)
F-test	UCOD*short term=UCOD*medium term	0.577	0.640	0.177	0.003	0.034	0.040

	UCOD*medium term=UCOD*long term	0.309	0.766	0.256	0.615	0.431	0.901
	UCOD*long term=UCOD*short term	0.141	0.835	0.016	0.009	0.145	0.023
Panel C	UCOD*quartile 1	−0.003[b]	−0.003	−0.004[c]	−0.008[a]	−0.007[c]	−0.009[b]
		(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)
	UCOD*quartile 2	−0.009[a]	−0.008[b]	−0.010[b]	−0.004	−0.007	−0.002
		(0.003)	(0.004)	(0.004)	(0.005)	(0.007)	(0.007)
	UCOD*quartile 3	−0.021[a]	−0.030[a]	−0.012	−0.014[b]	−0.014	−0.014
		(0.006)	(0.008)	(0.010)	(0.007)	(0.010)	(0.010)
	UCOD*quartile 4	−0.040[a]	−0.027[c]	−0.056[a]	−0.012	−0.065[a]	0.036
		(0.011)	(0.016)	(0.015)	(0.022)	(0.021)	(0.038)
F-test	UCOD*quartile 1=UCOD*quartile 2	0.072	0.196	0.231	0.544	0.959	0.409
	UCOD*quartile 2=UCOD*quartile 3	0.079	0.019	0.793	0.261	0.527	0.350
	UCOD*quartile 3=UCOD*quartile 4	0.137	0.886	0.013	0.926	0.029	0.201
	UCOD*quartile 1=UCOD*quartile 4	0.001	0.122	0.001	0.853	0.007	0.237
Observations		1,397,538	721,304	676,234	1,402,196	723,635	678,561

Note: We include five indicators corresponding to the level of parental education of each parent, child's gender, year of birth, birth order, type of birth, twin status, family income level, and both county and exam-year fixed effects. Superscripts a, b, and c denote the significance at 1 percent, 5 percent, and 10 percent levels, respectively. UCOD = Uninformative cause of death. ICOD = Informative cause of death. Standard errors are in parentheses. *P*-values on *F*-tests are reported.

Table 7
OLS Estimates of Parental Death on the Probability of Taking CUJEE

		Death of a Father			Death of a Mother		
	Coefficient	All	Boys	Girls	All	Boys	Girls
Panel A	UCOD	−0.027[a]	−0.029[a]	−0.024[a]	−0.037[a]	−0.039[a]	−0.035[a]
		(0.003)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
	ICOD	−0.028[a]	−0.030[a]	−0.026[a]	−0.027[a]	−0.025[a]	−0.030[a]
		(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)
F-test	UCOD=ICOD	0.723	0.900	0.714	0.050	0.047	0.454
Panel B	UCOD*short term	−0.029[a]	−0.018[b]	−0.041[a]	−0.043[a]	−0.044[a]	−0.042[a]
		(0.005)	(0.007)	(0.008)	(0.008)	(0.011)	(0.013)
	UCOD*medium term	−0.026[a]	−0.030[a]	−0.021[a]	−0.033[a]	−0.035[a]	−0.031[a]
		(0.005)	(0.006)	(0.007)	(0.008)	(0.009)	(0.011)
	UCOD*long term	−0.026[a]	−0.036[a]	−0.015[a]	−0.037[a]	−0.039[a]	−0.035[a]
		(0.004)	(0.006)	(0.007)	(0.007)	(0.010)	(0.010)
F-test	UCOD*short term=UCOD*medium term	0.635	0.199	0.048	0.359	0.573	0.945
	UCOD*medium term=UCOD*long term	0.975	0.478	0.532	0.690	0.804	0.759

	UCOD*long term=UCOD*short term	0.652	0.052	0.009	0.559	0.726	0.663
Panel C	UCOD*quartile 1	−0.022[a]	−0.022[a]	−0.022[a]	−0.040[a]	−0.036[a]	−0.043[a]
		(0.003)	(0.005)	(0.005)	(0.005)	(0.007)	(0.008)
	UCOD*quartile 2	−0.035[a]	−0.043[a]	−0.026[a]	−0.036[a]	−0.050[a]	−0.021
		(0.005)	(0.007)	(0.008)	(0.010)	(0.013)	(0.014)
	UCOD*quartile 3	−0.024[c]	−0.025	−0.023	−0.035[a]	−0.028	−0.042[b]
		(0.012)	(0.017)	(0.018)	(0.012)	(0.017)	(0.018)
	UCOD*quartile 4	−0.038[c]	−0.028	−0.048	−0.005	−0.073	0.059
		(0.021)	(0.028)	(0.032)	(0.034)	(0.045)	(0.049)
F-test	UCOD*quartile 1=UCOD*quartile 2	0.038	0.012	0.650	0.751	0.354	0.174
	UCOD*quartile 2=UCOD*quartile 3	0.396	0.310	0.846	0.922	0.308	0.360
	UCOD*quartile 3=UCOD*quartile 4	0.567	0.913	0.492	0.407	0.354	0.052
	UCOD*quartile 1=UCOD*quartile 4	0.466	0.825	0.431	0.309	0.423	0.038
Observations		1,397,538	721,304	676,234	1,402,196	723,635	678,561

Note: We include five indicators corresponding to the level of parental education of each parent, child's gender, year of birth, birth order, type of birth, twin status, family income level, and both county and exam-year fixed effects. Superscripts a, b, and c denote the significance at 1 percent, 5 percent, and 10 percent levels, respectively. UCOD = Uninformative cause of death. ICOD = Informative cause of death. Standard errors are in parentheses. *P*-values on *F*-tests are reported.

tween the UCOD and ICOD coefficients is statistically significant (5 percent level) for both the *All* and the *Boys* samples.

In Panel B, we report the time-bereavement gradients for the probability of taking the CUJEE. We find that the bereavement effect is significant regardless of when in the child's life the loss of the parent takes place and of the gender of the deceased parent. In terms of the magnitude of the bereavement effect, we observe that the death of a father has the most deleterious effect in the long term for boys and in the short term for girls, respectively, while the effect of the death of a mother remains equally large across time and gender of the child. The income-bereavement interactions, presented in Panel C, show that the probability of taking the CUJEE is particularly affected when children come from the two (three) lowest-income quartile families after the death of a father (mother). For brevity, the results for the standardized test scores are not reported in the tables. These results show that, in general, the loss of either parent has important negative consequences for the standardized test scores attained by children from third- and fourth-income quartile families.

Taken together, the regression results for the probability of taking the CUJEE and the performance during the exam suggest three different avenues for the income-bereavement effect. First, children from lower-income families are less likely to take the CUJEE altogether. Hence, it is not surprising to find that they are less likely to attend college or university. Second, following the death of a father, children from higher-income families may still take the CUJEE but, when so, perform systematically worse than nonbereaved children. Since a child's performance in the CUJEE is the most important determinant of the quality of education he/she receives, the latter finding also provides a plausible mechanism that explains why bereaved children, and in particular those from middle- to high-income families, experience significant reductions in the quality of their education following a father's death. Third, children who have lost a mother are both less likely to take the CUJEE and more likely to do worse when taking it.

D. Teenage Marriage, Teenage Employment, and Military Enrollment

Tables 8 through 10 summarize the results of the analysis of the effect of parental loss on teenage marriage, teenage employment, and military enrollment. Table 8 shows that while the loss of either parent has virtually no effect on the probability of teenage marriage for boys, it has a significant positive effect on girls. Moreover, as is evident from Panel B, the increase in the likelihood of teenage marriage for girls who experience parental death remains the same regardless of when in the girl's life the loss takes place. As for the income-bereavement interaction, we find that the death of either parent has the largest impact on the probability of teenage marriage for girls from the lowest-income quartile families. Finally, we also note that the ICOD and UCOD coefficients in this case are not statistically different.

In terms of the probability of working during their teenage years, from Panel A of Table 9 we observe that children who have lost a parent are, on average, more likely to work than those with living parents. Similar to the case of educational outcomes, Panel B shows that the *death of a father* has an equally large effect across time (larger short-term effect) for boys (girls), respectively whereas following the *death of a mother* (and regardless of the gender of the child) both the medium- and short-term effects are the most pronounced. Studying the income-bereavement interactions (Panel C), we

conclude that there is no significant income-gradient of the bereavement effect. Lastly, we note that for the teenage work outcome the estimated coefficients corresponding to the UCOD and ICOD indicators are practically the same.

The results in Panel A of Table 10 show that the likelihood of military enrollment also increases after the death of either parent. From Panel B we learn that boys are more likely to enlist in the military after either a short-term or a long-term loss of either parent. The results for the income gradient, reported in Panel C, are similar to those of taking the CUJEE. In particular, we see that boys from families falling in the three lower-income quartiles are more likely to substitute higher education for military enlistment (that is, a paying occupation). This suggests that the major driver of the decision to join the military is the financial need that follows the death of a parent and, in particular, the death of a father. Finally, as can be expected, when looking at the effect of parental loss on military enrollment more than five years after high school graduation, the UCOD coefficients are all insignificant.

V. Robustness Checks

As described above, the CCS regrouping allows us to aggregate ICD-9s into more than 100 clinically meaningful diagnosis categories (see Footnote 11). We check the robustness of our findings by employing an alternative COD classification, the ICD-9 72 grouping of the Center for Disease Control and Prevention. This grouping allows us to collapse ICD-9s into 72 selected CODs, as defined by the National Center for Health Statistics (NCHS) for analysis of mortality data. Following the same estimation methods decribed in Section III, the results obtained using this alternative COD grouping confirm the robustness of the main results for each of the six outcomes considered (Table 11).

As a second validity check we use the large set of explanatory variables at hand to estimate the conditional probability of receiving the treatment (that is, parental death) or propensity score function for each of the subsamples. The estimated propensity score is divided into q intervals, with the optimal number of intervals q chosen such that individuals falling in a particular interval have on average the same propensity score. For each of the q intervals, the difference between the average outcome of the treatment and the control (or ATT) is obtained. Finally, the sample ATT is then constructed as the average of the ATTs across all of the q intervals, where the contribution of each interval to the sample ATT is given by the proportion of treated units in each block. This alternative method allows us to use a scalar to summarize background characteristics that help explain the likelihood of selection into the treatment while abstaining from making any distributional assumption about the relationship between the treatment and the outcome. The results from this exercise confirm our main findings (Table 12).

VI. Discussion

The primary aim of our study is to analyze how the loss of a parent affects children's well-being. The identification strategy that we use shows that ignoring the endogeneity of parental death has a clear potential to underestimate the bereavement effect, particularly for educational outcomes. This upward bias is consistent with

Table 8
OLS Estimates of Parental Death on Teenage Marriage

		Death of a Father			Death of a Mother		
	Coefficient	All	Boys	Girls	All	Boys	Girls
Panel A	UCOD	0.009[a]	–0.000	0.019[a]	0.011[a]	0.000	0.022[a]
		(0.001)	(0.001)	(0.003)	(0.002)	(0.002)	(0.004)
	ICOD	0.012[a]	0.002[a]	0.022[a]	0.007[a]	0.000	0.014[a]
		(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.003)
F-test	UCOD=ICOD	0.097	0.087	0.293	0.172	0.987	0.156
Panel B	UCOD*short term	0.008[a]	0.000	0.018[a]	0.015[a]	0.006	0.027[a]
		(0.002)	(0.002)	(0.005)	(0.005)	(0.004)	(0.009)
	UCOD*medium term	0.008[a]	–0.000	0.017[a]	0.005	–0.005[a]	0.016[b]
		(0.002)	(0.002)	(0.005)	(0.004)	(0.002)	(0.008)
	UCOD*long term	0.010[a]	–0.001	0.021[a]	0.012[a]	0.000	0.023[a]
		(0.002)	(0.002)	(0.005)	(0.004)	(0.003)	(0.007)

F-test	UCOD*short term=UCOD*medium term	0.928	0.852	0.953	0.089	0.007	0.339
	UCOD*medium term=UCOD*long term	0.535	0.812	0.535	0.254	0.090	0.509
	UCOD*long term=UCOD*short term	0.597	0.671	0.579	0.510	0.200	0.716
Panel C	UCOD*quartile 1	0.012[a]	0.001	0.025[a]	0.014[a]	0.001	0.027[a]
		(0.002)	(0.002)	(0.004)	(0.004)	(0.003)	(0.007)
	UCOD*quartile 2	0.003	−0.003[b]	0.010[b]	0.010[b]	−0.002	0.027[b]
		(0.002)	(0.001)	(0.007)	(0.005)	(0.003)	(0.009)
	UCOD*quartile 3	0.007[c]	−0.001	0.015[b]	0.005	0.000	0.010
		(0.004)	(0.003)	(0.007)	(0.004)	(0.003)	(0.008)
	UCOD*quartile 4	0.011[c]	0.006	0.015	−0.001	−0.004[a]	0.003
		(0.006)	(0.005)	(0.011)	(0.007)	(0.000)	(0.013)
F-test	UCOD*quartile 1=UCOD*quartile 2	0.003	0.087	0.010	0.469	0.411	0.651
	UCOD*quartile 2=UCOD*quartile 3	0.413	0.444	0.566	0.399	0.638	0.304
	UCOD*quartile 3=UCOD*quartile 4	0.578	0.288	0.978	0.488	0.235	0.624
	UCOD*quartile 1=UCOD*quartile 4	0.829	0.362	0.429	0.059	0.069	0.095
Observations		1,397,538	721,304	676,234	1,402,196	723,635	678,561

Note: We include five indicators corresponding to the level of parental education of each parent, child's gender, year of birth, birth order, type of birth, twin status, family income level, and both county and exam-year fixed effects. Superscripts a, b, and c denote the significance at 1 percent, 5 percent, and 10 percent levels, respectively. UCOD = Uninformative cause of death. ICOD = Informative cause of death. Standard errors are in parentheses. *P*-values on *F*-tests are reported.

Table 9
OLS Estimates of Parental Death on Teenage Employment

		Death of a Father			Death of a Mother		
	Coefficient	All	Boys	Girls	All	Boys	Girls
Panel A	UCOD	0.038[a]	0.041[a]	0.034[a]	0.030[a]	0.035[a]	0.025[a]
		(0.003)	(0.005)	(0.005)	(0.005)	(0.008)	(0.008)
	ICOD	0.035[a]	0.039[a]	0.031[a]	0.038[a]	0.037[a]	0.039[a]
		(0.002)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
F-test	UCOD=ICOD	0.548	0.709	0.637	0.205	0.849	0.099
Panel B	UCOD*short term	0.051[a]	0.046[a]	0.056[a]	0.035[a]	0.037[a]	0.033[b]
		(0.006)	(0.009)	(0.009)	(0.010)	(0.014)	(0.014)
	UCOD*medium term	0.033[a]	0.033[a]	0.034[a]	0.036[a]	0.038[a]	0.034[b]
		(0.006)	(0.008)	(0.008)	(0.010)	(0.014)	(0.013)
	UCOD*long term	0.030[a]	0.044[a]	0.015[b]	0.022[b]	0.032[b]	0.011
		(0.006)	(0.008)	(0.008)	(0.009)	(0.012)	(0.012)
F-test	UCOD*short term=UCOD*medium term	0.037	0.258	0.062	0.911	0.925	0.952

	UCOD*medium term=UCOD*long term	0.666	0.343	0.099	0.258	0.729	0.194
	UCOD*long term=UCOD*short term	0.011	0.839	0.001	0.320	0.804	0.233
Panel C	UCOD*quartile 1	0.038[a]	0.043[a]	0.033[a]	0.038[a]	0.045[a]	0.030[a]
		(0.005)	(0.007)	(0.006)	(0.008)	(0.011)	(0.011)
	UCOD*quartile 2	0.037[a]	0.040[a]	0.033[a]	0.031[a]	0.040[b]	0.022
		(0.006)	(0.009)	(0.009)	(0.011)	(0.016)	(0.016)
	UCOD*quartile 3	0.039[a]	0.040[a]	0.038[b]	0.011	0.009	0.014
		(0.011)	(0.016)	(0.016)	(0.011)	(0.016)	(0.016)
	UCOD*quartile 4	0.035[b]	0.022	0.052[b]	0.009	–0.013	0.029
		(0.016)	(0.021)	(0.024)	(0.024)	(0.036)	(0.033)
F-test	UCOD*quartile 1=UCOD*quartile 2	0.826	0.814	0.986	0.631	0.799	0.641
	UCOD*quartile 2=UCOD*quartile 3	0.855	0.994	0.784	0.219	0.182	0.736
	UCOD*quartile 3=UCOD*quartile 4	0.841	0.489	0.608	0.924	0.567	0.686
	UCOD*quartile 1=UCOD*quartile 4	0.844	0.349	0.434	0.257	0.123	0.961
Observations		1,397,538	721,304	676,234	1,402,196	723,635	678,561

Note: We include five indicators corresponding to the level of parental education of each parent, child's gender, year of birth, birth order, type of birth, twin status, family income level, and both county and exam-year fixed effects. Superscripts a, b, and c denote the significance at 1 percent, 5 percent, and 10 percent levels, respectively. UCOD = Uninformative cause of death. ICOD = Informative cause of death. Standard errors are in parentheses. *P*-values on *F*-tests are reported.

Table 10
OLS Estimates of Parental Death on Military Enrollment

		Death of a Father					Death of a Mother				
	Coefficient	1 Year	2 Years	3 Years	4 Years	+5 Years	1 Year	2 Year	3 Year	4 Year	+5 Year
Panel A	UCOD	0.012[a]	0.022[a]	0.026[a]	0.029[a]	0.003	0.010[b]	0.025[a]	0.029[a]	0.024[a]	–0.001
		(0.003)	(0.005)	(0.005)	(0.005)	(0.002)	(0.005)	(0.008)	(0.008)	(0.008)	(0.004)
	ICOD	0.011[a]	0.023[a]	0.029[a]	0.031[a]	0.006[a]	0.008[b]	0.023[a]	0.027[a]	0.027[a]	0.003[c]
		(0.002)	(0.003)	(0.003)	(0.003)	(0.001)	(0.003)	(0.005)	(0.005)	(0.005)	(0.002)
F-test	UCOD=ICOD	0.811	0.797	0.659	0.707	0.238	0.640	0.790	0.882	0.818	0.402
Panel B	UCOD*short term	0.018[a]	0.031[a]	0.039[a]	0.041[a]	0.002	0.015[c]	0.028[b]	0.030[b]	0.021	0.002
		(0.006)	(0.008)	(0.009)	(0.009)	(0.004)	(0.009)	(0.014)	(0.014)	(0.015)	(0.007)
	UCOD*medium term	0.007	0.011	0.017[b]	0.023[b]	0.006	0.008	0.016	0.020	0.023	0.000
		(0.005)	(0.008)	(0.009)	(0.009)	(0.004)	(0.009)	(0.013)	(0.042)	(0.015)	(0.007)

	UCOD*long term	0.012[b]	0.024[a]	0.024[a]	0.024[a]	−0.000	0.008	0.030[b]	0.035[a]	0.028[b]	−0.005
		(0.005)	(0.008)	(0.008)	(0.009)	(0.004)	(0.008)	(0.012)	(0.013)	(0.013)	(0.006)
Panel C	UCOD*quartile 1	0.012[a]	0.016[a]	0.021[a]	0.024[a]	0.002	0.012[c]	0.020[c]	0.019[c]	0.018	−0.000
		(0.004)	(0.006)	(0.007)	(0.007)	(0.003)	(0.007)	(0.011)	(0.011)	(0.011)	(0.005)
	UCOD*quartile 2	0.010[c]	0.032[a]	0.039[a]	0.040[a]	−0.00	0.016	0.036[b]	0.045[a]	0.033[c]	−0.004
		(0.006)	(0.009)	(0.009)	(0.009)	(0.004)	(0.011)	(0.016)	(0.017)	(0.017)	(0.008)
	UCOD*quartile 3	0.016	0.011	0.008	0.011	0.011	0.001	0.026	0.036[b]	0.029	−0.001
		(0.010)	(0.015)	(0.016)	(0.017)	(0.010)	(0.011)	(0.016)	(0.017)	(0.018)	(0.098)
	UCOD*quartile 4	0.013	0.039[c]	0.039[c]	0.036	0.018	0.003	0.042	0.046	0.058	0.004
		(0.013)	(0.021)	(0.023)	(0.024)	(0.015)	(0.025)	(0.039)	(0.042)	(0.044)	(0.025)
Observations		721,304					723,635				

Note: We include five indicators corresponding to the level of parental education of each parent, child's gender, year of birth, birth order, type of birth, twin status, family income level, and both county and exam-year fixed effects. Superscripts a, b, and c denote the significance at 1 percent, 5 percent, and 10 percent levels, respectively. UCOD = Uninformative cause of death. ICOD = Informative cause of death. Standard errors are in parentheses. *P*-values on *F*-tests are reported.

Table 11
OLS Estimates of Parental Death on All Outcomes under Alternative Cause of Death Grouping (ICD9–72)

	Death of a Father					
	Attended College	Attended High Quality College	Took CUJEE	Teenage Marriage	Teenage Work	Military Enrollment (1 year)
UCOD	−0.023[a]	−0.008[a]	−0.030[a]	0.011[a]	0.044[a]	0.014[a]
	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)	(0.004)
ICOD	−0.017[a]	−0.006[a]	−0.027[a]	0.011[a]	0.034[a]	0.011[a]
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
UCOD = ICOD (*p*-value)	0.063	0.259	0.333	0.884	0.022	0.400
Observations	1,397,538	1,397,538	1,397,538	1,397,538	1,397,538	721,304
	Death of a Mother					
	Attended College	Attended High Quality College	Took CUJEE	Teenage Marriage	Teenage Work	Military Enrollment (1 Year)
UCOD	−0.028[a]	−0.008[a]	−0.035[a]	0.010[a]	0.033[a]	0.004
	(0.004)	(0.003)	(0.005)	(0.003)	(0.006)	(0.004)
ICOD	−0.020[a]	−0.006[a]	−0.028[a]	0.007[a]	0.037[a]	0.009[a]
	(0.002)	(0.002)	(0.003)	(0.001)	(0.003)	(0.003)
UCOD = ICOD (*p*-value)	0.116	0.534	0.266	0.324	0.600	0.353
Observations	1,402,196	1,402,196	1,402,196	1,402,196	1,402,196	723,635

Note: We include five indicators corresponding to the level of parental education of each parent, child's gender, year of birth, birth order, type of birth, twin status, family income level, and both county and exam-year fixed effects. Superscript a denotes the significance at 1 percent level. U = Uninformative cause of death. I = Informative cause of death. Standard errors are in parentheses. *P*-values on *F*-tests are reported.

the bereavement literature, which suggests that families that have experienced the loss of a parent as a result of a foreseen and/or predictable death — as opposed to an unforeseen or random death — may be more likely to be better prepared to assimilate the loss and, when possible, to have made arrangements to deal with it emotionally and financially (Vera 2003; Iserson 2000).[20] Our results show that losing either parent

20. In fact, the inconsistency of findings from studies that analyze the effect of parental bereavement on outcomes of children from Sub-Saharan Africa has often been credited to the fact that extended family networks are ubiquitous in the region (Kobiané, Calvès, and Marcoux 2005, Foster and Williamson 2000). Given that death from HIV-AIDS is highly foreseen, it is likely that as the disease reaches its final stage, relatives would

Table 12
Propensity Score Matching Estimates of Parental Death on All Outcomes

	ATT	Standard Error[b]	*t*-statistic
		Death of a Father	
Attended college	–0.025	0.003	–8.99
Attended high-quality college	0.006	0.011	0.57
Took CUJEE	–0.035	0.003	–11.25
Teenage marriage	0.009	0.002	5.36
Teenage work	0.033	0.004	8.67
Military enrollment[a] (1 year)	0.013	0.004	3.26
Observations		1,397,538	
		Death of a Mother	
Attended college	–0.033	0.003	–10.65
Attended high-quality college	–0.015	0.013	–1.18
Took CUJEE	–0.045	0.003	–12.96
Teenage marriage	0.016	0.002	7.43
Teenage work	0.037	0.005	7.95
Military enrollment[a] (1 year)	0.013	0.006	2.28
Observations		1,402,196	

Note: The propensity score model includes five indicators corresponding to the level of parental education of each parent, child's gender, year of birth, birth order, type of birth, twin status, family income level, and both county and exam-year fixed effects. ATT = stratified propensity score matching estimate of the average treatment effect on the treated. a. Observations include only boys: N = 721,304 for the death of a father and N = 723,635 for the death of a mother. b. Bootstrapped standard errors.

has significant effects on many dimensions of children's lives. Nevertheless, maternal bereavement has a larger negative effect on childrens' probability of acquiring higher education, driven primarily by the large negative effect it has on boys. Moreover, the effect of maternal berevement on children's higher education is generally more uniform across income relative to paternal bereavement.

While highly active in the labor force, women in Taiwan are largely in charge of the family chores, of which childrearing is perhaps the most important. As a result, a mother is more intertwined with her children's everyday activities and provides their lives with structure. When a mother is lost, the surviving father must provide the child with comfort and procure to fill the void left by the mother's death. Tremblay and Israel (1998) point out that open communication, emotional support, adequate care, and family environment allow the child to greave and to successfully adjust to the loss. However, a vast number of studies suggest that such level of communication may be

play an important role in mitigating the negative effects of the loss by caring for the child and by helping the child to transition to his/her new life without a parent.

particularly difficult for a father who, while besieged with new responsibilities, is also trying to cope with the loss of his wife and adapt to the new family structure. Additionally, children accustomed to having their mother in charge of dealing with the affective life of the family may be less inclined to open up and to share their feelings with their fathers (Silverman and Worden 1992). Consequently, it is not surprising to find that the death or absence of a mother in the child's life has, in general, a more uniform impact on the child's educational attainment than the death of a father.

We also find that the effect of bereavement on educational outcomes is persistent across time irrespective of the gender of the parent; still, following the *death of a father* the short-term effect is larger for girls. These results suggest that while time may help to weaken the negative impact of paternal loss on girls' educational outcomes, the latter may be particularly affected when the loss is more recent. The finding is also consistent with the hypothesis that income constrained mothers who are unable to make up for the loss of the main income earner in the family would be more likely to choose to invest in their sons' education than in their daughters'. This decision may be reinforced by the traditional role that Taiwanese sons play as caregivers for their elderly parents.

In terms of the SES-bereavement gradients, we find these to be quite heterogeneous. On the one hand, the negative father-son SES-bereavement gradient for the educational outcomes is driven by two extremes, the high SES and the low-SES families, whereas the negative father-daughter SES-bereavement gradient is driven by relatively lower education and lower-income families, the low- to middle-SES families. The large negative effect of the *death of a father* on the educational attainment of boys from the highest-SES families and the finding that the time-bereavement gradient is robust across time for boys are suggestive of the drastic role changes that a high-income family must undergo after the death of a main income earner. For instance, given Taiwan's patrilineal tradition, it is possible that boys rather than girls would be expected to assume the role of the head of the family following the father's death, causing them to search for a job or to take charge of the family business instead of pursuing higher education. On the other hand, the negative mother-son and mother-daughter SES-bereavement gradient is driven by the low- to middle-SES families. Finally, it is also interesting to note that the avenue for the bereavement effect is different for children from the highest-SES families. In particular, while bereavement affects most of the outcomes we have analyzed for children from the lower and middle-income families, the most significant effect for children from the highest-income families is the decline in the quality of education that they receive and one of the direct reasons appears to be their lower performance when taking the CUJEE.

VII. Conclusion

Our main results suggest that losing a parent can severely curtail human capital accumulation for girls and, in particular, girls in the lowest-income quartiles because it not only decreases their college or university enrollment ratios, but also makes them more likely to marry and to work during their teenage years. Similarly, boys who have lost a parent are more likely to be occupied with income earning activities before becoming adults, suggesting that the financial pressure felt after the death

of a parent causes boys to substitute earning income in place of higher education. The need to earn income and the possibility of early marriage and parenthood are expected to introduce new priorities into the child's life, thus limiting the child's chances of continuing her/his education.

Our study gives rise to two main policy implications: (1) Policies aimed at protecting the educational opportunities of children who have experienced the loss of a parent should help alleviate the financial pressure felt, in particular, by children from low- and middle-income families who are likely to be affected disproportionately by the loss of either parent. (2) Cost-benefit analyses undertaken to decide whether to carry out new screening and prevention programs, or whether to continue support for promising current efforts to prevent the early loss of parents should take into consideration all the potential costs savings from such efforts. These include the savings from both the decreased wages and worker productivity due to the lower educational attainment of bereaved children, as well as from the possible negative spillover on future generations due to both early marriage and lower educational attainment.

References

AHRQ. 2010. *National Health Care Quality Report*. Publication No. 10–0003, Agency for Healthcare Research and Quality. U.S. Department of Health and Human Services.

Agardh, Emilie, Peter Allebeck, Johan Hallqvist, Tahereh Moradi, and Anna Sidorchuk. 2011. "Type 2 Diabetes Incidence and Socioeconomic Position: A Systematic Review and Meta-Analysis." *International Journal of Epidemiology* 40(3):804–18.

Ainsworth, Martha, and Deon Filmer. 2006. "Inequalities in Children's Schooling: AIDS, Orphanhood, Poverty, and Gender." *World Development* 34(6):1099–128.

Ainsworth, Martha, and Innocent Semali. 2000. "The Impact of Adult Deaths on Children's Health in Northwestern Tanzania." World Bank Policy Research Working Paper No. 2266. Washington D.C.: The World Bank.

Ainsworth, Martha, Kathleen Beegle, and Godlike Koda. 2005. "The Impact of Adult Mortality and Parental Deaths on Primary Schooling in North-Western Tanzania." *Journal of Development Studies* 41(3):412–39.

Amato, Paul R. 2005. "The Impact of Family Formation Change on the Cognitive, Social, and Emotional Well-Being of the Next Generation." *The Future of Children* 15(2):75–96.

Baker, Susan P, Brian O'Neill, Marvin J. Ginsburg, and Guohua Li. 1992. *The Injury Fact Book*. New York, N.Y.: Oxford University Press.

Beaver, Elisa R. 2003. "Race, Hispanic Origin, and Socioeconomic Status in Relation to Motor Vehicles Occupant Death Rates and Risk Factors Among Adults." *Accident Analysis and Prevention* 35(3):295–309.

Beegle, Kathleen, Joachim De Weerdt, and Stefan Dercon. 2006. "Orphanhood and the Long-Run Impact on Children." *American Journal of Agricultural Economics* 88(5):1266–72.

Blair, Alistair S., Ffion Lloyd-Williams, and Frances S. Mair. 2002. "What Do We Know About Socioeconomic Status and Congestive Heart Failure? A Review of the Literature." *Journal of Family Practice* 51(2):169.

Case, Anne, and Cally Ardington. 2006. "The Impact of Parental Death on School Outcomes: Longitudinal Evidence from South Africa." *Demography* 43(3):401–20.

Case, Anne, Christina Paxson, and Joseph Ableidinger. 2004. "Orphans in Africa: Parental Death, Poverty, and School Enrollment." *Demography* 41(3):483–508.

Chang, Choon-Lan, Michael Marmot, Timothy Farley, and Neil Poulter. 2002. "The Influence

of Economic Development on the Association between Education and the Risk of Acute Myocardial Infarction and Stroke." *Journal of Clinical Epidemiology* 55(8):741–47.
Chaturvedi, Nish. 2004. "Commentary: Socioeconomic Status and Diabetes Outcomes; What Might We Expect and Why Don't We Find It?" *International Journal of Epidemiology* 33(4):871–73.
Chen, Stacey H, Yen-Chien Chen, and Jin-Tan Liu. 2009. "The Impact of Unexpected Maternal Death on Education: First Evidence from Three National Administrative Data Links." *American Economic Review* 99(2):149–53.
Chou, Shin-Yi, Jin-Tan Liu, Michael Grossman, and Ted Joyce. 2010. "Parental Education and Child Health: Evidence from a Natural Experiment in Taiwan." *American Economic Journal: Applied Economics* 2(1):33–61.
Corak, Miles. 2001. "Death and Divorce: The Long-Term Consequences of Parental Loss on Adolescents Death and Divorce." *Journal of Labor Economics* 19(3):682–715.
Currie, Janet, and Enrico Moretti. 2003. "Mother's Education and the Intergenerational Transmission of Human Capital: Evidence From College Openings." *Quarterly Journal of Economics* 118(4):1495–532.
Espinosa, Javier, and William N. Evans. 2008. "Heightened Mortality after the Death of a Spouse: Marriage Protection or Marriage Selection?" *Journal of Health Economics* 27(5): 1326–42.
Evans, David K., and Edward Miguel. 2007. "Orphans and Schooling in Africa: A Longitudinal Analysis." *Demography* 44(1):35–57.
Ford, Kathleen, and Victoria Hosegood. 2005. "AIDS Mortality and the Mobility of Children in KwaZulu Natal, South Africa." *Demography* 42(4):757–68.
Fortson, Jane G. 2008. "The Gradient in Sub-Saharan Africa: Socioeconomic Status and HIV/AIDS." *Demography* 45(2):303–22.
Foster, Geoff, and John Williamson. 2000. "A Review of Current Literature of the Impact of HIV/AIDS on Children in Sub-Saharan Africa." *AIDS* 14(3):275–84.
Fronstin, Paul, David H. Greenberg, and Philip K. Robins. 2001. "Parental Disruption and the Labour Market Performance of Children When They Reach Adulthood." *Journal of Population Economics* 14(1):137–72.
Gertler, Paul, David Levine, and Minnie Ames. 2004. "Schooling and Parental Death." *The Review of Economics and Statistics* 86(1):211–25.
Grossman, Michael. 2006. "Education and Nonmarket Outcomes." In *Handbook of the Economics of Education,* ed. Erik Hanushek and Finis Welch, 577–633. Amsterdam: North-Holland.
Hawkins, Nathaniel M., Pardeep S. Jhund, John J. V. McMurray, and Simon Capewell. 2012. "Heart Failure and Socioeconomic Status: Accumulating Evidence of Inequality." *European Journal of Heart Failure* 14(2):138–46.
Howard, George, Roger T. Anderson, Gregory Russell, Virginia J. Howard, and Gregory L. Burke. 2000. "Race, Socioeconomic Status, and Cause-Specific Mortality." *Annals of Epidemiology* 10(4):214–23.
Iserson, Kenneth V. 2000. "Notifying Survivors About Sudden, Unexpected Deaths," *Western Journal of Medicine* 173(4):261–5.
Kaplan, George A., and Julian E. Keil. 1993. "Socioeconomic Factors and Cardiovascular Disease: A Review of the Literature." *Circulation* 88(4):1973–98.
Kendler, Kenneth S., Kevin N. Sheth, Charles O. Gardner, and Carol A. Prescott. 2002. "Childhood Parental Loss and Risk for First-Onset of Major Depression and Alcohol Dependence: The Time Decay of Risk and Sex Differences." *Psychological Medicine* 32(7):1187–94.
Kobiané, Jean-François, Anne-Emmanuèle Calvès, and Richard Marcoux. 2005. "Parental Death and Children's Schooling in Burkina Faso." *Comparative Education Review* 49(4):468–89.

Lang, Kevin, and Jay L. Zagorsky. 2001. "Does Growing up with a Parent Absent Really Hurt?" *Journal of Human Resources* 36(2):253–73.
Lin, Ming-Jen, Jin-Tan Liu, and Shin-Yi Chou. 2007. "As Low Birth Weight Babies Grow, Can Well-Educated Parents Buffer This Adverse Factor? A Research Note." *Demography* 44(2): 335–43.
Link, Bruce G., and Jo Phelan. 1995. "Social Conditions As Fundamental Causes of Disease." *Journal of Health and Social Behavior* 35(Extra Issue):80–94.
Lloyd, Cynthia B., and Ann K. Blanc. 1996. "Children's Schooling in Sub-Saharan Africa: The Role of Fathers, Mothers, and Others." *Population and Development Review* 22(2):265–98.
Loomis, Dana P. 1991. "Occupation, Industry, and Fatal Motor Vehicle Crashes in 20 States, 1986–1987." *American Journal of Public Health* 81(6):733–35.
Manrique-Garcia, Edison, Anna Sidorchu, Johan Hallqvist, and Tahereh Moradi. 2011. "Socioeconomic Position and Incidence of Acute Myocardial Infarction: A Meta-Analysis." *Journal of Epidemiology and Community Health* 65(4):301–309.
McLanahan, Sara, and Gary D. Sandefur. 1994. *Growing Up with a Single Parent: What Hurts, What Helps*. Cambridge, Mass.: Harvard University Press.
Mendez, Gustavo F., and Martin R. Cowie. 2001. "The Epidemiological Features of Heart Failure in Developing Countries: A Review of the Literature." *International Journal of Cardiology* 80(2–3):213–19.
Mustard, Cameron, and Jacob Etches. 2003. "Gender Differences in Socioeconomic Inequality in Mortality," *Journal of Epidemiology and Community Health* 57(12):974–80.
Schooling, C. Mary, Elaine W. Lau, Keith Y. Tin, and Gabriel M. Leung. 2010. "Social Disparities and Cause-Specific Mortality During Economic Development." *Social Science & Medicine* 70(10):1550–57.
Silverman, Phyllis R., and J. William Worden. 1992. "Children's Reactions in the Early Months after the Death of a Parent." *American Journal of Orthopsychiatry* 62(1):93–104.
Steer, Andrew C., Jonathan R. Carapetis, and Terence M. Nolan. 2002. "Systematic Review of Rheumatic Heart Disease Prevalence in Children in Developing Countries: The Role of Environmental Factors." *Journal of Paediatrics and Child Health* 38(3):229–34.
Tremblay, George C., and Allen C. Israel. 1998. "Children's Adjustment to Parental Death," *Clinica Psychology: Science and Practice* 5(4):424–38.
Vera, Maria I. 2003. "Social Dimensions of Grief." In *Handbook of Death and Dying*, ed. Clifton D. Bryant, 838–846. Thousand Oaks, Calif.: Sage Publications.
Weires, Marianne, Justo Bermejo, Kristina Sundquist, Jan Sundquist, and Kari Hemminki. 2008. "Socio-Economic Status and Overall and Cause-Specific Mortality in Sweden." *BMC Public Health* 8(1):340.
Whitlock, Gary, Robyn Norton, Taane Clark, Megan Pledger, Rodney Jackson, and Stephen MacMahon. 2003. "Motor Vehicle Driver Injury and Socioeconomic Status: A Cohort Study with Prospective and Retrospective Driver Injuries." *Journal of Epidemiology and Community Health* 57(7):512–6.
World Bank. 2002. *Education and HIV/AIDS: A Window of Hope*. Washington, D.C.: The World Bank.