The Relationship Between the Death of a Parent or Sibling in Early Childhood and Educational Achievement

Yael Navon, Carmel Blank, Yossi Shavit, and John Gal

Taub Center for Social Policy Studies in Israel

Initiative on Early Childhood Development and Inequality

The Taub Center's *Initiative on Early Childhood Development and Inequality* is tasked with examining the effects of the young child's environment on future achievements and disseminating the latest research on this subject. The Initiative's goal is to assist in the advancement of effective policy to improve the environmental conditions of children in Israel during their early years of life, in order to improve their outcomes and reduce disparities due to socioeconomic background. The researchers involved in this initiative draft up-to-date research reports, literature surveys, position papers, and policy papers. As part of its effort to disseminate the latest available knowledge, the Initiative holds an academic seminar to provide a multidisciplinary basis — both theoretical and empirical — for the investigation of early childhood. The activity of the Initiative is guided by an International Advisory Council consisting of leading academics, policy makers and members of civil society organizations who are committed to the advancement and implementation of effective policy in the area of early childhood in Israel. The activities of the Initiative are supported by the Bernard van Leer Foundation, the Beracha Foundation, and Yad Hanadiv.

The Initiative is headed by Prof. Yossi Shavit, Principal Researcher, Taub Center for Social Policy Studies in Israel; Professor Emeritus, Tel Aviv University.

Research staff: Dr. Carmel Blank, Dr. Yael Navon, Dana Shay, Dr. Sarit Silverman.

Advisory Council: Prof. Esti Adi-Japha, Daniella Ben-Attar, Efrat Degani-Toperoff, Prof. Isaac Friedman, Prof. John Gal, Dr. Shoshi Goldberg, Prof.Reuven Gronau, Sima Hadad, Dr. Tzipi Horowitz-Kraus, Fatma Kassem, Orit Levin, Varda Malka, Michal Mankas, Dr. Tali Yariv Mishal, Dr. Naomi Moreno, Prof. Frank Oberklaid, Ehud (Udi) Prawer, Prof. Sigal Sadetsky, Prof. Avi Sagi-Schwartz, Prof. Manual Trajtenberg, Dr. Maya Yaari.

The Relationship Between the Death of a Parent or Sibling in Early Childhood and Educational Achievement

Yael Navon, Carmel Blank, Yossi Shavit, and John Gal

In memory of Danielle Granot Blank,
aged five and a half at the time of her death,
who was the inspiration for this research

Introduction

The loss of a close relative — a parent or a sibling — is a tremendous shock for any individual and most certainly for children. Apart from the grief and stress caused by the loss, there are also enduring effects on the family unit as well as on the human and material resources available to the child during their development. Although a death within the nuclear family during childhood is considered to be an extreme and rare event, the data show that the number of children experiencing such an event in Israel and other countries is not insignificant. In Israel, about 2.5% of allchildren born between 1985 and 1998

lost a sibling before reaching age 18 and about 4% lost at least one parent.[1] The latter figure is similar to that in Western countries during the early 21st century, namely 3.5%–5.0% (Elsner et al., 2022; Høeg et al., 2019). The current study examines the relationship between the death of a parent or sibling during early childhood and educational achievement, as represented by qualification for a *bagrut* (matriculation) certificate. The focus on a death occurring during early childhood is important in view of the sensitivity of young children to stressful environments (see, for example, Bailey et al., 2001). The findings of a study in Denmark showed that the death of a parent in early childhood has a cumulative and adverse effect on achievement as the child advances through the education system (Høeg et al., 2019). In this sense, qualification for a bagrut certificate, which is influenced by the student's past performance and which constitutes a threshold for entering higher education, can serve as an index of the cumulative harm over time caused by a death in the family to educational achievement. In addition to its contribution to knowledge on this subject, it also has policy implications in view of the distinction made in Israel's welfare policy between the death of a parent and the death of a sibling.

Apart from the frequency of premature death in the nuclear family in the overall population, findings in other countries indicate that this type of death occurs at higher rates among children in households with a low socioeconomic status or who are members of a vulnerable population group (Elsner et al., 2022; Fletcher et al., 2018). Similar patterns are observed in Israel. In terms of total life expectancy, between 2010 and 2014, life expectancy at age 30 (the number of additional years an individual of that age is expected to live) was 51.4 years for Jewish men vs 48.4 for Arab men, and among women, life expectancy at age 30 was 54.4 for Jewish women vs 52.0 for Arab women (Chernichovsky et al., 2017). A recent Ministry of Health report shows that the gap in life expectancy at age 30 between individuals with a post-secondary or academic education and those with up to 11 years of schooling is more than 6 years and that gap has widened over the last decade (Ministry of Health, 2022). From a geographic perspective, a Ministry of Health report found that eight of the ten cities with the highest mortality rates had Arab or Bedouin populations and that the two Jewish cities on the list were part of Israel's geographic periphery. The report also indicates that in the Haifa and the Southern districts the average infant mortality rate among Arabs between 2018 and 2020 was

---

1   These rates were calculated by the authors using data from the Population Registry for those years.

more than three times higher than among the Jewish population: 4.5 per 1,000 live births among Arabs vs 1.4 among Jews and others in Haifa and 9.0 among Arabs vs 2.7 among Jews in the South. In other districts, the gap is small but in all cases, mortality rates among Arabs are higher. The literature that discusses the relationship between socioeconomic status and the likelihood of experiencing a death in the family presents similar patterns, whether that involves the death of a parent or the death of a child; however, little is known about the relationship between loss and educational achievement among the surviving children and in particular the differences in this context between the death of a parent and that of a sibling.

As mentioned, this study examines a loss that occurs during early childhood. The literature indicates that this is a critical stage in individual development and that at this stage the environment is critical in determining life outcomes in the medium and long term (see, for example, Chugani et al., 2001; Heckman et al., 2010). In particular, chronic stress experienced in early childhood has an adverse effect on the development of a child, including physical, emotional, social, and cognitive (Lupien et al., 2009; Shavit et al., 2018). During this period, the developing brain is especially vulnerable to stress resulting from the loss of a secure relationship with a caring adult (the parent in this case) and young children have fewer resources to deal with such loss (Berg et al., 2016; Biank & Werner-Lin, 20111). However, and despite the particular importance of early childhood, most of the literature dealing with the effect of a death in the family during childhood does not in fact focus on loss that occurs during early childhood. Thus, the research surveyed here relates to death experienced during childhood, which is defined broadly as starting from birth (or in some of the studies only from school age, i.e., 6 and older) until age 16 or even 18.

In general, the studies show that a death in the nuclear family during childhood (birth to 18 years of age) is a traumatic event, which in comparison to an individual who has not experienced loss, raises the risk of adverse life outcomes, such as psychological problems, involvement in crime, and so on. (Elsner et al., 2022). The literature shows that the death of a parent is also negatively linked to a child's educational outcomes (Berg et al., 2014; Burrell et al., 2020; Høeg et al., 2019; Liu et al., 2022). For example, in Norway, Sweden, and Finland, it was found that the death of a parent during childhood affects a number of educational outcomes: lower scores at the end of compulsory education (at the age of 16); less chance of completing various educational stages, including high school; and less chance of entering higher education

(Berg et al., 2014; Burrell et al., 2020; Kailaheimo-Lönnqvist & Erola, 2020). In these studies, the analysis was carried out for children who had experienced loss at some point between birth and age 15 or 16 (depending on the study) and no particular importance was attributed to early childhood. Similarly, a relationship was found in South Africa between the death of a parent, primarily the mother, and various educational outcomes, such as years of schooling, although the sample was based on children aged 6–16 only (Case & Ardington, 2006). Another study conducted in Vietnam found a similar negative link between the loss of a parent and the likelihood of attending primary school, high school, or university; however, the study sample only included children from age 7 to 22 (Viet Nguyen & Hoang Vu, 2023).

The literature points to the significance of the environment during early childhood for child development and later life achievements and although there are few studies that focus on the link between loss in early childhood and life outcomes, there is empirical evidence supporting the hypothesis that the loss of a parent during early childhood has a particularly large effect on these outcomes. Thus, for example, Berg et al. (2016) found that individuals who had lost a parent before the age of five were at higher risk of developing clinical depression in adulthood relative to those who lost a parent in adolescence. There is also evidence supporting this hypothesis with regard to educational achievement. In their analysis of administrative data in Sweden, Liu et al. (2022) found that the younger the child was at the time of the death of a parent, the lower would be their grades at the end of compulsory education (at age 17). Their study, though, was based on children who lost a parent after the age of 8. Another study in Finland looked at children from birth until age 22 and found that the older the child was at the time of death of a parent, the greater the chance they would enter higher education (Kailaheimo-Lönnqvist & Erola, 2020). In other words, the longer that a child grows up without both parents the worse their educational achievement will be, a finding that is consistent across parents' level of education. Some evidence for the effect of the death of a parent in early childhood can be found in the research of Serratos-Sotelo & Eibich (2021) who compared children, among them also siblings in the same family, who experienced loss at various ages (Family Fixed Effects).[2] Their study shows that the death of a mother when the children are between the ages of 2

---

2   Family Fixed Effects are a model that controls for the effects of fixed family characteristics in samples with more than one child from each family, such as constant characteristics of the parents which are shared by all of the children in the family.

and 5 leads to lower educational achievement relative to the loss of a mother when the children are between birth and one year of age or older than 16 (although the critical age span for the loss of a father was found to be 6–15). On the basis of the literature on the importance of the environment during early childhood in determining life outcomes and on the basis of these research findings, we hypothesize that the loss of a parent in early childhood will have adverse effects on educational outcomes later in life.

There is also evidence linking the death of a sibling at various ages to negative outcomes, such as behavioral issues (Hoffmann et al., 2018; McCown & Pratt, 1985), a higher risk of diabetes and other health problems (Brooten et al., 2018, Virk et al., 2016), depression, anxiety, PTSD, and psychiatric hospitalization (Barrera et al., 2002; Charles & Charles, 2006; Lövgren et al., 2016), as well as low self-confidence and quality of life (Eilegård et al., 2013). As in the case of research dealing with the death of a parent, most of the studies that examine the death of a sibling did not focus on children who experience the loss in early childhood, and, furthermore, a large share of them are based on small samples that are not obtained using probabilistic methods, such as on the basis of referrals from hospitals. Birenbaum (2000) looked at the reactions of children of various ages to the death of a sibling during the two years following the death and found evidence of various emotional problems relative to a control group that did not experience such a loss. It is interesting to note that the more serious problems were in fact observed among adolescents rather than among children ages 3–5. However, the sample included fewer than 20 young children. Only a few studies have examined the effects of losing a sibling during childhood on educational achievement but those studies also found evidence of negative effects on achievement and a greater chance of dropping out of school (Fletcher et all, 2013; McCown & Pratt, 1985). In a study based on panel data gathered as part of a long-term biannual survey of children and their families in the US (CNLSY79), researchers compared the cognitive and emotional indices for 331 children who had experienced the death of a sibling before and after the event (Fletcher et al., 2018). They found that the death of a sibling is negatively linked to cognitive indices and is associated with a rise in behavioral problems and a decline in the academic self-perception profile. They found the negative relationship to be stronger when the death occured later in childhood. However, it is important to mention that the study examined only 121 families.

Apart from the emotional harm caused by the loss of a parent, the negative association between the death of a parent during childhood, and in particular early childhood, and educational outcomes can be understood in light of the relationship between parental resources — economic and others — and educational achievement, which is well known in the literature (Breen & Jonsson, 2005). In many cases, the death of a parent involves the loss of parental resources, at least in part. In contrast, the death of a sibling does not directly involve a similar loss of resources, on the assumption that the child did not contribute to family income. Moreover, according to the resource dilution theory (Blake, 1989), it can even be claimed that after the death of a sibling the remaining children may benefit from more parental resources, such as time or money, since they are now being divided among fewer children. Nonetheless, the experience of losing a sibling is a complex one and combines the grief of the child with that of the parents. Each of them on their own is liable to have a negative effect on the child and together the effect is amplified (Chan et al., 2022). Following the death of a child, the parent's total mental and emotional resources may be reduced in the long run and in that case the surviving children and their achievements will be negatively affected (Auman, 2007; Crehan, 2004; Fletcher et al., 2018). Unsurprisingly, qualitative studies carried out among parents and children after the death of a child due to cancer found that parents reported changes in their parenting and the remaining children reported greater sadness in their parents (Gilmer et al., 2012). In other words, it is not just material resources that are involved. In this context, it is again worth mentioning the large amount of literature that links the exposure to chronic stress situations in early childhood to child development (for a survey, see Shavit et al., 2018).

As in the case of the few studies that have examined the relationship between the death of a sibling and educational achievement, there are almost no studies that compare the relationship between the death of a parent and life outcomes on the one hand, and the death of a sibling and life outcomes on the other, and in particular, later educational achievement. In a rare study of children in the US that compared the relationship between the death of a parent and behavioral, emotional, and social problems on the one hand and the connection between the death of a sibling on those same problems on the other, it was found that both types of death are positively related to behavioral problems in the short term. Furthermore, sex differences were found, such that boys were more affected by the death of a parent than by

the death of a sibling (in most cases, it was the death of a father), whereas girls were more affected by the death of a sibling, particularly a sister, than the death of a parent (Worden, 1999). Another study, based on longitudinal data for thousands of Dutch youth, including 131 who had experienced the loss of a member of the nuclear family, examined the mental health of these adolescents before and after the loss. It was found that internalized behavioral problems, and primarily depression, were more common after the death of a sibling than after the death of a parent, although the difference was not statistically significant (Stikkelbroek et al., 2016) These are interesting findings but they focus on emotional problems rather than educational achievement. The studies that look at the association between death and educational achievement focus almost exclusively on one or the other types of death in the nuclear family — that of a sibling or that of a parent — but not both. Our research is novel from this perspective since it is one of the only studies that examines the difference in effect between the loss of a parent and the loss of a sibling, based on a large database that is representative of most of the Israeli population.

Apart from the study's theoretical contribution, it also has policy implications. As we will see in the next section, interventions by the social welfare system in Israel following the death of a sibling are very limited in contrast to its involvement following the death of a parent. Therefore, answering the question of whether the harm experienced by children by the death of a sibling is more or less than that caused by the death of a parent can assist in the formulation of policy that will also benefit children in bereaved families.

Social policies supporting families who have experienced loss

There are no specific social policies in Israel that address the effects of the loss of a parent or a sibling on young children and the assistance offered is minimal, except where acute detrimental impact on the mental or physical health of a survivor is identified. There is, of course, no database that brings together the information on all of the children in this situation. The current policy in Israel with respect to a death in the family differentiates between families according to the circumstances of the death (Rabinowitz, 2019). The basic distinction is between *military bereavement* and *civilian bereavement*. The former relates to families who lost a loved one during their military service (or as a result of it) and is dealt with by the Ministry of Defense. Civilian bereavement is dealt

with by the National Insurance Institute (NII) and is divided into three groups, according to the circumstances of the death: terrorist activity; traffic accidents, homicide, or suicide; and illness or an accident (other than a traffic accident). The laws provide relatively generous financial support and a variety of services to spouses and parents of those who die during their military service or as a result of it or in a terror attack.[3] Assistance to the two remaining groups — the families of those who die in circumstances not related to the military or to terrorism — is also differentiated by cause of death, primarily with respect to the services provided by the Ministry of Welfare and Social Affairs. According to various laws and government decisions, the spouse or children in families where a parent or sibling has died as a result of a traffic accident, homicide, or suicide are eligible for defined assistance and services provided by the Ministry of Welfare and Social Affairs. Currently, there are about a thousand families dealt within this framework each year.[4] The services include initiated contact with the bereaved family after their active identification and care and support by means of eight regional assistance centers that provide information and guidance as well as individual and family therapy, group therapy, and monitoring of the therapeutic program's progress. In practice, the assistance received by these families is provided by the Centers for Marriage and Family Therapy operating in 130 social services departments, to which family members are referred by the regional assistance centers. The Ministry of Welfare and Social Affairs provides almost all of the therapy in the centers and finances it. In locations without a center, family members are referred to private therapists financed by the Ministry. In contrast, bereaved families who have lost a parent or child as the result of illness or an accident are not dealt with at the regional centers and are not eligible for any designated type of therapy. Such families can request therapy at the regional Centers for Marriage and Family Therapy but they are not eligible for a discount on the cost and it is provided subject to personnel and resource constraints.

---

3   Although the victims of terror attacks are civilians and their family members are defined as suffering from civilian bereavement (and therefore they are dealt with by the NII, rather than the Ministry of Defense), the financial assistance and services provided to them correspond with those provided to family members of those killed during military service or as a result of it.

4   See the site of the Ministry of Welfare and Social Affairs, *Assistance and Rights for Bereaved Families —Victims of Crime, Traffic Accidents, or Suicide* (in Hebrew).

Apart from the Ministry of Defense and the Ministry of Welfare and Social Affairs, the main source of financial support for families with children in which one of the parents has died in non-security-related circumstances is the NII. The guiding principle in these cases is that the death of a parent reduces the household's income, and since the State is the guarantor of social security, it has the responsibly to assist in maintaining a reasonable standard of living for families that have lost a parent and consequently suffered a loss in income. This financial assistance is provided to the spouse of the deceased and its amount is determined by the number of children in the family under the age of 18. The main payments provided in these cases are survivor insurance, work injury compensation, and guaranteed income supplements. There are also a number of one-time grants provided to children who have lost one of their parents, such as an education grant and a bar mitzvah grant. In recent years, parents of a deceased child have become eligible for the funds deposited on the child's behalf in the *Saving for Every Child* program, in which part of the universal child allowance is deducted and saved in a special account from birth until age 18 or 21. However, this is a one-time relatively small amount and its sum decreases the younger the age of the child at the time of death. In contrast, the social security system does not in general provide financial assistance for the death of a sibling.[5]

The current study

The death of a parent or sibling in childhood, and particularly in early childhood, while not common is also not as rare as one might think, and for someone who has experienced such a loss, it is a life-changing event, which is what makes this research important. Nonetheless, even in war-torn Israel, in which death, bereavement, and loss have been investigated on a large scale, there is little statistical quantitative research on bereavement and its implications and in particular civilian bereavement. Our research examines the effect of the death of a parent or sibling during early childhood (ages 1 to 6) on future outcomes and compares the two types of loss. Since the support provided by the State to families that have experienced the loss of a parent is very different from that provided for the death of a sibling, this type of research can also have implications for future policy. Our main research questions are:

---

5   See the site of the NII, *Survivor's Payments* (in English).

1. What is the relationship between the death of a parent or sibling in early childhood and future educational achievement?
2. Is there a difference in the correlation of educational achievement with the death of a sibling and the death of a parent during early childhood?

Methodology

Data

The research makes use of a unique and particularly large database that we created by merging administrative files from various sources obtained through the Central Bureau of Statistics (CBS): the Population Registry; live birth files from the Ministry of Health; *bagrut* (high school matriculation exams) files from the Ministry of Education; the CBS Education Registry; and income files from the Tax Authority (hereafter: administrative data). Merging of the data was carried out using anonymized identity numbers determined by the CBS for the individuals, their parents, and their siblings. The files include data for individuals born between 1985 and 1998 who appear in the Population Registry in Israel.[6] The data includes the year of death of the individual's sibling or parent and make it possible to calculate the individual's age in years at the time of the death.[7] The analysis was carried out for about 1.05 million individuals registered as Jews or Arabs,[8] for whom there is full information on all of the research variables (about 70% of all Israelis in those cohorts). The analysis is based on native-born Israelis only since there is only partial documentation of a death in the nuclear family for those born outside of Israel.

---

6   The data files were prepared by the CBS for the purpose of a broader study of how family characteristics in early childhood affect future educational outcomes. The 1985 cohort was chosen as the oldest because its members were the first to be tested using the *Meitzav* tests (even though the current study does not use that variable). Most of the cohort who took the *bagrut* exams did so in 2003. The 1998 cohort was chosen as the upper boundary because it is the youngest one for which there is full data on qualification for a bagrut certificate at the time of the request for the files made to the CBS.

7   A death in the family during the individual's year of birth is not included in the data because it may have occurred before his birth (the data file includes only the year of death but not the month).

8   The full database also includes "others" who are not Jews or Arabs; however, this group is very small, its definition in the CBS data has changed over the years and it includes many immigrants. Therefore, it was not included in the sample.

Variables

The dependent variable:

- Qualification for a bagrut certificate — a dichotomous variable (1 = qualification). An individual who did not qualify for a bagrut certificate for any reason (including those who did not take the exams, those who took them but failed to fulfill the requirements for a bagrut certificate, or those who dropped out before the exams) receives a value of 0.

Independent variables:

- The death of a parent during early childhood — A dichotomous variable that identifies the death of a parent (1 = death of a mother or father) when the individual was aged 1 to 6.

- The death of a sibling during early childhood — A dichotomous variable that identifies the death of a sibling (1 = death of a sibling) when the individual was aged 1 to 6.

Control variables:

The control variables are those known to have a significant influence on educational outcomes. We control for them in order to ensure that the estimated effect of a death in the family on the likelihood of qualifying for a bagrut certificate does not represent the effect of these variables.

- The education level of each of the parents — Two dichotomous variables for whether the parent has an academic education (1 = has an academic education).

- Parental income — The percentile of the total salaries (from salaried work only) of the mother and father as recorded in the Population Registry. In the main analysis, use was made of the father's and mother's income percentile in the year prior to the birth of the individual. Using income before the individual was born ensures that this variable is not endogenous, that is, it is not influenced by the death in the family (of a parent or sibling). Given the lack of data on income for the self-employed during the relevant period, various definitions of the sample according to the availability of income data were used to test for the consistency of the results.

- Number of siblings in the year of the individual's birth — The number of the individual's older siblings and those born in the same year. The change in the size of the family that occurs subsequently is important and therefore we control for another sibling variable, as described below.

- Number of younger siblings — The number of siblings born starting in the year following the birth of the individual and up to the occurrence of the death (in the families in which a death occurred) or before the individual turned 7 (in families in which a death did not occur). The reason that the variable is based only on siblings born before the occurrence of the death in the family is the positive association found in the literature between the death of a sibling and the number and timing of subsequent births, whereby the loss of a child raises fertility and, therefore, the number of children born after a loss is liable to grow as a result of the death (Olsen, 1980; van Soest & Saha, 2018; Zhang, 1990). In contrast, following the loss of a parent, the chances of additional children being born in the family diminish. In order to avoid using a variable that is influenced by the occurrence of a death, we chose to include only the number of children in a family before the death or up until the age of 7 in families which did not experience a loss (in the findings section, we discuss this issue in detail).

- Population group — A dummy variable where a value of 1 is for Arabs (the reference group is Jews).

- Age of the father and age of the mother at the time of the child's birth — Two separate continuous variables.

- Low birth weight — A dichotomous variable that takes a value of 1 for a birth weight of less than 2 kilograms, which is the threshold for a premature baby. The control of this variable is important since birth weight is associated with development and achievement. Furthermore, it can be assumed to be related to pregnancy and birth complications which are liable to be correlated with the death of a mother or a sibling. In analyses where the sample did not include premature babies, a low birth weight was defined as less than 3 kilograms.

- Sex — A dichotomous variable (1 = female).

- Year of birth — A variable that is intended to control for changes in the trend of qualification for a bagrut certificate over time. For the sake of simplicity and convenience, the years 1985–1998 were replaced by the numbers 0 to 13.

- The individual's age at the time of the death of a family member — A calculation of the age of the individual, in years, according to the family member's year of death and the individual's year of birth.

The method of analysis

The data were analyzed using logistic regressions which estimate the log odds for qualification for a bagrut certificate. The analysis was carried out in the Research Room of the CBS using the STATA software and in compliance with the CBS rules for information security and confidentiality.

Research findings

Descriptive statistics

Table 1 presents the averages (or rates in the case of dichotomous variables) and the standard deviations for the research variables. As noted previously, the research draws upon administrative data for individuals born in Israel between 1985 and 1998, and, in this sense, we are dealing with a census rather than a sample. However, because not all of the data is available for all individuals, the analysis is based on a sample that is smaller than the total population of those born in Israel during the relevant period. In particular, the sample is differentiated from the general population with respect to the parents' labor force participation. Since there is no way to know if the lack of reported income is evidence of no labor income or self-employment, we omitted all individuals for whom there is no report of the parents' labor income during the year prior to their birth, rather than ascribe zero income to them. As a result of this omission, those with a weak socioeconomic status are not fully represented in the sample and its characteristics are biased toward the stronger socioeconomic groups. Thus, for example, the proportion of Arabs in the sample (about 21%) is lower than the proportion of all live births in their population during the sampling period (about 30% in 1999; see CBS, 2000, Table 3.13), and the rate of qualification for matriculation in the sample is higher than in the general population. In view of the well-documented correlation between socioeconomic background and the likelihood of death at a young age, underrepresentation of those with a weak socioeconomic status also leads to the omission of a likely substantial number of deaths from the analysis. Nonetheless, the sample includes more than 6,000 cases in which at least one parent dies during the individual's early childhood (ages 1 to 6) and about 10,000 cases in which at least one sibling dies during that same age span.[9] Overall, almost 2% of the children in the sample experienced a death in their nuclear family between the ages of 1 and 6.

9   Among native-born Israelis for which there is full information, there are about 100 individuals who experienced the death of both a parent and a sibling during this age period. These individuals were not included in the regression analysis.

Table 1. Averages and standard deviation in the sample

N~1.05M

Variable	Average / Percent	Standard deviation
Bagrut certificate (over all cohorts)	55.1%	0.50
Bagrut certificate out of all taking exams (N = 0.8K)	71.7%	0.45
Parent deceased when individual was aged 1–6	0.6%	0.08
Sibling deceased when individual was aged 1–6	1.0%	0.10
Father's education level (1 = academic)	23.6%	0.42
Mother's education level (1 = academic)	27.6%	0.45
Sector (1 = Jewish)	78.6%	0.41
Sector (1 = Arab)	21.4%	0.41
Father's age at individual's birth	31.81	5.72
Mother's age at individual's birth	28.45	5.34
Parent's income percentile year preceding birth	58.97	27.47
Number of siblings in birth year	1.63	1.74
Number of younger siblings born before the death in the family or before the individual was age 7	1.03	1.01
Sex (1 = female)	48.9%	0.50
Low birth weight (under 2 kilograms)	2.6%	0.16

Source: Navon et al., Taub Center | Data: Administrative data, Taub Center Initiative on Early Child Development and Inequality

The death of a parent or sibling and educational achievement

Table 2 presents the relationship between a death in the nuclear family when the individual is aged 1 to 6 and the likelihood of qualifying for a bagrut certificate, while controlling for demographic and socioeconomic background variables that are linked to both the chances of being exposed to such a death and educational achievement. In the first model presented in the table, the coefficient of *a death in the family at the age of 1 to 6* indicates that above and beyond the background variables, the odds of an individual who experienced a death in the nuclear family qualifying for a bagrut certificate is lower than that of an individual who experienced no such loss (coefficient of -0.304). In the next two models, which separately test the effects of the death of a parent at the age of 1 to 6 (Model 2) and the death of a sibling during that same age span (Model 3),[10] there is a negative and statistically significant relationship between a death in the family and the likelihood of qualifying for a bagrut

10 Model 2 does not include children who experienced the death of a sibling between the age of 1 and 6 while Model 3 does not include children who experienced the death of a parent during that age span. These specifications are meant to ensure that the reference group will include only children who did not experience a death in the nuclear family during that age span.

certificate, whether it is the death of a parent or of a sibling.

The coefficients of the background variables in Table 2 are for the most part unsurprising and are consistent with the trends that are reported in the literature, according to which the parents' education levels and ages have a positive association with the qualification for a bagrut certificate (Dahan et al., 2003). Furthermore, it was found that an increase in the family income percentile in the year prior to the individual's birth is accompanied by an increase in the likelihood of qualification for bagrut.[11] In addition, girls have a greater likelihood of qualifying for a bagrut certificate than boys. As expected, low birth weight is related to lower likelihood of qualifying for a bagrut certificate, apparently as a result of its relation to various health issues. It is worth mentioning that after controlling for the other background variables, the likelihood of Arabs qualifying for a bagrut certificate is somewhat higher than that of Jews (the coefficient for Arab ethnicity is negative in the model that does not include control variables).

The number of children in a family is also negatively associated with the likelihood of qualifying for bagrut, which is also well-known from the literature (Conley & Glauber, 2006; Hanushek, 1992; Jaeger, 2008; Lee, 2008; Rosenzweig & Zhang, 2009). In this context, it is important to mention that the number of siblings preceding the death in the nuclear family (or up to the age of 7 in a family that did not experience a death) is not necessarily the number of siblings at the time of the bagrut exams. Examining the number of siblings in a family who were born after the death or from age 7 to 16 we found that during this period an average of 0.76 children were born to the family. It was also found that the average is higher for families that experienced the loss of a child than for families that did not. This finding is consistent with a large demographic literature that indicates a positive association between infant mortality and fertility in the family after the death of a child, a phenomenon known as the replacement effect (see, for example, Olsen, 1980; van Soest & Saha, 2018; Zhang, 1990). The addition of the sibling born between the ages of 7 and 16 variable to the model (not presented) led to a large drop in the strength of the coefficient for the death of a sibling (B =-0.066 relative to B =-0.287). However, it was not included in the final analysis, as this variable is apparently endogenous (i.e., it is affected by the death of a sibling), and this

---

11 As noted in the Methodology section, income was measured near the time of birth in order to avoid endogeneity, in which the income measure is affected by a death in the family. Therefore, this measure of income does not necessarily represent the economic situation of the family when the child is in high school (when bagrut exams are taken), although it is reasonable to assume that there is some measure of stability in a family's relative income (percentile) over time.

weaker coefficient is suspected to be biased.

Table 2. Results of logistic regression (log odds) on bagrut qualification

	Qualification for a bagrut certificate		
	(Model 1)	(Model 2)	(Model 3)
Family death when individual was aged 1–6 (parent or sibling)	-0.304**		
	(0.018)		
Parent's death when individual was aged 1–6		-0.322**	
		(0.028)	
Sibling's death when individual was aged 1–6			-0.287**
			(0.023)
Father's education level (1 = academic)	0.720**	0.718**	0.721**
	(0.006)	(0.006)	(0.006)
Mother's education level (1 = academic)	0.712**	0.713**	0.712**
	(0.006)	(0.006)	(0.006)
Sector (1 = Arab)	0.043**	0.042**	0.043**
	(0.006)	(0.006)	(0.006)
Father's age at child's birth	0.031**	0.031**	0.031**
	(0.001)	(0.001)	(0.001)
Mother's age at child's birth	0.025**	0.026**	0.026**
	(0.001)	(0.001)	(0.001)
Parent's income level in year preceding individual's birth	0.013**	0.013**	0.013**
	(0.000)	(0.000)	(0.000)
Number of siblings in birth year	-0.350**	-0.351**	-0.351**
	(0.002)	(0.002)	(0.002)
Number of younger siblings born before the death in the family or before age 7	-0.278**	-0.280**	-0.279**
	(0.003)	(0.003)	(0.003)
Sex (1 = female)	0.810**	0.810**	0.810**
	(0.004)	(0.004)	(0.004)
Year of birth	0.048**	0.048**	0.048**
	(0.001)	(0.001)	(0.001)
Low birth weight (under 2 kilograms)	-0.325**	-0.318**	-0.324**
	(0.014)	(0.014)	(0.014)
Intercept	-2.459**	-2.452**	-2.461**
	(0.018)	(0.019)	(0.019)
Number of observations	1,047,086	1,037,027	1,040,665
Pseudo R^2	0.16	0.16	0.16

Significance levels: *p < 0.05; **p < 0.01.
Source: Navon et al., Taub Center | Data: Administrative data, Taub Center Initiative on Early Child Development and Inequality

The differences in the association of educational achievement with the death of a parent and the death of a sibling

In order to test whether there is a difference in the magnitude of the correlation of educational achievement and a death in the family between the death of a parent and the death of a sibling, we estimated another model which compares occurrences of death by the type of family relationship between the deceased and the individual in the reduced sample, which includes only individuals who experienced a death in the nuclear family when they were aged 1 to 6. The results are presented in Table 3. Omitted from the analysis sample are individuals who lost more than one family member, twins,[12] and anyone born as a premature baby (according to birth weight). We also omitted individuals born to very young parents (under the age of 21) or very old parents (over the age of 49), in order to control, as much as possible, the effect of external factors that are known to be related to educational achievement and are likely to be related in different ways to the likelihood of experiencing the death of a parent and to the likelihood of experiencing the death of a sibling.

The independent variable in this model is the type of family relationship between the deceased and the individual: parent (= 1) or sibling (the reference category). Thus, the coefficient of the independent variable death of a parent captures the difference in the log odds of qualifying for a bagrut certificate between individuals who experienced the death of a parent and individuals who experienced the death of a sibling.

The results indicate that there is no statistically significant difference between the death of a parent and the death of a sibling with respect to the effect on the likelihood of bagrut qualification. The coefficient of the death of a parent is positive but not significant (B = 0.083, p < 0.05). In other words, both types of loss — the loss of a parent and the loss of a sibling — when the individual is a young child are negatively related to the likelihood of qualifying for a bagrut, and the hypothesis that the effect is similar in both cases cannot be rejected. This finding may be surprising given the centrality of a parent in a child's life, particularly in early childhood, and also given the highly adverse effect on the family of a parental death, which deprives the children of economic resources as well as the time and availability of the parents, their attention, and guidance.

12   Studies show that the educational achievements of children born in a multiple birth are lower than in the case of a single birth. Furthermore, a multiple birth is associated with a higher risk of health problems and death.

Table 3. Results of logistic regression (log odds) on bagrut qualificaiton, sample of individuals who experienced the loss of a parent or sibling at age 1–6

	Qualifying for a bagrut certificate
Family relationship to the deceased (1 = parent)	0.083
	(0.048)
Father's education level (1 = academic)	0.845**
	(0.063)
Mother's education level (1 = academic)	0.663**
	(0.057)
Population group (1 = Arab)	0.154**
	(0.048)
Father's age at individual's birth	0.032**
	(0.006)
Mother's age at individual's birth	0.021**
	(0.007)
Parents' income percentile in the year preceding the birth of the individual	0.014**
	(0.001)
Number of siblings at time of individual's birth	-0.266**
	(0.015)
Number of younger siblings born prior to the death in the family or before the individual reached age 7	-0.142**
	(0.027)
Sex (1 = female)	0.884**
	(0.041)
Year of individual's birth	0.045**
	(0.005)
Low birth weight (under 3 kilograms)	-0.251**
	(0.092)
Individual's age at time of the death in the family	0.025
	(0.013)
Intercept	-3.187**
	(0.167)
Number of observations	12,015

Significance levels: *$p < 0.05$; **$p < 0.01$.
Source: Navon et al., Taub Center | Data: Administrative data, Taub Center Initiative on Early Child Development and Inequality

It is worth noting that the findings are liable to be biased due to the differences in other characteristics between families that experienced the death of a parent and those that experienced the death of a child. The lack of information that would allow us to estimate this selection effect is a serious limitation of the research. This type of selection may be manifested in a different relationship between the background variables and qualification for bagrut; nonetheless, when estimating separate regressions for children who lost a parent and children who lost a sibling, it was found that in most cases, the coefficients were very similar, with the exception of father's higher education.

Sensitivity of the results to the definition of the sample

In order to test the consistency of the results under different sample definitions, the two models presented in Table 2 and 3 were tested for three additional different samples:

a. Samples that do not include individuals who did not take the bagrut exams, with the goal of reducing the effect of the Haredi (ultra-Orthodox Jewish) population on the results (the Haredi population do not generally take the bagrut exams and are also differentiated by other characteristics including infant mortality rates).

b. Samples in which both parents are employees, in order to eliminate the biasing of the income percentile variable and the model's coefficients due to the lack of information on the income of the self-employed.

c. A sample that includes all of the cases in the data file, without omitting anyone for whom there is no report of parents' salary income during the year prior to the individual's birth.

These models were estimated with all of the control variables (except income in Sample c). Table 4 and 5 present the coefficients of the death variables for the same models that appear in Table 2 and 3 respectively, with changes in the definition of the sample and the variables according to Samples a, b, and c. The results suggest that the main trends are not affected by the sample definitions. Nonetheless, the negative association between the death of a sibling and qualification for bagrut among those taking the bagrut exams is weaker than in the entire cohort. In other words, part of the association may be the result of higher infant mortality among Haredim (who do not take the bagrut exams). In order to determine the extent to which this population biases the results, we also examined the association between the death of a sibling and

qualification for bagrut for the entire cohort in a sample in which we omitted yeshiva students (not presented) and found that this relationship is stronger than that described in Model 2a in Table 4. It appears that the difference in the association between loss during early childhood and the likelihood of bagrut qualification according to the various definitions of the reference group (all of the non-eligible vs those who took the exams but did not qualify for a full certificate) is not just a result of including the Haredim, and the relationship that was found according to the broad definition of qualification also includes the higher risk of dropping out of school among children who experienced such a loss.

Table 4. Results of logistic regression (log odds) on bagrut qualification, various samples

	Model 2a			Model 2b			Model 2c		
Family death before individual is age 6 (parent or sibling)	-0.162** (0.022)			-0.276** (0.028)			-0.358** (0.016)		
Parent's death before individual is age 6		-0.243** (0.033)			-0.272** (0.041)			-0.398** (0.025)	
Sibling death before individual is age 6			-0.098** (0.029)			-0.273** (0.038)			-0.327** (0.020)
Number of observations	805,312	799,275	800,520	527,768	524,466	524,827	1,290,341	1,276,46	1,281,947

Significance levels: *$p < 0.05$; **$p < 0.01$.
Source: Navon et al., Taub Center | Data: Administrative data, Taub Center Initiative on Early Child Development and Inequality

Table 5. Results of logistic regression (log odds) on bagrut qualification, sample of individuals who experienced a loss of a parent or sibling at age 1–6, various samples

	Model 3a	Model 3b	Model 3c
Death of a parent	-0.048 (0.050)	0.002 (0.067)	0.067 (0.037)
Number of observations	10,764	6,208	22,085

Significance levels: *$p < 0.05$; **$p < 0.01$.
Source: Navon et al., Taub Center | Data: Administrative data, Taub Center Initiative on Early Child Development and Inequality

Conclusion

This study has dealt with a traumatic event experienced in early childhood, namely a death in the nuclear family. We examined whether this type of death is related to educational achievement at a later stage (the first research question). In addition, we examined whether the effect on educational achievement is different when the death is that of a sibling or a parent (the second research question). The analysis focused on qualification for a bagrut certificate since it is a necessary, though not sufficient, condition to enter higher education in Israel and thus it has importance for an individual's educational and occupational future. In other words, it can be assumed that non-qualification for a bagrut certificate prevents entering higher education and in turn reduces the chances of entering a prestigious profession in the future.

Even though loss and bereavement have been investigated to a great extent in Israel, there is no quantitative research on the relationships between loss during early childhood and educational achievement. Our unique database, which includes all individuals born in Israel between 1985 and 1998, made it possible to investigate a not particularly common event, while differentiating between the different types of loss in a family (i.e., the loss of a sibling vs the loss of a parent).

The data indicate that almost 2% of the individuals in the sample experienced the loss of a parent or a sibling during early childhood, as defined here — between ages 1 and 6. The literature points to sociodemographic disparities in the risk of premature death among adults and children and consequently in the likelihood of an individual experiencing a death in the nuclear family. The risk is higher among minority groups, populations with a low socioeconomic status, and residents of the periphery (Elsner et al., 2022; Fletcher et al., 2018). Thus, as noted previously in this paper, this is an underestimate relative to the rate in the general population since populations with a low socioeconomic status, in which parents have no income, and which are characterized by a higher rate of mortality, are underrepresented in the research population. In other words, the phenomenon of the death of a parent or sibling in early childhood is less rare than might be expected, even relative to the picture that emerges from the data.

With respect to the first research question, the current findings confirm the findings of studies reported in the literature relating to the negative relationship between death in the nuclear family and educational achievement (Berg et al., 2014; Burrell et al., 2020; Fletcher et al., 2013; Høeg et al., 2019;

Liu et al., 2022; McCown & Pratt, 1985). Accordingly, the findings shown here indicate that the likelihood of someone who experienced a death in the nuclear family in early childhood qualifying for a bagrut certificate is significantly lower than for children with similar socioeconomic characteristics who did not experience such an event. As mentioned in the introduction, the connection between a death in the family in early childhood and educational achievement has not been sufficiently studied, even though there is plentiful evidence for the negative contribution of stress situations in the family during early childhood — due to a variety of traumatic experiences and situations, such as poverty and economic distress (Shavit et al., 2018), violence of various kinds (Krug et al., 2002), and war (Torche & Shwed, 2015) — to life outcomes in the medium and long terms. The findings of our research point to a negative relationship between such a loss and educational achievement, even many years after the loss. It is important to note again that our research only included native-born Israelis in view of the absence of data on family deaths prior to immigration to Israel. It can be assumed that among immigrants the implications will be even more pronounced, since their social connections and support networks may be more limited.

Our second research question involves the differences between the death of a parent and the death of a sibling with respect to educational achievement in light of differential assistance from the State authorities. The findings indicate that the death of a sibling and the death of a parent during an individual's early childhood have a similar negative association with the likelihood of qualifying for a bagrut certificate. This finding is somewhat surprising in view of the central role of a parent in the life of a child, particularly during early childhood, as the first and most important attachment figure for a child (Melhem et al., 2011; Mikulicer et al., 2003). Therefore, one might have expected that the death of a parent would have a greater negative effect than the death of a sibling. A possible explanation for this finding is that, notwithstanding the adverse effect of losing a parent, some of the roles of the deceased parent may be fulfilled by a step parent or a different adult from within the extended family, at least in some aspects. In this way the loss of resources that the child experiences may be offset and become more like the death of a sibling. Indeed, the literature presents some evidence that the remarriage of the remaining parent moderates the adverse effects of the death on life outcomes, although this finding is not unambiguous and some of the research indicates that the contribution of a remarriage is in fact negative (Biank & Werner-Lin, 2011; Case

& Ardington, 2006; Kailaheimo-Lönnqvist & Erola, 2020). Furthermore, since the data we possess do not include information on the household structure, there is no way of knowing if the deceased parent lived with the individual prior to their death and whether the household composition changed following the death. Another possible explanation for the similarity in the effect on educational achievement between a parent's and sibling's death is that the loss of a child (i.e., the death of a sibling) — and not just the loss of a parent — may also lead to diminished availability of parental resources, and particularly emotional resources as a result of grief, thus adversely affecting outcomes for the surviving children. This explanation is supported by findings in the literature which show that from an emotional perspective the most difficult loss is that of a child and that the likelihood of disruption due to prolonged and complicated grief is greater with the loss of a child than with the loss of a spouse (Kersting et al., 2011). It is worth mentioning that the distinction between the loss of economic resources and that of emotional resources is not clear-cut, since bereaved parents who experience emotional turmoil may also find it difficult to maintain the family income, such that economic distress is not unique to the loss of a parent.

As noted, the data do not make it possible to reject the claim that differences in other characteristics between families that experienced the death of a parent and those that experienced the death of a child are responsible for the similarity of the relationship found here. In light of this possibility, there is a need for further research to examine this issue and in particular the heterogeneity of the relationships found (by the child's sex and the deceased family member or population group, for instance). Nonetheless, the conclusions presented here with respect to policy remain valid even if the claim is true.

The survey of the welfare system's support of bereaved families presented in the introduction indicates that there is no coherent policy of support in the case of civilian bereavement for the loss of a child that is not the result of a terror attack. While in cases of military bereavement, the families are entitled to a broad range of economic and emotional supports from the Ministry of Defense (or the National Insurance Institute in the case of victims of terror attacks), in the case of civilian bereavement, there is only minimal economic support in the case of the loss of a parent and negligible support in the case of the loss of a sibling. Unfortunately, the database does not include details of the circumstances of death that would enable a distinction between military and terror attack bereavement and other causes of death. However, we did have

indicators of death from external causes vs death from disease. The latter was much more common in our database, both in the case of parental death and in those of sibling death.

In light of the study's findings, which indicate that a death in the nuclear family is associated with long-term harm to educational achievement for the surviving children (and perhaps other life outcomes as well), there is a need to expand the support provided in the case of civilian bereavement. First, there is no coherent reason for the existing distinction between military bereavement and civilian bereavement and within civilian bereavement between a death caused by a traffic accident, homicide, and suicide and one caused by illness or an accident other than a traffic accident. This is an artificial distinction that limits the support provided to families who have experienced a death due to illness or an accident and leaves them with only limited support (in the case of the death of a parent) or no support at all (in the case of the death of a child). In order to address this, the Ministry of Welfare and Social Affairs should expand the services and support provided to those who experience civilian bereavement, regardless of the circumstances of the death. This could be achieved by creating centers for the treatment of bereavement that will operate in a similar format to the currently existing Centers for Marriage and Family Therapy which operate alongside the social services departments. These centers will provide the services that bereaved families currently receive at the regional centers and at the Centers for Marriage and Family Therapy. Another option is to expand the activity of the regional support centers so that they can deal with anyone who has experienced civilian bereavement and provide psychosocial assistance to the members of a bereaved family. Second, the expansion of assistance provided in cases of civilian bereavement is essential in order to ensure that government authorities are not neglecting any individuals. They should provide emotional and economic support for the loss of both a parent and a child and that support should be tailored to each member of the family. In order to prevent the emergence of problems and disparities over time, this should be done as soon as possible after the loss.

Our research sheds light on the need to support bereaved siblings particularly during the early stages of life.[13] Such institutional support, provided by the psychological-educational services, the schools, or the health funds, is likely to narrow educational and other disparities that are liable to emerge as the result of the death of a sibling during an individual's childhood. A step in this direction was the amendment of the Law for Families of Soldiers Killed in Battle (Compensation and Rehabilitation) – 1950, which was passed by the Knesset in June 2022, and established that bereaved siblings would be eligible for economic assistance for the purpose of their emotional welfare and which expanded the availability of tuition subsidies for a bachelor's degree. The recognition that bereaved siblings experience a significant loss that requires attention from the State is without a doubt welcome progress; however, the fact that the law only deals with the families of fallen soldiers and the families of victims of terror attacks further illustrates the disparity in Israel in dealing with military bereavement and civilian bereavement.

---

13 In other analyses that we carried out (not presented) which include loss at later ages (after the age of 6), a particularly strong association was found with qualification for bagrut when the death of the sibling occurs in early childhood.

References

English

Auman, M. J. (2007). Bereavement support for children. *The Journal of School Nursing, 23*(1), 34–39.

Barrera, M., Chung, J. Y. Y., Greenberg, M., & Fleming, C. (2002). Preliminary investigation of a group intervention for siblings of pediatric cancer patients. *Children's Health Care, 31*(2), 131–142.

Bailey, D. B. Jr., Bruer, J. T., Symons, F. J., & Lichtman J. W. (Eds.). (2001). *Critical thinking about critical periods*. Paul H Brookes Publishing.

Berg, L., Rostila, M., & Hjern, A. (2016). Parental death during childhood and depression in young adults — a national cohort study. *The Journal of Child Psychology and Psychiatry, 57*(9), 1092–1098.

Berg, L., Rostila, M., Saarela, J., & Hjern, A. (2014). Parental death during childhood and subsequent school performance. *Pediatrics, 133*(4), 682–689.

Biank N. M., & Werner-Lin, A. (2011). Growing up with grief: Revisiting the death of a parent over the life course. *OMEGA-Journal of Death and Dying, 63*(3), 271–290.

Birenbaum, L. K. (2000). Assessing children's and teenagers' bereavement when a sibling dies from cancer: A secondary analysis. *Child: Care, Health and Development, 26*(5), 381–400.

Blake, J. (1989). Number of siblings and educational attainment. *Science, 245*(4913), 32–36.

Breen, R., & Jonsson, J. O. (2005). Inequality of opportunity in comparative perspective: Recent research on educational attainment and social mobility. *Annual Review of Sociology, 31*, 223–243.

Brooten, D. A., Youngblut, J. M., Roche, R. M., Caicedo, C. L., & Page, T. F. (2018). Surviving siblings' illnesses, treatments/health services over 13 months after a sibling's death. *Journal of Child and Family Studies, 27*(1), 2049–2056.

Burrell, L. V., Mehlum, L., & Qin, P. (2020). Educational attainment in offspring bereaved by sudden parental death from external causes: A national cohort study from birth and throughout adulthood. *Social Psychiatry and Psychiatric Epidemiology, 55*(6), 779–788.

Case, A., & Ardington, C. (2006). The impact of parental death on school outcomes: Longitudinal evidence from South Africa. *Demography, 43*(3), 401–420.

Chan, W. C. H., Leung, G. S. M., Leung, M. M. M., Lin, M. K. L., Yu, C. T. K., & Wu, J. K. (2022). Facing the loss of siblings in childhood: Interactions and dynamics between bereaved siblings and their parents. *Journal of Pediatric Nursing, 66*, e1–e8.

Charles, D. R., & Charles, M. (2006). Sibling loss and attachment style: An exploratory study. *Psychoanalytic Psychology, 23*(1), 72–90.

Chernichovsky, D., Bisharat, B., Bowers, L., Brill, A., & Sharony, C. (2017). The health of the Arab population. In A. Weiss (Ed.), *State of the nation report: Society, economy and policy in Israel 2017* (pp. 325-372). Taub Center for Social Policy Studies in Israel.

Chugani, H. T., Behen, M. E., Muzik, O., Juhász, C., Nagy, F., & Chugani, D. C. (2001). Local brain functional activity following early deprivation: A study of postinstitutionalized Romanian orphans. *Neuroimage, 14*(6), 1290–1301.

Conley, D., & Glauber, R. (2006). Parental educational investment and children's academic risk: Estimates of the impact of sibship size and birth order from exogenous variations in fertility. *Journal of Human Resources, 41*(4), 722–737.

Crehan, G. (2004). The surviving sibling: The effects of sibling death in childhood. *Psychoanalytic Psychotherapy, 18*(2), 202–219.

Dahan, M., Dvir, E., Mironichev, N., & Shye, S. (2003). Have the gaps in education narrowed? On factors determining eligibility for the Israeli matriculation certificate. *Israel Economic Review, 1*(2), 37–69.

Eilegård, A., Steineck, G., Nyberg, T., & Kreicbergs, U. (2013). Psychological health in siblings who lost a brother or sister to cancer 2 to 9 years earlier. *Psycho-Oncology, 2*(3), 683–691.

Elsner, T. L., Krysinska, K., & Andriessen, K. (2022). Bereavement and educational outcomes in children and young people: A systematic review. *School Psychology International, 43*(1), 55–70.

Fletcher, J., Mailick, M., Song, J., & Wolfe, B. (2013). A sibling death in the family: Common and consequential. *Demography, 50*(3), 803–826.

Fletcher, J., Vidal-Fernandez, M., & Wolfe, B. (2018). Dynamic and heterogeneous effects of sibling death on children's outcomes. *Proceedings of the National Academy of Sciences of the United States of America, 115*(1), 115–120.

Gilmer, M. J., Foster, T. L., Vannatta, K., Barrera, M., Davies, B., Dietrich, M. S., Fairclough, D. L., Grollman, J., & Gerhardt, C. A. (2012). Changes in parents after the death of a child from cancer. *Journal of Pain and Symptom Management, 44*(4), 572–582.

Hanushek, E. A. (1992). The trade-off between child quantity and quality. *Journal of Political Economy, 100*(1), 84–117.

Heckman, J. J., Moon, S. H., Pinto, R., Savelyev, P., & Yavitz, A. (2010). The rate of return to the High Scope Perry Preschool Program. *Journal of Public Economics, 94*(1), 114–128.

Høeg, B. L., Johansen, C., Christensen, J., Frederiksen, K., Oksbjerg Dalton, S., Bøge, P., Dencker, A., Dyregrov, A., & Bidstrup, P. E. (2019). Does losing a parent early influence the education you obtain? A nationwide cohort study in Denmark. *Journal of Public Health (United Kingdom), 41*(2), 296–304.

Hoffmann, R., Kaiser, J., & Kersting, A. (2018). Psychosocial outcomes in cancer bereaved children and adolescents: A systematic review. *Psycho-Oncology, 27*(10), 2327–2338.

Jaeger, M. M. (2008). Do large sibships really lead to lower educational attainment? New evidence from quasi-experimental variation in couples' reproductive capacity. *Acta Sociologica, 51*(3), 217–235.

Kailaheimo-Lönnqvist, S., & Erola, J. (2020). Child's age at parental death and university education. *European Societies, 22*(4), 433–455.

Kersting, A., Brähler, E., Glaesmer, H., & Wagner, B. (2011). Prevalence of complicated grief in a representative population-based sample. *Journal of Affective Disorders, 131*(1–3), 339–343.

Krug, E. G., Mercy, J. A., Dahlberg, L. L., & Zwi, A. B. (2002). The world report on violence and health. *The Lancet, 360*(9339), 1083–1088.

Lee, J. (2008). Sibling size and investment in children's education: An Asian instrument. *Journal of Population Economics, 21*(4), 855–875.

Liu, C., Grotta, A., Hiyoshi, A., Berg, L., & Rostila, M. (2022). School outcomes among children following death of a parent. *JAMA Network Open, 5*(4), 1–11.

Lövgren, M., Jalmsell, L., Eilegård Wallin, A., Steineck, G., & Kreicbergs, U. (2016). Siblings' experiences of their brother's or sister's cancer death: A nationwide followup 2–9 years later. *Psycho-Oncology, 25*(4), 435–440.

Lupien, S. J., McEwen, B. S., Gunnar, M. R., & Heim, C. (2009). Effects of stress throughout the lifespan on the brain, behavior and cognition. *Nature Reviews Neuroscience, 10*(6), 434–445.

McCown, D. E., & Pratt, C. (1985). Impact of sibling death on children's behavior. *Death Studies, 9*(3–4), 323–335.

Melhem, N. M., Porta, G., Shamseddeen, W., Walker Payne, M., & Brent, D. A. (2011). Grief in children and adolescents bereaved by sudden parental death. *Archives of General Psychiatry, 68*(9), 911–919.

Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment-related strategies. *Motivation and Emotion, 27*, 77–102.

Olsen, R. J. (1980). Estimating the effect of child mortality on the number of births. *Demography, 17*(4), 429–443.

Rosenzweig, M. R., & Zhang, J. (2009). Do population control policies induce more human capital investment? Twins, birth weight and China's "one-child" policy. *The Review of Economic Studies, 76*(3), 1149–1174.

Serratos-Sotelo, L., & Eibich, P. (2021). *Lasting effects of parental death during childhood: Evidence from Sweden*. Max Planck Institute for Demographic Research.

Shavit, Y., Friedman, I., Gal, J., & Vaknin, D. (2018). *Emerging early childhood inequality: On the relationship between poverty, sensory stimulation, child development, and achievement*. Taub Center for Social Policy Studies in Israel.

Stikkelbroek, Y., Bodden, D. H. M., Reitz, E., Vollebergh, W. A. M., & van Baar, A. L. (2016). Mental health of adolescents before and after the death of a parent or sibling. *European Child & Adolescent Psychiatry, 25*(1), 49–59.

Torche, F., & Shwed, U. (2015). The hidden costs of war: Exposure to armed conflict and birth outcomes. *Sociological Science, 2*, 558–581.

van Soest, A., & Saha, U. R. (2018). Relationships between infant mortality, birth spacing and fertility in Matlab, Bangladesh. *PloS One, 13*(4), e0195940.

Viet Nguyen, C., & Hoang Vu, L. (2023). Does parental absence harm children's education? Evidence from Vietnam. *Journal of Asian and African Studies*. (Online)

Virk, J., Ritz, B., Li, J., Obel, C., & Olsen, J. (2016). Childhood bereavement and type 1 diabetes: A Danish national register study. *Paediatric and Perinatal Epidemiology, 30*(1), 86–92.

Worden, J. W. (1999). Comparing parent loss with sibling loss. *Death Studies, 23*(1), 1–15.

Zhang, J. (1990). Mortality and fertility: How large is the direct child replacement effect in China? *Journal of Population Economics, 3*(4), 303–314.

Hebrew

Ministry of Health (2021). *Inequality in health and dealing with it 2021*. Ministry of Health.

Rabinowitz, M. (2019). *Government assistance to orphans*. Knesset, Research and Information Center.