



Research paper

Self-harm risk between adolescence and midlife in people who experienced separation from one or both parents during childhood

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ABSTRACT

Background: Experience of child-parent separation predicts adverse outcomes in later life. We conducted a detailed epidemiological examination of this complex relationship by modelling an array of separation scenarios and trajectories and subsequent risk of self-harm.

Methods: This cohort study examined persons born in Denmark during 1971–1997. We measured child-parent separations each year from birth to 15th birthday via complete residential address records in the Civil Registration System. Self-harm episodes between 15th birthday and early middle age were ascertained through linkage to psychiatric and general hospital registers. Incidence rate ratios (IRRs) from Poisson regression models were estimated against a reference category of individuals not separated from their parents.

Results: All exposure models examined indicated an association with raised self-harm risk. For example, large elevations in risk were observed in relation to separation from both parents at 15th birthday (IRR 5.50, 95% CI 5.25–5.77), experiencing five or more changes in child-parent separation status (IRR 5.24, CI 4.88–5.63), and having a shorter duration of familial cohesion during upbringing. There was no significant evidence for varying strength of association according to child's gender.

Limitations: Measuring child-parent separation according to differential residential addresses took no account of the reason for or circumstances of these separations.

Conclusions: These novel findings suggest that self-harm prevention initiatives should be tailored toward exposed persons who remain psychologically distressed into adulthood. These high-risk subgroups include individuals with little experience of familial cohesion during their upbringing, those with the most complicated trajectories who lived through multiple child-parent separation transitions, and those separated from both parents during early adolescence.

1. Introduction

The American Psychological Association has highlighted that more than 9 out of 10 people in Western cultures marry by age 50 years, and that healthy marriages promote wellbeing for children and help to protect them from mental, physical, educational and psychosocial difficulties. However, the Association also reported that around 40–50% of first marriages in the United States end in divorce, with the divorce rate for subsequent marriages being higher still (<http://www.apa.org/topics/divorce/index.aspx>). The majority of children whose parents divorce or separate grow up to be well-functioning adults (Hetherington, 1993; Afifi et al., 2009). However, previous research has demonstrated that exposure to this common phenomenon during

childhood is linked with elevated suicidality risk in later years; specifically, attempted suicide and suicidal ideation in the US national population (Afifi et al., 2009), in Montreal, Canada (Tousignant et al., 1993) and in Scania, southern Sweden (Lindström and Rosvall, 2015); attempted suicide in the US national population (Lizardi et al., 2009; Alonzo et al., 2014); suicidal ideation in the Canadian national population (Fuller-Thomson and Dalton, 2011); and death by suicide in New York City, USA (Gould et al., 1998).

Most children living in developed countries more frequently experience separation from one or both parents than parental death during upbringing, but this exposure may be more strongly linked with the development of psychopathology than the impact of parental loss (Canetti et al., 2000). Despite the existence of a sizeable body of

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literature on this topic, strong and consistent evidence is lacking concerning variability in degree of heightened self-harm risk according to which parent the child was separated from, the age at which separation occurred, child's gender, the duration of separation from one or both parents, and the total number of separations and subsequent reunions during a child's upbringing. For example, there are conflicting reports as to which gender has the greater elevation in suicidality risk (Lizardi et al., 2009; Fuller-Thomson and Dalton, 2011).

To better understand the pathways that link these exposures with elevated self-harm risk, we examined interlinked national Danish administrative registers. This large cohort study provided total population coverage and abundant statistical power for modelling the various scenarios and trajectories of child-parent separation and later risk of self-harm. These data sources enabled us to examine all separations from one or both parents according to complete and accurate residential address information for the whole national population. They also provided us with a rare opportunity to examine adverse outcomes over the longer term (Chase-Lansdale et al., 1995; Jónsson et al., 2000; Huurre et al., 2006) well into adult maturity, although the registry data did not enable us to examine self-harm cases with and without suicidal intent separately. Our goal was to generate novel evidence concerning varying approaches to examining exposure to child-parent separation and its association with later self-harm risk, to inform future interventions and preventive initiatives.

2. Methods

2.1. Study population

This investigation was approved by the Danish Data Protection Agency. The study population consisted of persons born in Denmark from 1st January 1971 to 31st December 1997. The cohort was delineated using the Danish Civil Registration System (CRS) (Pedersen et al., 2006), which has provided continuously updated computerised data on the whole population since 1968. The CRS routinely captures demographic information, including gender, date of birth, identity of parents and siblings and vital status, on all Danish residents. We restricted the cohort to individuals born in Denmark and living there on their 15th birthday, with both parents also born in Denmark and alive on the cohort member's 15th birthday.

2.2. Self-harm classification

Cohort members were linked via their unique personal identifiers to the Danish Psychiatric Central Research Register (Mors et al., 2011), which has recorded all psychiatric admissions since 1969, and to the National Patient Register (Lyngé et al., 2011), which has captured all general hospital admissions since 1977. Both registers have also recorded all outpatient episodes, including emergency room visits, from 1995 and onwards. Diagnoses were made by treating clinicians and assigned according to the Danish modification of the International Classification of Diseases (ICD); 8th revision prior to 1994 (WHO, 1967) and 10th revision from 1994 onwards (WHO, 1992). Self-harm was defined by ICD diagnosis and/or 'self-harm' or 'attempted suicide' being the recorded reason for hospital contact. We examined follow-up time from 15th birthday to the first subsequent registered self-harm episode. For a more detailed description of the self-harm classification used in this investigation, please see Nordentoft et al., 2011.

2.3. Child-parent separation exposure classifications

Our measure of child-parent separation was based on complete recording of all periods in which a child did not live with one or both parent/s. Residential addresses have been recorded in the CRS since 1971, and Danish residents are legally required to notify the authorities

of any change to their permanent address. Child-parent separation was based on cohort members residing or not residing with their legal parent/s, and was measured at birth and at each birthday from 1st to 15th, inclusive. Separation status was defined as: no separation (living with both parents); paternal separation (living with the mother, but not father); maternal separation (living with father, but not mother); maternal and paternal separation (living with neither parent); or missing (unknown), as in an earlier study by Paksarian et al. (2015). Persons separated from both parents at birth and who subsequently lived with at least one parent prior to their 15th birthday, along with individuals with missing child-parent separation status information for at least one year, were excluded; i.e. 1.4% of the initial cohort. Children who resided abroad at one of their birthdays prior to their 15th birthday, who accounted for 1.3% of the cohort studied, were included and were assumed to be living with their parent/s if they also lived abroad in the same country.

We examined child-parent separation between birth and 15th birthday using seven different exposure models, and we compared these against each other to better understand the complex association between child-parent separation and elevated self-harm risk. The classifications we examined were as follows:

- 1) Child-parent separation status at birth
- 2) Child-parent separation status at 15th birthday
- 3) Age at first child-parent separation
- 4) Duration of child-parent separation
- 5) Duration of familial cohesion
- 6) Total number of changes in child-parent separation status
- 7) Array of specific child-parent separation trajectories

A change in separation status was defined as when a cohort member shifted from experiencing one kind of separation status one year to another in the subsequent year, which might occur just once, multiple times, or never. For classification 7, 'Array of specific child-parent separation trajectories', all change sequences were included if the whole trajectory accounted for at least 0.1% of the total population examined.

2.4. Study design and analysis

Persons were followed from their 15th birthday until their first registered self-harm episode, emigration from Denmark, death or the end of the study (31st December 2012), whichever came first. Persons with a registered self-harm episode prior to their 15th birthday were excluded. Incidence rate ratios (IRRs) for self-harm were estimated from Poisson regression models (Laird and Olivier, 1981) along with likelihood ratio-based 95% confidence intervals (CIs) and likelihood ratio tests, using the GENMOD procedure of SAS 9.4. Age and calendar year were treated as time-dependent variables, and all IRRs reported were adjusted for calendar year, age, gender, and interactions between these variables, whilst also accounting for changes in gender and age-specific incidence by calendar year, to produce non-significant score tests for overdispersion (Breslow, 1996). We fitted additional models adjusted for parental socioeconomic status during the year that cohort members reached their 15th birthdays, according to the following measures: 1. Income in annual quintiles; 2. Highest educational level attained (primary school, high school/vocational training, higher education); 3. Employment status (employed, unemployed, outside workforce for other reasons).

The Akaike Information Criterion (AIC) (Akaike, 1974) considers a model's goodness-of-fit in relation to the number of parameters used to fit the model. For the seven different exposure classification models examined, the one with the smallest AIC value was designated as having the optimal fit to the data; i.e. the exposure classification that best describes the association between child-parent separation and elevated self-harm risk. This approach allows for comparison between

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