

# **DANGEROUS DADS? Ecological and longitudinal analyses of paternity leave and risk for child injury**

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**Contributors:** LL was involved in the conception of the study and its design, took part in the interpretation of the results and drafted the manuscript. AM was responsible for the initial design of the longitudinal study,

undertook the data collection, supervised the statistical analyses, and revised the draft paper. ML contributed to study design, designed and completed all statistical analyses, and revised the draft paper. CM conceived the idea for this paper, was involved in study design, and revised the paper, and is guarantor.

## **WHAT THIS PAPER ADDS**

### **What is already known on this subject?**

- In 1974 Sweden became the first country to permit fathers to take paid parental leave, and other countries are currently following suit;
- The evidence of an association between parental supervision and child injury is equivocal, debated and seems conditional to context;
- Whether the association differs depending on which parent is at home has not been studied.

### **What does this study add?**

- Ecological time trends indicate that child injury rates have gone down in Sweden over the last two decades in spite of an stark increase in paternity leave;
- At the individual level, child injury incidence is higher during maternity rather than paternity leave. After controlling for parental socio-demographic attributes for same age children, there is no support for the notion of differential injury risk during paternity compared to maternity leave.

## **Abstract**

**Background:** In 1974 Sweden became the first country to permit fathers to take paid parental leave. Other countries are currently following suit issuing similar laws. While this reform supports the principles of the UN convention of the right for children to be with both parents, and enshrines the ethos of gender equality, there has been little systematic examination of its potential impact on child health. Instead, there is uninformed debate that fathers may expose their children to greater risks of injury than mothers. In this Swedish national study, we therefore assess whether fathers' parental leave can be regarded as a more serious risk factor for child injuries than that of mothers.

**Methods:** Nationwide register-based ecological and longitudinal studies of hospitalization due to injury (and intoxication) in early childhood, involving the Swedish population in 1973-2009 (ecological design), and children born in 1988 and 1989 (n=118,278) (longitudinal design).

**Results:** An increase in fathers' share of parental leave over time was paralleled by a downward trend in child injury rates (age 0-4 years). At the individual level, the crude incidence of child injury (age 0-2 years) was lower during paternity, as compared to maternity leave. This association was, however, explained by parental socio-demographic characteristics (multivariate hazard ratio 0.96, 95% confidence interval 0.74 to 1.2).

**Conclusion:** There is no support for the notion that paternity leave increases the risk of child injury.

## **Introduction**

The right for children to be with both their father and mother is rooted in the 1989 United Nations Convention on the Rights of the Child,<sup>1</sup> which is endorsed by many countries worldwide. However, the variations between countries regarding legislation and policy that

support both parents in their desire to care for their offspring are great.<sup>2</sup> In 1974 Sweden was the first country in the world to permit fathers to take parental leave, based on the assumption that a gender equal division of parental leave is decisive for gender equal opportunities on the labour market.<sup>3,4</sup> Evidence is also emerging regarding the benefits of more fathers being caregivers on both parents' prospects for health,<sup>5-7</sup> and on the children's intellectual and social development,<sup>8,9</sup> as well as mental health.<sup>10 10</sup>

Altering the firm gender traditions around parenthood may, however, imply negative effects as well, such as feeling insecure and experiencing loss of former privileges for both parents.<sup>11</sup> Recently, it has also been claimed that paternity leave represents a threat to child safety in the home, on grounds that fathers do not supervise their offspring in an appropriate manner and expose them to hazards to a greater extent than mothers do.<sup>12</sup>

Whereas there is no empirical support to this statement, theoretical support can be found, at least in two considerations. One is in the notion of differential socialization of men and women that better prepares men for the breadwinning rather than the caring role of parenthood, which may imply increased risk by lack of skill.<sup>13</sup> Another is men's greater propensity to take risks – and get injured – which could also be detrimental to their offspring's safety.<sup>5</sup> In this Swedish national study, we assess whether fathers' parental leave can be regarded as a more serious risk factor for child injuries than that of mothers.

## **Method**

We employed two approaches for our investigation. First, using an ecological design, we contrasted time trends in child injury and paternity leave based on aggregated Swedish

national data. We then performed an individual-based study, set in a register-based cohort on parental leave, child injury and confounding factors (parental socio-demographics).

### ***Ecological study***

Aggregated yearly data on men's share of the total use of parental leave days in Sweden (period 1974-2009) was obtained from the Social Insurance Register (SRI), held by the National Social Insurance Board (details of the Swedish social insurance system are available from <http://www.forsakringskassan.se/sprak/eng>). By means of descriptive plots and linear regression, the time trend of this proportion was compared to the time trend in incidence rates of child hospitalization for injury and intoxication among Swedish residents aged 0-4 years (period 1987-2009). In the latter case, aggregated yearly statistics were obtained from the National Patient Register (NPR), held by the National Board of Health and Welfare, which covers virtually all public in-patient care in Sweden since 1987 and includes information on date of admission, and primary as well as secondary diagnoses coded according to the International Classification of Disease (ICD). Hospitalization due to injury and intoxication was defined as a main discharge diagnosis of ICD S00-T98 (ICD-10) or E800-E999 (ICD-9).

### ***Longitudinal study***

Our longitudinal register-based study encompassed all Swedish residents born in 1988 and 1989, identified as the first common child of a couple (n=118,278) via the Swedish national Multi-generation Register (MGR). The MGR is held by Statistics Sweden and includes family information data on all persons resident in Sweden and born since 1932.<sup>14</sup> The MGR was furthermore used to identify biological parents, their dates and countries of birth. We obtained information on parental leave, child injury and parental socio-demographic characteristics through record linkage with various national registers using the civic identification number

assigned to all Swedish residents.<sup>15</sup> Our final analytical sample was restricted to children with complete information on parental leave and other covariates (detailed below) (n=104,855; 88.7%).

Data on dates and duration of maternity and paternity leave was extracted from the SIR. Cases of child hospitalization for injury (and intoxication) were identified via the NPR, and defined as main discharge diagnoses E800-E999 according to ICD-9. The Longitudinal Integration Database for Health Insurance and Labour Market Studies, held by Statistics Sweden, (<http://www.scb.se>) was used to collect prospectively recorded information on parental educational attainment and occupational class.

Person-time was accrued from birth until children's first hospitalization for any injury, emigration, death or two years of age, whichever occurred first. We considered as time at risk exclusively those periods during which either paternity or maternity leave occurred. First, incidence rates of child injury according to the child's attained age, and whether the mother or father had taken parental leave for that particular period, were calculated. We then investigated the relationship between paternity leave uptake and risk of child injury using Cox proportional hazards regression models, presenting hazard ratios (HR) with 95% confidence intervals (CI) as estimates of associations. The assumption of proportionality was tested using the log-rank test. After estimating crude associations (model 1), we adjusted for potentially confounding factors including paternal and maternal age (15-24, 25-34, 35+ years), educational attainment (completing  $\leq 9$ , 10-12, and  $\geq 12$  years of education), occupational class (unskilled manual workers, skilled manual workers, lower level non-manuals, intermediate non-manuals, higher level non-manuals, self-employed and farmers, higher managers and professionals), and country of birth (Sweden, Nordic country, and other countries) (model 2).

The statistical analysis was performed with SAS version 9.2 (SAS Institute, Cary, NC, USA).

Ethical approval for the longitudinal study was granted by the Stockholm regional ethical review board (No 2008/363-31/5).

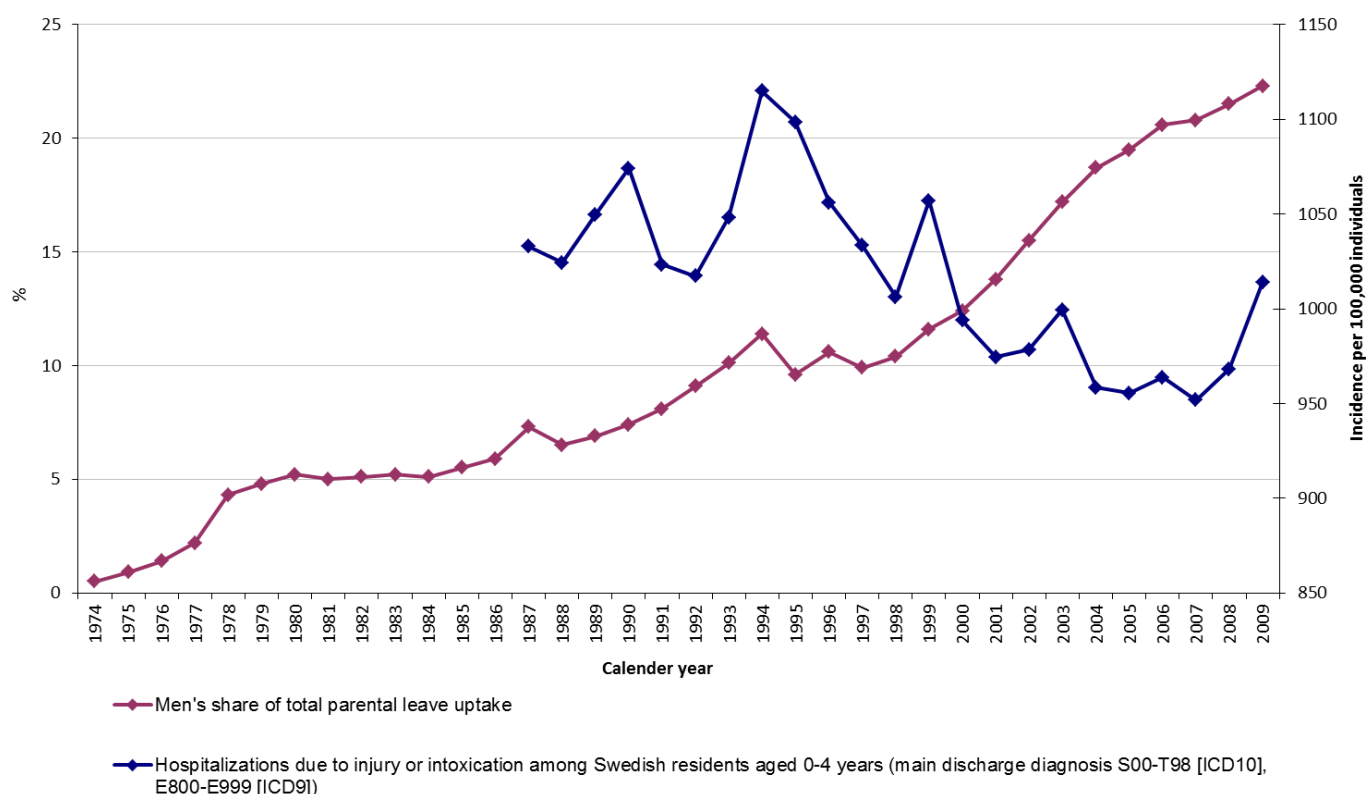
## Results

National time trends are shown in Figure 1. From 1974 through 2009, fathers' uptake of parental leave increased dramatically ( $p$  for trend  $<0.0001$ ), exceeding 20% in 2009 and representing then an over threefold increase compared with corresponding data for 1987. By contrast, for the period 1987-2009, in spite of fluctuations due to the small number of events, there was a clear decrease in child injury hospitalizations among Swedish children aged 0-4 years (average annual decrease of 4.6 cases/100,000 individuals,  $p$  for trend=0.0004).

Table 1 presents parental characteristics of the longitudinal study sample according to fathers' uptake of parental leave. Parents among which fathers ever took parental leave were more highly educated and less often born outside Sweden but of similar age and occupational class than those parents among which fathers did not take parental leave.

**Table 1.** Parental characteristics at birth of the index child in relation to fathers' uptake of parental leave

Parental characteristics	No paternity leave (46.6%)	Any paternity leave (53.4%)
<i>Mean age, y</i>		
Father	32	31
Mother	29	29
<i>Less than 9 years education, %</i>		
Father	27.3	19.0
Mother	24.1	15.6
<i>Unskilled manual worker, %</i>		
Father	27.6	27.5
Mother	40.6	35.0
<i>Born outside Sweden, %</i>		
Father	28.9	9.6
Mother	26.4	10.1



**Figure 1.** Men's share of total parental leave uptake and incidence rate of hospitalizations due to injury or intoxication among children aged 0-4 years, Sweden 1974-2009

During a total of 644 233 person years at risk, 884 children (0.8%) experienced at least one hospitalization due to injury or intoxication during their first two years of life. Figure 2 depicts the crude incidence rates in age groups of children according to their attained age and whether parental leave was taken by the mother or the father. Rates were higher during periods for which mothers took parental leave, except for children aged more than 18 months among whom rates were similar regardless of which parent was on leave.

Cox regression analysis revealed a seemingly decreased risk of child injury during periods of paternity leave compared to those of maternity leave (Table 2). This relationship was, however, attenuated and even nullified after adjustment for the parental socio-demographic characteristics (HR 0.96, 95% CI 0.74 to 1.26)

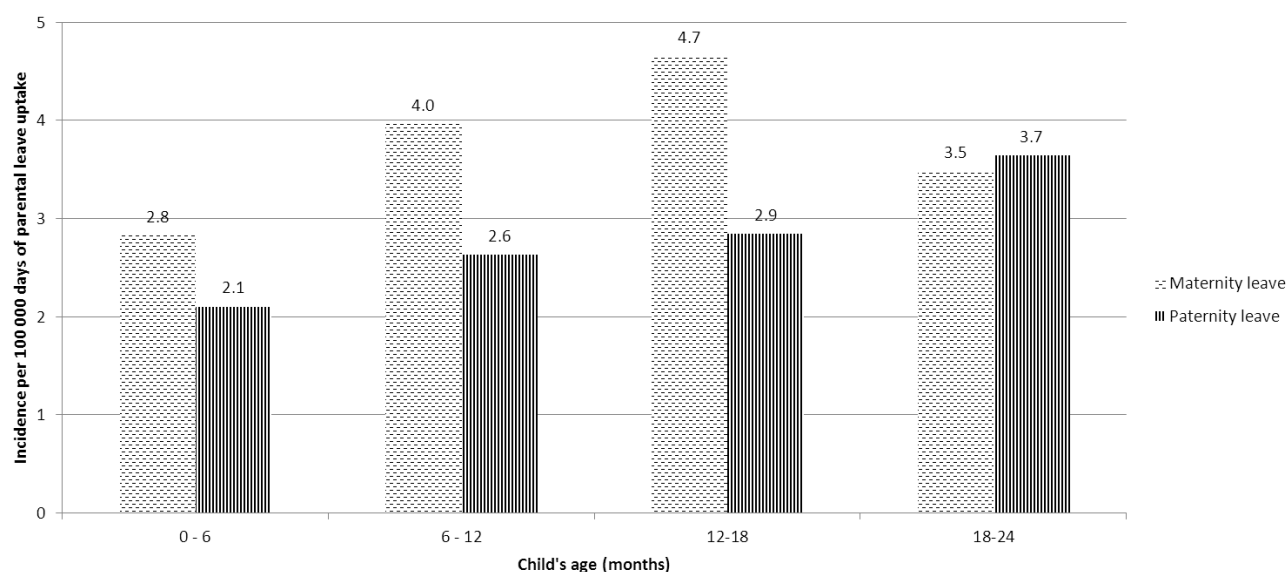


**Table 2.** Parental leave uptake and hazard ratios (with 95% confidence intervals) of hospitalizations due to injury or intoxication among Swedish children aged 0-2 years, born in 1988 and 1989

Parental leave uptake	Number of cases	Number of person-days	Model 1* HR (95% CI)	Model 2 † HR* (95% CI)
Maternal	817	21 144 171	1.00 (reference)	1.00 (reference)
Paternal	67	2 386 438	0.88 (0.68 to 1.14)	0.96 (0.74 to 1.26)

\*Model 1: Hazard ratios (HR) and 95% Confidence Intervals (CI) derived from Cox proportional hazards model with attained age as the underlying time variable.

† Model 2: Model 1 further adjusted for paternal and maternal age, educational attainment, occupational class, and country of birth.



**Figure 2.** Incidence rates of hospitalization due to injury or intoxication among Swedish children aged 0-2 years, born in 1988 and 1989, by parental leave uptake and age

## Discussion

Our study does not support the conjecture that fathers as caregivers expose their offspring to a greater risk of injury than mothers. First, a steady increase in fathers' share of parental leave was not paralleled with noteworthy changes in the downward trend for children injury rates (age 0-4 years). Although this ecological form of evidence is weak for individual-level demonstration, it suggests at least that paternity leave does not rule out, at a country level, the safety measures otherwise promoted and implemented to protect young children from

injury.<sup>16-18</sup> The significance of parental supervision – of any parent – on child injury has been a recurrent theme in the literature<sup>19,20</sup> and currently represents an area of animated debate.<sup>21,22</sup> The evidence at hand is far from convincing and extremely conditional to context.<sup>19,20</sup> Sweden for its part is a country that favours measures of a passive nature, built into the environments where children are and in the products they come into contact with.<sup>23,24</sup> Passive safety is acknowledged as the most effective way to prevent injury,<sup>17,18</sup> and one of the reasons behind the enviable track record of Sweden in child injury prevention.<sup>25</sup>

Second, at the individual level, for same age children, there were no significant differences in injury risks when fathers took parental leave instead of mothers. If anything, crude incidence rates suggest that the younger children (up to 18 months) could be hospitalized for injuries and intoxications to a greater extent when mothers are on leave, but this difference disappears after controlling for parental age, educational attainment, occupational class, and country of birth. This is, to our knowledge, the first study of this kind in the peer-reviewed literature and our results are therefore difficult to relate to other empirical studies. As an additional piece to the complex puzzle relative to the association between parental supervision and childhood injuries<sup>19-22</sup> they add the following: “fathers can do as well as mothers”. Nonetheless, just as many others,<sup>26</sup> our results do not shed light on what kind of care – in quantity and in quality – is appropriate for child safety and development. Further, as we lack individual level measures of supervision, the group of fathers on parental leave, just as in the group of mothers, may include those lacking skills and those taking risks,<sup>5</sup> and eventually those doing well,<sup>13</sup> either because of being protective by nature or by being routinized by experience. Hence, the effect observed may reflect a variety of caring qualities and supervision styles among parents.

The study is based on solid register data that allow us to compare mothers and fathers of same age children, which is a prerequisite for our investigation. Whereas time trends data suffer from changes in reporting systems (and ICD versions), our longitudinal analyses rest on data from a similar time period with good quality as regards both the exposure and outcome. The NPR reached national coverage in 1987, and is, even though a risk of misclassification exists, judged to be reliable.<sup>27</sup> The SRI holds a variety of social insurance data; yet, the potential errors in administrative handling or from corrupted parental claims of reimbursement are unlikely to be differential between mothers and fathers, and hence not a source of bias.

The study could have benefited from additional information on both parents' and children's attributes as sources of confounding. Further, transferring the findings to countries with other safety as well as family policies must be done with caution. However, the fact that Swedish fathers do take paternity leave and care for children to a greater extent than before – and than fathers from other countries – allows for the study of a variety of outcomes associated to this phenomenon, of which child safety. At the European Union level, there is an on-going debate and initiatives are being taken that aim at increasing paternity leave among Member Countries. In light of these reforms, it is important to address anecdotal concerns that children's safety may be endangered when their fathers care for them. Our study gives various indications that this is not likely to be an issue and that, on the contrary, fathers can actually do just as well as mothers in that respect.

### **Acknowledgement**

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## References

1. UN General Assembly. Convention on the rights of the child. Geneva: United Nations; 1989. Treaty Series, vol. 1577, p. 3. Available at: <http://www2.ohchr.org/english/law/pdf/crc.pdf> [accessed 31 May 2011].
2. Department for Business, Enterprise and Regulatory Reform. International review of leave policies and related research 2007. Moss P, Wall K, editors. London (UK): Crown; 2007. Employment relations research series, No. 80. Available at: <http://www.berr.gov.uk/files/file40677.pdf> [accessed 31 May 2011].
3. Swedish Government Official Report (SOU) 2005:73. Reformerad föräldraförsäkring – Kärlek, omvårdnad, trygghet [Reformed parental insurance – Love, care, security]. Ministry of Health and Social Affairs: Stockholm; 2005. Swedish.
4. Ferrarini, T. Parental leave institutions in eighteen post-war welfare states [dissertation]. [Stockholm (Sweden)]: Stockholm University, Swedish Institute for Social Research; 2003. 166 p.
5. Månsdotter A, Lindholm L, Winkvist A. Paternity leave in Sweden: costs, savings and health gains. *Health Policy*. 2007 Jun;82(1):102-115.
6. Barnett RC. Women and multiple roles: myths and reality. *Harv Rev Psychiatry*. 2004 May-June;12(3):158-164.
7. Härenstam A, Aronsson G, Hammarström A. The future of gender inequalities in health. In: Östlin P, Danielsson M, Diderichsen F, Härenstam A, Lindberg G, editors. *Gender inequalities in health: a Swedish perspective*. Boston: Harvard University Press; 2001. p. 269-304.
8. Engle PL. The role of men in families: achieving gender equity and supporting children. *Gend Dev*. 1997 Jun;5(2):31-40.

9. Pruett KD. Father's influence in the development of infant's relationships. *Acta Paediatr Scand Suppl.* 1988;77(344):43-52.
10. Flouri E, Buchanan A. The role of father involvement in children's later mental health. *J Adolesc.* 2003 Feb;26(1):63-78.
11. Backhans M, Lundberg M, Månsdotter A. Does increased gender equality lead to convergence of health outcomes? A study of Swedish municipalities. *Social Science and Medicine* 2007, 64(9): 1892-1903.
12. Sternberg E. House dads are dangerous for children. [Hemmapapporna är livsfarliga för barnen.] Debate article. *Expressen*, March 25, 2010. Available at: <http://www.expressen.se/debatt/1.1930217/hemmapapporna-ar-> [accessed 31 May 2011]. (in Swedish)
13. Okin Moller S. *Justice, gender and the family.* New York: Basic Books; 1989.
14. Ekblom A. The Swedish Multi-generation Register. *Methods Mol Biol* 2011;675: 215-20.
15. Ludvigsson JF, Otterblad-Olausson P, Pettersson BU, Ekblom A. The Swedish personal identity number: possibilities and pitfalls in healthcare and medical research. *Eur J Epidemiol.* 2009;24(11):659-67.
16. Peden M, Oyegbite K, Ozanne-Smith J, Hyder AA, Branche C, Rahman AKMF, Rivara F, Bartolomeos K, editors. *World report on child injury prevention.* Geneva (Switzerland): World Health Organization; 2008.
17. Harvey A, Towner E, Peden M, Soori H, Bartolomeos K. Injury prevention and the attainment of child and adolescent health. *Bull World Health Organ.* 2009 May;87(5):390-4.
18. Sethi D, Towner E, Vincenten J, Segui-Gomez M, Racioppi F. *European Report on Child Injury Prevention.* Copenhagen (Denmark): World Health Organization; 2008.

19. Saluja G, Brenner R, Morrongiello BA, Haynie D, Rivera M, Cheng TL. The role of supervision in child injury risk: definition, conceptual and measurement issues. *Inj Control Saf Promot.* 2004 Mar;11(1):17-22.
20. Morrongiello B A. Caregiver supervision and child-injury risk: I. Issues in defining and measuring supervision; II. Findings and directions for future research. *J Pediatr Psychol.* 2005 Oct-Nov;30(7):536-52.
21. Schwebel DC, Kendrick D. Caregiver supervision and injury risk for young children: time to re-examine the issue. *Inj Prev.* 2009 Aug;15(4):217-19.
22. Nakahara S, Ichikawa M. Care giver supervision and child injuries: consideration of different contexts when translating knowledge into practice. *Inj Prev.* 2010 Oct; 16(5):293-5.
23. Berfenstam R. Prevention of childhood accidents in Sweden. With special attention to the work of the Joint Committee for Prevention of Accidents. *Acta Paediatr Scand Suppl.* 1979;68(275):88-95.
24. Berfenstam R. Sweden's pioneering child accident programme: 40 years later. *Inj Prev.* 1995 Jun;1(2):68-9.
25. Laflamme L, Hasselberg M, Burrows S. The social inequalities in health risks related to unintentional injuries among children. In: *Environment and health risks: a review of the influence and effects of social inequalities.* Copenhagen: World Health Organization Regional Office for Europe; 2010. pp. 76-104.
26. World Health Organization. *Fatherhood and health outcomes in Europe.* Regional office for Europe: Copenhagen; 2007. p. 16. Available at: <http://www.euro.who.int/document/e91129.pdf> [accessed 31 May 2011].
27. Rosén M. National health data registers: a Nordic heritage to public health. *Scand J Public Health* 2002;30(2):81-5.