Kin availability and the risk of-, or the prognosis after a hip fracture, or both? A register based cohort study of elderly Swedes?

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SHORT ABSTRACT

Background: Kin availability, especially a spouse and/or adult children, has shown to be beneficial for health and mortality in old age. There is need for more studies about at which stage during the disease process the support matter. Hip fractures are among the most common and debilitating injuries in old age. It is reasonable to assume that individuals attaining a hip fracture could benefit from support provided by children, given the high level of functional limitations that follows a hip fracture. Spouses or children can also be of importance for the risk of attaining a hip fracture due to either biological factors related to bone density, but also through osteoporosis treatment or adjustments in the home preventing the risk of falling.

Methods: This study is based on Swedish register data of the total population, with information about living conditions, civil status, children, education and hip fractures and the prognosis. We compare the incidence rates of hip fractures as well as the prognosis after the fracture among individuals with and without spouse and children.

Results: Preliminary findings show that men and women who are married and have children experience lower mortality after their hip fracture. For regained walking ability, having children seem to be associated with increased odds whereas marital status did not improve the odds, rather the opposite. Finally, being married were positively associated with the odds of having returned to living at own home 4 months after the fracture both among men and women.

EXTENDED ABSTRACT

Background

Previous research has demonstrated that kin availability, especially a spouse and/or adult children, is beneficial for health and mortality in old age (1). The reasons behind these findings are most likely multi-faceted. The selection of healthier individuals into marriage and parenthood (2) may account for part of the observed associations, while informational, emotional, and social support accounts for another part. Close kin may be Relationships with offspring and spouses may also counteract loneliness and social isolation which are known risk factors for poor health and mortality (3).

There is need for more studies examining which type of support may be beneficial for the health of older men and women, but also at which stages during the process of health deterioration support from children becomes important. This study focuses on the latter question and examines whether the presence of children is more closely related to the risk of developing a disease or to survival chances once a disease has occurred.

In a previous publication we have already shown that having children seems to matter more for the survival of older individuals once hospitalized than for the initial risk of becoming hospitalized (4). In this study we focus on hip fractures which are among the most common and debilitating injuries in old age; the lifetime risk of sustaining a hip fracture is more than 20% for Swedish women and around 12% for Swedish men (5). Almost all affected individuals are hospitalized, receive surgery, are temporarily immobilized, and at high risk of complications. More than one out of five patients die within one year of sustaining a hip fracture (5). Among survivors, increasing disabilities (6), a deterioration of quality of life (7), and a higher risk of institutionalization (8) are common consequences.

It is reasonable to assume that individuals with hip fracture could benefit from social relationships and support provided by children or spouses given the high level of functional limitations that follows a hip fracture. So far, the relevance of social support for hip fracture recovery and survival has not been studied extensively, but some studies suggest that social contacts are associated with lower mortality and a better recovery of functional status among hip fracture patients (9).

At the same time there is strong evidence for a beneficial effect of high parity on bone strength and hip fracture risk among women (10), which could explain differences in the risk of attaining a fracture between mothers and women without children. Whether this effect translates to a longer survival after sustaining a fracture has not been examined. Almost all studies investigating the relationship between parity and fracture risk are restricted to women and some, but not all (11) suggest the association may be explained by a positive effect of lactation and breastfeeding rather than the number of children per se. Interestingly, however, a study from Denmark found that the lower risk of hip fractures among parents is not limited to women (12).

In addition to the biological protective effect of parity on hip fracture risk, it can be hypothesized that children affect the risk of attaining a hip fracture by supporting their old parents with getting access to osteoporosis medication and adapting their homes to prevent falling. Comparing the effect of children on the risk of – and prognosis after – hip fracture between men and women could thus provide valuable insights into mechanisms behind the survival advantage of parents.

With access to a unique database containing all hip fractures in Sweden including information about patients' living conditions, civil status, and number of children, we aim to investigate the

associations of having close kin with the incidence of hip fracture as well as prognosis after hip fracture. More specifically, we will analyze how the presence of a spouse and children is related to the risk of sustaining a first hip fracture, and the prognosis after hip fracture measured by returning to independent living, walking ability and mortality.

Material and Methods

The study is based on a linkage of several population registers covering the entire Swedish population. All men and women over the age of 65 living in Sweden at any point between January 2013 and June 2017 were identified in the Register of the total population. Family members were connected using the Multi-Generation Register. Information on marital status, education, and income was retrieved from the Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA) and the Population and Housing Censuses. Death dates were retrieved from the Cause of Death Register.

Incident cases of hip fractures were identified in the National Patient Register using the International Classification of Diseases Version 10 (ICD-10) codes S720-722. Outcomes after hip fracture were examined among patients included in the Swedish hip fracture register "Rikshöft" (SHR). The SHR includes approximately 90% of all hip fractures in Sweden and contains clinical information about patients' health status, fracture type, living situation, and outcomes at a follow-up assessment four months after the fracture.

Age-specific incidence rates, and prognostic outcomes will be estimated separately for married and unmarried individuals with and without children. Prognosis after hip fracture is defined by three different variables; survival after hip fracture, the probability of returning to independent living, and regaining pre-fracture walking ability at the follow-up assessment 4 months after the fracture. We will estimate multivariable regression models in which marital status, and educational level of patients, spouses and children, and patients' health status are considered.

Preliminary Findings

Our preliminary results show that men and women who are married and have children experience lower mortality after their hip fracture. The associations persist after adjustment for several potential confounding factors, except having children and mortality after hip fracture among women.

For the outcome regained walking ability, having children seem to be associated with increased odds whereas marital status did not improve the odds of regaining walking ability, rather the opposite. Finally, the odds of having returned to living at own home 4 months after the fracture were higher among married compared to unmarried individuals. Having children were only statistically significantly related to returning to own home among men. Future analyses will include incidence, number of children, possible interaction effects between presence of spouse and children and children's socioeconomic resources.

Table 1: Association between presence of close kin and survival after first hip fracture (n=37,304)

		Model 1 HR [95%-CI]	Model 2 HR [95%-CI]	Model 3 HR [95%-CI]	Model 4 HR [95%-CI]	Model 5 HR [95%-CI]
Women	Married	0.87		0.88	0.90	0.92
(n=25,233)	*Reference: Unmarried*	[0.82-0.92]		[0.83-0.93]	[0.84-0.95]	[0.86-0.97]
	At least 1 child		0.89	0.89	0.88	0.88
	Reference: No children		[0.83-0.94]	[0.84-0.95]	[0.83-0.93]	[0.82-0.93]
Men	Married	0.87		0.87	0.90	0.88
(n=12,071)	*Reference: Unmarried*	[0.82-0.91]		[0.82-0.92]	[0.85-0.95]	[0.83-0.94]
	At least 1 child		0.93	0.96	0.99	0.97
	Reference: No children		[0.86-0.99]	[0.89-1.03]	[0.92-1.06]	[0.90-1.04]

HR: Hazard Ratio; CI: Confidence Interval; Models 1-3 adjusted for age; Model 4 additionally adjusted for patients' educational level and income quintile; Model 5 additionally adjusted for fracture type, health status measured through ASA-score, and walking ability before the fracture

Table 2: Presence of close kin and odds of regaining pre-fracture walking ability at 4 months after fracture among patients with completed 4-month follow-up assessment (n=21,680)

		Model 1 HR [95%-CI]	Model 2 HR [95%-CI]	Model 3 HR [95%-CI]	Model 4 HR [95%-CI]	Model 5 HR [95%-CI]
Women	Married	0.85		0.84	0.81	0.80
(n=15,109)	*Reference: Unmarried*	[0.79-0.91]		[0.78-0.91]	[0.75-0.88]	[0.73-0.87]
	At least 1 child		1.16	1.18	1.20	1.22
	Reference: No children		[1.05-1.27]	[1.07-1.30]	[1.09-1.32]	[1.10-1.35]
Men	Married	1.00		0.95	0.93	0.94
(n=6,571)	*Reference: Unmarried*	[0.90-1.11]		[0.85-1.05]	[0.84-1.04]	[0.84-1.04]
	At least 1 child		1.33	1.35	1.36	1.37
	Reference: No children		[1.17-1.52]	[1.18-1.55]	[1.18-1.56]	[1.19-1.58]

HR: Hazard Ratio; CI: Confidence Interval; Models 1-3 adjusted for age; Model 4 additionally adjusted for patients' educational level and income quintile; Model 5 additionally adjusted for fracture type, health status measured through ASA-score, and walking ability before the fracture

Table 3: Presence of close kin and odds of living in own home at 4 months after fracture among patients with completed 4-month follow-up assessment (n=21,680)

		Model 1 HR [95%-CI]	Model 2 HR [95%-CI]	Model 3 HR [95%-CI]	Model 4 HR [95%-CI]	Model 5 HR [95%-CI]
Women	Married	1.36		1.35	1.21	1.24
(n=15,109)	*Reference: Unmarried*	[1.21-1.53]		[1.20-1.52]	[1.07-1.37]	[1.09-1.42]
	At least 1 child		1.12	1.10	1.14	1.15
	Reference: No children		[0.99-1.28]	[0.97-1.25]	[1.00-1.30]	[1.00-1.31]
Men	Married	1.62		1.60	1.51	1.63
(n=6,571)	*Reference: Unmarried*	[1.41-1.86]		[1.38-1.84]	[1.30-1.75]	[1.40-1.89]
	At least 1 child		1.24	1.09	1.06	1.06
	Reference: No children		[1.04-1.48]	[0.91-1.31]	[0.89-1.28]	[0.88-1.28]

HR: Hazard Ratio; CI: Confidence Interval; Models 1-3 adjusted for age; Model 4 additionally adjusted for patients' educational level and income quintile; Model 5 additionally adjusted for fracture type, health status measured through ASA-score, and walking ability before the fracture

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