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# Health Economics and Decision Science (HEDS)

## Discussion Paper

**Childcare, breadwinning and mortality in the Swedish parental cohort of 1988/89**

Anna Månsdotter[1*], Aki Tsuchiya[2*], Mona Backhans[1], Johan Hallqvist[3], Michael Lundberg[1], Andreas Lundin[1], Lars Lindholm[4]

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[1]School of Health and Related Research (ScHARR), University of Sheffield, Regent Court, 30 Regent Street, Sheffield S1 4DA, UK

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Anna Månsdotter[1*], Aki Tsuchiya[2*], Mona Backhans[1], Johan Hallqvist[3], Michael Lundberg[1], Andreas Lundin[1], Lars Lindholm[4]

[1] Department of Public Health Sciences, Karolinska Institutet, Sweden

[2] School of Health and Related Research, and Department of Economics, University of Sheffield, United Kingdom

[3] Department of Public Health and Caring Sciences, Preventive Medicine, Uppsala University, Sweden

[4] Department of Public Health and Clinical Medicine, Umeå University, Sweden

* Corresponding author: a.tsuchiya@sheffield.ac.uk

**Sources:** Financial support was received from the Swedish Council for Working Life and Social Research (Dnr 2007-0091), and the Swedish Research Council (Dnr 2007- 2804).

**Keywords:** parenthood, gender equality, mortality

**Word count**: 7,100

**Abstract**

The division of parenthood into male breadwinning and female caring is a key component of the gender system. It could also contribute to the gender gap in longevity. The overall objective of this study was to examine the association between gender equality and mortality based on a population of all Swedish men and women who had their first child together in 1988-89 (N=118 278 couples). Gender equality was measured by the parents´ division of income and occupational position (public indicators), and parental leave and temporary childcare (domestic indicators) during 1988-91 into categories of traditionally unequal, equal, and untraditionally unequal couples. The outcome was all-cause mortality during 1992-2008. It was found that fathers (compared to being equal) run a lower/higher risk when traditional and untraditional, respectively, regarding income, a higher/lower risk when traditional and untraditional, respectively, regarding occupational position, and a higher risk when traditional regarding temporary childcare. Further, mothers (compared to being equal) run an increased risk of mortality when untraditional regarding parental leave, and possibly, decreased risks when traditional in occupational position and in temporary childcare. The study mostly harmonises with an earlier study on gender equality and mortality among Swedish parents of 1978. Two important exceptions are: the more recent fathers benefit from gender equality in occupational position; the more mothers are not harmed from gender equality in income. Only future research can confirm or reject the overall hypothesis of decreased gender inequality in longevity from increased gender equality in parenthood.

## Introduction

### Theoretical background

The division of parenthood into male breadwinning and female caring is still a key component of the gender system (Harding, 1986; Okin, 1989; Connell, 2002). An increasingly posited theory is that increased gender equality in terms of mothers taking on more support for the family and fathers caring more for the children and household could affect the patterns of mortality for both sexes (Waldron, 1976; Annandale & Hunt, 2000; Hemström, 1999; Månsdotter et al., 2006). In order to hypothesise on trends, there are at least three principal clusters of theories that need to be considered.

First, theories of how privileges translate between spheres of life hold that groups with socioeconomic advantages enjoy better health. The evidence for this regarding structures such as class and ethnicity is prominent, but it does not support the overall picture of male versus female excess of premature death (Wamala & Lynch, 2002; UNDP, 2007; Wilkinson & Pickett, 2008; CSDH, 2008). Hence, the negative impact on mortality from being connected to caring and thus unprivileged in society is compensated by other (beneficial) mechanisms for women, while the positive impact from being connected to breadwinning and thus privileged in society is compensated by other (detrimental) mechanisms for men. Generally, however, this theoretical context suggests that men would lose and women would gain longevity from gender equality.

Second, theories of masculinity and femininity hold that health-related behaviours are at the core of constructing oneself as a man or woman (Connell, 1995). For example, men pursue risky lifestyles and do hazardous work to demonstrate their masculinity and power, while women may use caring practices to demonstrate their femininity and inferiority (Courtenay, 2000). This cluster acknowledges the risk of ill-health, sickness, and death associated with departing from the cultural prescription of the proper man and woman (Helgesson, 1995; Connell, 1995; Messerschmidt, 1993; Månsdotter et al., 2009). Nevertheless, men who take on the caring role are likely to develop more healthy (female) behaviours since taking risks has an adverse effect on children's health and security (Waldron, 1976; Danielsson, 2000). Correspondingly, women who become career- versus childcare oriented may obtain sufficient resources and freedom to develop more risky (male) behaviours. In other words, this

theoretical context indicates mainly that men would gain and women would lose longevity from gender equality.

Third, theories of multiple roles hold that lifetime health is dependent on the number of roles individuals take on (Biddle, 1986). On the one hand, many roles imply disadvantages due to conflict and pressure according to the stress hypothesis (Goode, 1960). On the other hand, many roles imply advantages due to the opportunity to compensate positive circumstances in one area of life with negative circumstances in other areas according to the expansion hypothesis (Thoits, 1983). Before making any assumption regarding gender equality and mortality, one must add 1) the general conclusion that multiple roles benefit health and longevity as long as the overall stress is not extreme (Barnett, 2004; Härenstam et al., 2001), and 2) the general trend that women enter the public sphere of earning before men enter the domestic sphere of caring (Backhans et al., 2007). Hence, this theoretical context indicates at least three main steps regarding gender equality and longevity at the population level: first, women gain (through expansion); second, women lose (through stress); and third, women and men gain simultaneously (through alleviated stress and expansion, respectively).

An overall belief regarding gender equality and mortality comes from the "hypothesis of convergence" (Backhans et al., 2007). This holds that a society of similarity between women and men in every aspect of life (behaviours, work, resources, powers, norms, etc.) would be one of no or reduced sex differences in health-related aspects such as anxiety and worry, health-related quality of life, risky lifestyles and life expectancy. That is, even though the process towards gender equality is likely to involve contradictory trends, the ultimate outcome should be a decreased gender gap in lifetime health (Annandale & Hunt, 2000; Månsdotter et al., 2006). The hypothesis of convergence, hence, implies that men would gain and women would lose longevity in a state of fulfilled gender equality, both in parenthood and in other aspects of life.

However, absolute equality between women and men is not the sole and evident endpoint; a mother can go beyond her partner in aspects of public life, a father can go beyond his partner in aspects of domestic life, and parents may entirely swap positions regarding breadwinning and caring. According to the convergence hypothesis, men would continue to gain and women continue to lose longevity in states beyond gender equality (hence, here rather a "hypothesis of divergence"). Ultimately, the untraditional form of gender inequality could result in a

gender gap in longevity favouring men, if not ruled out by a biological advantage of women (Wingard, 1982; Verbrugge, 1989).

Empirical research on the health consequences of gender equality regarding the breadwinning and caring roles of parenthood is limited. An exception is a study of all Swedish parents who had their first child together in 1978, which found that women acting equally in the public sphere ran higher risks of sickness absence and death compared to women acting traditionally (Månsdotter et al.; 2006). It was also indicated that equal men in the public sphere ran lower health risks than traditional men, and that both sexes ran lower health risks when being equal compared to traditional in the private sphere. Based on the same cohort it has also been shown that men decreased and women increased the long-term risk of alcohol-caused mortality when being gender equal compared to acting according to gender stereotypes during early parenthood (Månsdotter et al., 2008).

### Objectives and hypothesis

The overall objective in the present study was to examine the association between gender equality in public and domestic spheres (1988-1991) and all-cause mortality (1992-2008) among Swedish parents who had a child in the late 1980s. Specifically, our aim was to: 1) study a potential cohort effect regarding the association between gender equality and mortality compared to parents in the late 1970s , 2) refine the associations by further consideration of social confounding and health-related selection, and 3) examine potential effect modification on the association between one aspect of gender equality and mortality from other gender equality aspects. Our main hypothesis was convergence, meaning that: a) traditional fathers have a higher risk and untraditional fathers a lower risk of mortality than equal fathers, b) traditional mothers have a lower risk and untraditional mothers a higher risk of mortality than equal mothers.

## Methods

### Population

The population consisted of all mothers and fathers in Sweden who had their first child together in 1988 and 1989 (N=118 278 parental couples). It was generated from the

Multigenerational Register (Statistics Sweden) and linked to various national registers by a civic identification number which all Swedish residents have.

Exposure to gender (parental) equality

The basis of the measurement of the degree of gender equality was that both public and domestic life should be examined (Okin, 1989; Kiss, 1998; Ministry of Health and Social Affairs, 2005). We choose to use income and occupational position as indicators in the public sphere, and parental leave and temporary childcare as indicators in the domestic sphere.

Data on income consisted of taxable incomes (Swedish krona, "SEK") in 1990-1991 from the Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA, Statistics Sweden); the inclusion criterion being that both parents had a registered income above 0 SEK. Data on occupational position were obtained from the Swedish Population and Housing Census of 1990 (Statistics Sweden) and ranked on 7 levels: unskilled manual workers, lower level non-manual workers, skilled manual workers, higher level non-manual workers, intermediate non-manual workers, self-employed and farmers, and higher managers and professionals; the inclusion criterion being that data were available for both parents. Data on parental leave (i.e. ordinary childcare during infancy) came from the Social Insurance Register (National Social Insurance Board) and consisted of the number of full-time compensated parental leave days in 1988-1990. During these years, the maximum number of compensated parental leave days per child was 360 (January 1988-June 1989) and then 450 (from July 1989), of which 270/360 days were compensated at 90% of salary up to a maximum annual amount of 210 000 SEK, and 90 days at a level of 60 SEK; the inclusion criterion being that at least one parent had received the compensation. Data on temporary childcare (i.e. mainly care due to sickness of the child) were obtained from the Social Insurance Register (National Social Insurance Board), and consists of full-time days with income-related benefit in 1990-1991; the inclusion criterion was that at least one parent had received the benefit.

The reason for the different periods of gender equality exposure is that the major part of parental leave is taken before the child is 18 months old (hence 1988-1990), while the division of income, occupational position, and temporary childcare are most relevant when both parents can return to working life (hence 1990-1991).

The data were transformed to ratios between the parents and categorised so that: equality was deemed to be fulfilled when both parents each had at least 40% of the total for each indicator, moderate inequality when one parent had more than 60% but less than 80%, and pronounced inequality when one parent had 80% or more (Månsdotter et al., 2006). This resulted in five parental categories of (in)equality: pronounced traditional and moderately traditional (father dominant in public, mother dominant in private), equal (neither parent dominant), moderately untraditional and pronounced untraditional (mother dominant in public, father dominant in private). The analyses were carried out separately for fathers and mothers, and in the main analyses, separately for each gender equality indicator, which implied four male and four female "sub-samples". Hence, each couple was categorised four times (preconditioned data available) and could, for example, be found equal in income but moderately traditional in parental leave.

### Outcome of mortality

The outcome consists of all-cause mortality during 1992-2008 using data from the National Cause of Death Register (National Board of Health and Welfare).

### Confounders

The confounders considered, i.e. factors known to affect mortality and to possibly associate with gender equality, were age (continuous), income 1990-91 (continuous), education 1990 (6 levels), occupational position (7 levels), work-related income 1987 (continuous), born outside Sweden (dichotomous), cohabiting as married or not 1990 (dichotomous), children before 1988 (dichotomous), other children 1988-1991 (dichotomous), and partner's education 1990 (6 levels) (various national registers, Statistics Sweden). Further, potential health-related selection into parental equality/inequality was considered by overweight (dichotomous, BMI $\geq$25) as an indicator of unhealthy lifestyle (males at conscription, National Service Administration; females at first ante-natal clinic visit, National Board of Health and Welfare), inpatient care 1986-87 (dichotomous, $\geq$1 day), and sickness absence 1986-87 (dichotomous, 75$^{th}$ percentile for men and women, respectively).

### Statistical modelling

The statistical method used was logistic regression analysis (SPSS, version 17), with odds ratio (OR) as estimates of relative risk (RR), and 95% confidence intervals (CI) representing

statistical significance. The reference group was equal fathers (male analysis) and mothers (female analysis) and hence, the results reported the relative risk of mortality in the four inequality categories compared to the equal category.

The initial step, after estimating crude results, was to repeat the final model used in the study among parents in 1978 (Månsdotter et al., 2006) to examine a potential cohort effect. The two parental cohorts were selected using the same criterion, but differed in length of follow-up (1978: 21 years, 1988/89: 17 years), and in number of confounding and selection variables (fewer in the former compared to the latter cohort). Hence, the first model included controls for age and taxable income, and level of the gender equality indicator under study. The latter adjustment was motivated by the aim of examining the parents´ relative position. Further, a set of stratified analyses had indicated that the level at which parents positioned them as equal/unequal did not modify the association between gender equality and mortality.

There then followed several steps aimed at making the association between gender equality and mortality less tainted by social and health-related bias. The second model added a restriction of the study population by requiring that the child was alive throughout the period of exposure, and controls for a wider socioeconomic position in terms of educational level, occupational position, being born outside Sweden and work-related income before parenthood. The third model added controls regarding family situation in terms of cohabiting (married or not), having earlier/later children and partner's socioeconomic status indicated by his/her educational level. The fourth model added controls for health-related selection indicated by overweight, inpatient care or sickness absence before parenthood. In the fifth model, we re-ran the fourth model based on a study population restricted to parents categorised as equal/unequal in all indicators of gender equality (n=66,786). This model was also used to examine whether parents who were pronounced and moderately traditional ("entirely traditional"), and pronounced and moderately untraditional ("entirely untraditional") in all indicators had a higher or lower risk of mortality than parents who were equal in all indicators ("entirely equal").

The final step was to examine potential effect modification on the association between gender equality in one indicator and mortality, from gender equality in the three other indicators. These regression analyses were also performed by the fifth model, although restricted to being traditional (pronounced and moderately) versus equal (reference) since these categories contain the majority of parents.

The study was approved from an ethical point of view by the Karolinska Institutet Research Ethics Committee in 2008 (No: 2008/363-31/5).

## Results

As shown in Table 1, the size of the four "sub-samples", the proportions of parental couples by category, and the patterns of deaths and confounders are greatly dependent on the gender equality indicator. For instance, equal couples represent 35% of those categorised in income, 58.8% of those categorised in occupational position, 2.4% of those categorised in parental leave, and 14% of those categorised in temporary childcare. The variety is further confirmed by lack of correlation between the categorisations of gender equality using the Spearman rho coefficient ranking test. The highest correlations (based on the restricted population in the fifth model) were found between income and occupational position (0.11, $p<0.000$), and between parental leave and temporary childcare (0.13, $p<0.000$). Generally, the proportions of pronounced traditional parents decreased while the proportions of equal parents increased comparing the cohort of 1978 with the cohort of 1988/89. For all indicators except temporary childcare, there was also an increase of untraditional parents, although for occupational position, there were no longer any pronounced (traditionally or untraditionally) unequal parents.

**(Table 1 about here)**

Model I, which aimed at comparing the studied parental cohort with the cohort of 1978, reports for fathers that: as far as income is concerned, being traditional and untraditional involves decreased and increased risks respectively; as far as occupational position is concerned, being traditional and untraditional involves increased and decreased risks respectively; and as far as temporary childcare is concerned, being traditional involves an increased risk of mortality compared to the equal counterparts (Table 2). The same model reports, for mothers, that: as far as income is concerned, being untraditional involves an increased risk of mortality compared to being equal (Table 3). For fathers, the differences between the two cohorts, based on confidence intervals not overlapping, can be found regarding income in the pronounced untraditional category (1978: OR 0.98, 1988/89: OR

1.95), and regarding occupational position in the moderately traditional (1978: OR 1.12, 1988/89: OR 1.50) and moderately untraditional (1978: OR 1.04, 1988/89: 0.69) categories. The corresponding difference for mothers regards income in the pronounced traditional category (1978: OR 0.63, 1988/89: OR 1.13).

A general finding in the refined analyses is that the controls for wider socioeconomic position (Model II), family situation (Model III), health-related selection (Model IV) and the restriction of the population to those categorised in all gender equality indicators did not greatly alter the association between gender equality and mortality. The final model reports for fathers (Table 2) that: by income, there was a 16% decreased risk among moderately traditional, a 44% increased risk among moderately untraditional, and slightly more than double the risk (2.13) among pronounced untraditional; by occupational position, there was a 27% increased risk among moderately traditional and a 20% decreased risk among moderately untraditional; and by temporary childcare, there was a 24% increased risk among pronounced traditional. For mothers (Table 3), the only statistically significant finding was the odds ratio of 2.65 by parental leave among moderately untraditional. There were also minor indications of a decreased risk by occupational position among moderately traditional (10%, CI: 0.71-1.12), and decreased and increased risks by temporary childcare among pronounced traditional (18%, CI: 0.64-1.06) and untraditional (23%, CI: 0.92-1.65).

The number of "entirely traditional" was found to be 6 312 couples (128 male, 48 female deaths), "entirely equal" 178 couples (2 male, 1 female deaths), and "entirely untraditional" zero couples. This resulted in odds ratios (not shown in table) among "entirely traditional" versus "entirely equal" of 1.48 (CI: 0.21-10.48) regarding men, and of 0.14 (CI: 0.02-1.23) regarding women.

**(Table 2 about here)**

**(Table 3 about here)**

The analyses of being traditional and the risk of mortality by strata of being equal or traditional in the other indicators could not prove any statistically significant effect modification (Table 4). Yet there are some noteworthy indications. Traditional fathers in parental leave (fewer days than the mother) tend to have an OR of 0.71 if they are equal in income, but 1.38 if they are traditional in income. Further, traditional fathers in temporary childcare (fewer days than the mother) tend to have an OR of 4.57 when combined with

equality in parental leave, but 1.06 when combined with tradition in parental leave. Traditional mothers in income (less earning than the father) tend to have an OR of 1.06 if they are equal in occupational position, but 0.70 if they are traditional in occupational position. Finally, traditional mothers in parental leave (more days than the father) tend to have an OR of 2.96 when combined with equality in income, but 0.81 when combined with tradition in income.

**(Table 4 about here)**

## Discussion

### Main findings

This study has reported associations between aspects of gender equality (1988-91) and mortality (1992-2008) among parents who had their first child together during 1988-1989, adjusted for socioeconomic position, family situation, and health selection. Theoretically, it acknowledges a number of mediating factors from exposure to outcome such as changes in health-related behaviours, paid/unpaid work, keeping/losing partners, stress levels and power relations, although this was not empirically examined.

The main findings for fathers were a lower risk of mortality when being traditional and a higher risk when being untraditional in income; a higher risk when being traditional and a lower risk when being untraditional in occupational position; and a higher risk when being traditional in temporary childcare (compared to their equal counterparts). For mothers, the main finding was a higher risk of mortality when being untraditional versus equal in parental leave. There were also indications (not statistically significant) of lower risks for mothers when being traditional in occupational position and temporary childcare, and a higher risk when being untraditional in temporary childcare.

Our main hypothesis of convergence was hence supported for fathers regarding occupational position (traditional +risk, untraditional –risk) and temporary childcare (traditional +risk), and for mothers regarding parental leave (untraditional +risk), occupational position (traditional –risk) and temporary childcare (traditional –risk, untraditional +risk). Yet, there were indications that did not support the hypothesis of convergence, and the male findings

regarding income contradicts this hypothesis in the traditional (–risk) as well as untraditional (+risk) category. Therefore, alternative interpretations must be discussed.

### Comparing the cohorts of 1978 and 1988/89

The overall conclusion when comparing the parental cohorts of 1978 and 1988/89 is that the associations between gender equality and mortality are quite consistent. That is, the time passed did not significantly alter the risk of death following the decision to position oneself as equal or unequal during early parenthood. This could be interpreted by the fact that the late 1970s to late 1980s in Sweden were not years of radical change in gender equality. However, there are some important exceptions. Mothers in the 1988/89 cohort no longer gain longevity from being traditional versus equal in income. This may be caused by a more accepting attitude towards female careers (from themselves, their partner, or the surrounding environment, Strandh & Nordenmark, 2006) and by the shift from the traditional categories to the equal category (equal women becoming more prevalent, and less selected in terms of pioneering, Backhans et al., 2009). Further, fathers in the 1988/89 cohort (not in the 1978 cohort) lost longevity from being untraditional in income, and lost/gained longevity from being traditional and untraditional, respectively, in occupational position. This indicates that managing deviations from the masculinity ideal of dominance in breadwinning may be simultaneously worsened in one aspect (earning) and eased in another aspect (position at work) over time (Connell, 1995; Messerschmidt, 1993).

### Combining public and domestic spheres

The analyses of being simultaneously equal or traditional in other gender equality indicators proved no effect modification, i.e. impact from role exposure on mortality. This was partly caused by a lack of statistical power (rare deaths and few equal couples particularly in parental leave), but the tendencies may be used for theoretical speculation. The indication that traditional fathers in parental leave run a lower risk when equal and a higher risk when traditional in income suggests beneficial expansion from multiple roles (Thoits, 1993). Correspondingly, the indication that traditional mothers in parental leave run a higher risk if equal and a lower risk if traditional in income suggests damaging stress from multiple roles (Goode, 1960). Hence, the health consequences from multiple roles seem to be dependent on gender in the late 20th century in Sweden (Härenstam et al., 2000).

## Distinguishing between ideology and practice?

In this parental cohort, gender equality in occupational position was more achieved than gender equality in income (public indicators), and gender equality in temporary childcare more achieved than gender equality in parental leave (domestic indicators). This supports the common wisdom that gender equality does not progress simultaneously in all aspects of life. It could also indicate a gap between parents´ gender ideology (attitudes regarding the proper division of roles and duties) and gender practice (how roles and duties are actually divided) (Kroska, 2009). This potential disagreement may in itself affect lifetime health, but it could also be that the two concepts display different associations with mortality (Nordenmark, 2004).

Let us restrict the discussion to equal versus traditionally unequal parents. Further, let us assume that gender equality in occupational position and temporary childcare embraces a general acceptance of similarity between women and men in public/domestic life, and link that assumption to ideology; and let us assume that gender equality in income and parental leave embraces an active support of similarity between women and men in public/domestic life, and link that assumption to practice. Then, in terms of mortality, a gender-equal ideology in public life (occupational position) is good for men and bad for women; a gender-equal practice in public life (income) is bad for men and indifferent for women; a gender-equal ideology in domestic life (temporary childcare) is good for men and bad for women; and finally, gender-equal practice in domestic life (parental leave) is indifferent for both men and women. In modern-day Sweden, gender equality in ideology, rather than gender equality in practice, would then hypothetically lead to convergence between women and men regarding longevity. However, this is a tentative proposal based on blunt registry data, and more direct indicators of ideology (e.g. explicit opinions regarding parental equality) and practice (e.g. time devoted to unpaid and paid work) in future research may display another picture.

## Strengths and weaknesses

The main strength of this study is that gender equality/inequality is indicated by the relative position of women and men in public as well as domestic life. Nevertheless, it only considers four out of many relevant indicators of gender equality during parenthood (such as further aspects of domestic duties and specified working conditions). Additional strengths are that the study is population-based, and considers a wide range of socioeconomic-, family-, and health-

related confounders. However, it does not consider self-reported health and lifestyles, which has been found to associate with fathers' uptake of parental leave (Månsdotter et al., 2010). Further, Swedish registers are known to be reliable, but the use of registry data always encompasses a risk of administrative mistakes (e.g. income) and individual cheating (e.g. temporary childcare). Another weakness is the speculations involved when interpreting the results. Hopefully, this can be transformed into strength in future studies on gender equality and various aspects of health.

## Concluding remarks

Even in Sweden, a country renowned for its gender equality, the proportion of parents being equal in public as well as in domestic life is low. Since death in the studied ages is also rare, this study could only tentatively suggest that men gain and women lose longevity from being "entirely equal" compared to "entirely traditional". We suggest that the hypothesis of decreased gender inequality in mortality from increased gender equality in parenthood is still valid. Yet, this could only be empirically verified if mothers and fathers continue to share daily life more equally.

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Financial support was received from the Swedish Council for Working Life and Social Research (Dnr 2007-0091), and the Swedish Research Council (Dnr 2007- 2804).

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## Tables

**Table 1** Distribution of parental couples, deaths, and critical confounders for males (M) and females (F) by categories of gender (in)equality for income, occupational position, parental leave, and temporary childcare

| | Traditional pronounced M/F | Traditional moderate M/F | Equal couples M/F | Untraditional moderate M/F | Untraditional pronounced M/F | Total |
|---|---|---|---|---|---|---|
| Income | | | | | | |
| Number (proportion) of couples | 11 738 (10.9%) | 50 019 (46.6%) | 37 597 (35.0%) | 5 330 (5.0%) | 2 645 (2.5%) | 107 329 (100%) |
| Proportion 1978 cohort* | 20.4% | 46.6% | 29.8% | 3.6% | 1.9% | 100% |
| Deaths 1992-2008, number | 291/182 | 972/458 | 892/324 | 231/64 | 167/30 | 2 553/1 058 |
| Birth year, mean | 1957/1961 | 1958/1961 | 1959/1961 | 1958/1961 | 1957/1961 | 1958/1961 |
| Incomes 1990-91 mean TSEK | 411/55 | 342/162 | 256/223 | 105/220 | 25/202 | 300/175 |
| Education, tertiary level 1990 | 29.9%/19.5% | 25.8%/22.3% | 19.8%/27.5% | 17.3%/27.5% | 14.4%/23.6% | 23.4%/24.1% |
| Occupation group, workers 1990 | 52.1%/56.3% | 61.3%/56.9% | 67.0%/53.8% | 61.6%/53.4% | 63.6%/55.0% | 62.4%/55.5% |
| Born outside Sweden | 20.4%/24.4% | 9.2%/9.3% | 11.6%/10.0% | 23.0%/15.3% | 30.2%/20.2% | 12.5%/11.7% |
| Cohabiting (married or not) 1990 | 84.0% | 89.6% | 87.6% | 73.1% | 63.4% | 86.8% |
| Inpatient care 1986-87 | 8.0%/19.4% | 8.2%/18.3% | 9.3%/17.3% | 12.4%/18.6% | 14.9%/20.0% | 8.9%/18.1% |
| Overweight (BMI≥25) | 5.4%/7.5% | 6.4%/9.1% | 6.5%/9.6% | 6.3%/8.6% | 5.0%/7.8% | 6.3%/9.0% |
| Occupational position | | | | | | |
| Number (proportion) of couples | - | 20 816 (28.5%) | 42 887 (58.8%) | 9 267 (12.7%) | - | 72 970 (100%) |
| Proportions 1978 cohort* | 9.3% | 35.7% | 46.9% | 7.9% | 0.03% | 100% |
| Deaths 1992-2008, number | - | 476/180 | 834/390 | 181/86 | - | 1, 491/656 |
| Birth year, mean | - | 1959/1962 | 1958/1961 | 1958/1961 | - | 1958/1961 |
| Incomes 1990-91 mean TSEK | - | 314/177 | 330/204 | 286/203 | - | 319/196 |
| Education, tertiary level 1990 | - | 21.6%/6.4% | 30.1%/34.8% | 9.2%/34.0% | - | 25.0%/26.6% |
| Occupation group, workers 1990 | - | 60.9%/45.5% | 57.5%/74.5% | 84.4%/47.2% | - | 61.9%/54.0% |
| Born outside Sweden | - | 8.4%/9.1% | 8.6%/8.2% | 9.7%/7.1% | - | 8.7%/8.3% |
| Cohabiting (married or not) 1990 | - | 89.5% | 91.4% | 90.6% | - | 90.7% |
| Inpatient care 1986-87 | - | 8.9%/18.5% | 8.1%/17.1% | 9.1%/16.7% | - | 8.4%/17.5% |
| Overweight (BMI≥25) | - | 7.0%/10.6% | 6.0%/8.7% | 6.7%/10.4% | - | 6.4%/9.4% |
| Parental leave | | | | | | |
| Number (proportion) of couples | 96 518 (87.6%) | 8 983 (8.2%) | 2 646 (2.4%) | 881 (0.8%) | 1 162 (1.1%) | 110 190 (100%) |
| Proportions 1978 cohort* | 92.3% | 4.8% | 2.1% | 0.04 | 0.04% | 100% |
| Deaths 1992-2008, number | 2 473/984 | 170/85 | 58/25 | 19/14 | 32/16 | 2 752/1 124 |
| Birth year, mean | 1958/1961 | 1958/1961 | 1957/1960 | 1957/1961 | 1956/1960 | 1958/1961 |
| Incomes 1990-91 mean TSEK | 292/171 | 304/200 | 282/191 | 259/147 | 267/89 | 292/172 |
| Education, tertiary level 1990 | 21.6%/21.8% | 34.0%/39.0% | 35.7%/40.0% | 29.1%/34.4% | 34.3%/31.6% | 23.1%/23.8% |
| Occupation group, workers 1990 | 63.3%/56.9% | 56.8%/45.9% | 54.8%/43.8% | 58.4%/48.4% | 53.1%/56.7% | 62.4%/55.7% |
| Born outside Sweden | 13.1%/11.7% | 9.5%/10.7% | 12.5%/14.4% | 20.2%/25.8% | 27.6%/42.9% | 13.0%/12.1% |
| Cohabiting (married or not) 1990 | 85.4% | 93.2% | 92.6% | 89.2% | 90.2% | 86.3% |
| Inpatient care 1986-87 | 9.2%/18.5% | 8.8%/17.4% | 8.2%/17.6% | 9.8%/17.9% | 8.5%/18.5% | 9.2%/18.4% |
| Overweight (BMI≥25) | 6.4%/9.3% | 5.1%/7.9% | 5.0%/8.6% | 5.2%/7.6% | 5.2%/5.9% | 6.2%/9.1% |
| Temporary childcare | | | | | | |
| Number (proportion) of couples | 35 987 (37.9%) | 15 598 (16.4%) | 13 338 (14.0%) | 9 138 (9.6%) | 20 949 (22.0%) | 95 010 (100%) |
| Proportions 1978 cohort* | 40.2% | 10.6% | 10.2% | 7.8% | 31.2% | 100% |
| Deaths 1992-2008, number | 1 124/345 | 291/134 | 232/123 | 148/81 | 422/242 | 2 217/925 |
| Birth year, mean | 1958/1961 | 1959/1961 | 1959/1961 | 1959/1961 | 1959/1962 | 1958/1961 |
| Incomes 1990-91 mean TSEK | 284/190 | 315/202 | 311/200 | 302/186 | 301/137 | 298/181 |
| Education, tertiary level 1990 | 21.3%/22.7% | 25.2%/27.2% | 25.7%/28.9% | 23.7%/26.3% | 22.2%/20.3% | 23.0%/24.1% |
| Occupation group, workers 1990 | 59.8%/56.2% | 63.5%/51.0% | 64.0%/50.3% | 67.3%/55.8% | 68.2%/61.8% | 63.7%/55.5% |
| Born outside Sweden | 13.9%/11.0% | 8.1%/8.4% | 8.1%/8.0% | 8.4%/8.1% | 12.0%/12.8% | 11.2%/10.3% |
| Cohabiting (married or not) 1990 | 76.6% | 92.1% | 94.1% | 95.1% | 93.7% | 87.2% |
| Inpatient care 1986-87 | 9.9%/18.2% | 8.7%/17.4% | 8.4%/17.9% | 8.5%/19.0% | 8.4%/20.6% | 9.0%/18.6% |
| Overweight (BMI≥25) | 6.2%/8.9% | 6.3%/9.1% | 6.4%/9.0% | 6.4%/10.5% | 6.8%/10.0% | 6.4%/9.3% |

* Månsdotter A, Lindholm L, Lundberg L, Öhman A, Winkvist A (2006) Parental share in public and domestic spheres – a population study on gender equality, death and sickness. Journal of Epidemiology and Community Health 60: 616-620.

**Table 2** Males: associations between gender equality (1988-1991) in income, occupational position, parental leave, and temporary childcare, and mortality (1992-2008) (95% CI)

| | OR Crude | OR Model I | OR 1978* | OR Model II | OR Model III | OR Model IV | OR Model V |
|---|---|---|---|---|---|---|---|
| Income | n=107 329 | | | n=106 711 | | | n=66 786 |
| Traditional -pronounced | 1.05 (0.92-1.20) | 0.96 (0.84-1.11) | 1.04 (0.92-1.19) | 0.92 (0.79-1.08) | 0.82 (0.70-0.96) | 0.83 (0.70-0.97) | 0.84 (0.62-1.13) |
| Traditional -moderate | 0.82 (0.74-0.89) | 0.87 (0.79-0.96) | 0.92 (0.82-1.03) | 0.87 (0.79-0.97) | 0.84 (0.75-0.93) | 0.84 (0.76-0.94) | 0.84 (0.74-0.96) |
| Equal couples | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Untraditional -moderate | 1.87 (1.62-2.17) | 1.56 (1.33-1.82) | 1.11 (0.89-1.38) | 1.74 (1.42-2.13) | 1.67 (1.36-2.05) | 1.61 (1.31-1.98) | 1.44 (1.11-1.87) |
| Untraditional -pronounced | 2.79 (2.36-3.31) | 1.95 (1.61-2.36) | 0.98 (0.73-1.32) | 2.29 (1.66-3.17) | 2.16 (1.56-3.00) | 2.02 (1.45-2.80) | 2.13 (1.42-3.19) |
| Occupational position | n=72 970 | | | n=72 551 | | | n=66 786 |
| Traditional -pronounced | - | - | 1.16 (0.95-1.43) | - | - | - | - |
| Traditional -moderate | 1.18 (1.05-1.32) | 1.50 (1.32-1.71) | 1.12 (0.99-1.27) | 1.46 (1.28-1.67) | 1.28 (1.11-1.48) | 1.26 (1.10-1.46) | 1.27 (1.09-1.48) |
| Equal couples | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Untraditional -moderate | 1.00 (0.85-1.18) | 0.69 (0.57-0.82) | 1.04 (0.85-1.28) | 0.70 (0.58-0.84) | 0.78 (0.65-0.91) | 0.79 (0.66-0.96) | 0.80 (0.66-0.98) |
| Untraditional -pronounced | - | - | (0.79) (0.38-1.61) | - | - | - | - |
| Parental leave | n=110 190 | | | n=109 386 | | | n=66 786 |
| Traditional -pronounced | 1.17 (0.90-1.53) | 0.93 (0.66-1.33) | 1.06 (0.69-1.63) | 1.04 (0.69-1.57) | 1.06 (0.70-1.62) | 1.06 (0.70-1.62) | 1.17 (0.69-1.97) |
| Traditional -moderate | 0.86 (0.64-1.16) | 0.82 (0.60-1.13) | 0.71 (0.48-1.06) | 0.97 (0.66-1.40) | 1.03 (0.71-1.50) | 1.02 (0.70-1.49) | 1.00 (0.64-1.58) |
| Equal couples | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Untraditional -moderate | 0.99 (0.58-1.66) | 0.98 (0.57-1.67) | 1.01 (0.51-2.38) | 1.21 (0.66-2.20) | 1.07 (0.58-1.98) | 1.06 (0.57-1.96) | 0.84 (0.36-1.98) |
| Untraditional -pronounced | 1.26 (0.82-1.96) | 1.08 (0.69-1.69) | 0.69 (0.31-1.56) | 1.17 (0.69-1.98) | 1.00 (0.58-1.73) | 1.02 (0.59-1.76) | 0.82 (0.33-2.04) |
| Temporary childcare | n=95 010 | | | n=94 453 | | | n=66 786 |
| Traditional -pronounced | 1.83 (1.59-2.11) | 1.51 (1.30-1.76) | 1.59 (1.26-2.00) | 1.38 (1.17-1.63) | 1.21 (1.03-1.43) | 1.21 (1.02-1.43) | 1.24 (1.03-1.49) |
| Traditional -moderate | 1.07 (0.90-1.28) | 1.10 (0.92-1.31) | 1.05 (0.79-1.39) | 1.14 (0.95-1.37) | 1.11 (0.92-1.34) | 1.11 (0.92-1.34) | 1.12 (0.91-1.37) |
| Equal couples | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Untraditional -moderate | 0.93 (0.76-1.14) | 0.93 (0.75-1.14) | 1.11 (0.81-1.52) | 0.94 (0.76-1.18) | 0.96 (0.77-1.20) | 0.96 (0.77-1.20) | 1.00 (0.78-1.27) |
| Untraditional -pronounced | 1.16 (0.99-1.36) | 1.11 (0.94-1.31) | 1.32 (1.04-1.67) | 1.08 (0.90-1.28) | 1.06 (0.89-1.26) | 1.06 (0.89-1.27) | 1.06 (0.86-1.30) |

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Model I: controls for age, taxable income and absolute levels of income (for income), occupational position (for occupational position), parental leave (for parental leave) and temporary childcare (for temporary childcare)
Model II: I + restricted population using the criteria that parents and child were alive during exposure, and controls for educational level, occupational position, born outside Sweden and work-related income before parenthood
Model III: II + controls for being cohabiting (married or not), having earlier/later children, and partner's educational level
Model IV: III + controls for over-weight, inpatient care, and sickness leave before parenthood
Model V: IV + restriction of population by the criteria of being categorised as equal/unequal in all four indicators

**Table 3** Females: associations (OR) between gender equality (1988-1991) in income, occupational position, parental leave and temporary childcare, and mortality (1992-2008) (95% CI)

| | OR Crude | OR Model I | OR 1978* | OR Model II | OR Model III | OR Model IV | OR Model V |
|---|---|---|---|---|---|---|---|
| Income | n=107 329 | | | n=106 711 | | | n=66 786 |
| Traditional | 1.81 | 1.13 | 0.63 | 1.09 | 1.17 | 1.17 | 1.06 |
| -pronounced | (1.51-2.18) | (0.89-1.44) | (0.48-0.82) | (0.76-1.56) | (0.81-1.69) | (0.81-1.68) | (0.69-1.63) |
| Traditional | 1.06 | 0.94 | 0.71 | 0.99 | 1.04 | 1.03 | 0.96 |
| -moderate | (0.92-1.23) | (0.80-1.09) | (0.60-0.84) | (0.83-1.17) | (0.87-1.23) | (0.87-1.23) | (0.79-1.16) |
| Equal couples | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Untraditional | 1.40 | 1.33 | 0.78 | 1.15 | 1.02 | 1.02 | 0.90 |
| -moderate | (1.07-1.83) | (1.01-1.74) | (0.53-1.15) | (0.83-1.59) | (0.72-1.43) | (0.72-1.43) | (0.56-1.49) |
| Untraditional | 1.32 | 1.14 | 1.39 | 0.80 | 0.76 | 0.76 | 0.82 |
| -pronounced | (0.91-1.92) | (0.78-1.66) | (0.93-2.07) | (0.46-1.37) | (0.44-1.32) | (0.44-1.32) | (0.30-2.22) |
| Occupational position | n=72 970 | | | n=72 551 | | | n=66 786 |
| Traditional | - | - | 0.68 | - | - | - | |
| -pronounced | | | (0.50-0.93) | | | | |
| Traditional | 0.95 | 0.83 | 0.88 | 0.86 | 0.89 | 0.90 | 0.90 |
| -moderate | (0.80-1.14) | (0.67-1.02) | (0.71-1.09) | (0.70-1.07) | (0.72-1.11) | (0.72-1.12) | (0.71-1.12) |
| Equal couples | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Untraditional | 1.02 | 1.10 | 1.58 | 1.04 | 1,00 | 1.00 | 1.00 |
| -moderate | (0.81-1.29) | (0.86-1.40) | (1.20-2.07) | (0.81-1.34) | (0.77-1.29) | (0.77-1.29) | (0.76-1.30) |
| Untraditional | - | - | - | - | - | - | |
| -pronounced | | | | | | | |
| Parental leave | n=110 190 | | | n=109 386 | | | n=66 786 |
| Traditional | 1.08 | 1.32 | 1.61 | 1.48 | 1.37 | 1.37 | 1.37 |
| -pronounced | (0.72-1.61) | (0.87-1.99) | (0.93-2.78) | (0.87-2.52) | (0.80-2.35) | (0.78-2.34) | (0.75-2.49) |
| Traditional | 1.00 | 1.17 | 1.17 | 1.40 | 1.37 | 1.36 | 1.32 |
| -moderate | (0.64-1.57) | (0.74-1.84) | (0.64-2.14) | (0.79-2.46) | (0.77-2.41) | (0.77-2.40) | (0.70-2.49) |
| Equal couples | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Untraditional | 1.71 | 1.48 | 0.93 | 2.30 | 2.31 | 2.34 | 2.65 |
| -moderate | (0.88-3.30) | (0.76-2.88) | (0.27-3.24) | (1.02-5.16) | (1.03-5.21) | (1.04-5.28) | (1.07-6.58) |
| Untraditional | 1.49 | 0.94 | 2.83 | 0.93 | 0.96 | 0.97 | 1.18 |
| -pronounced | (0.79-2.80) | (0.49-1.80) | (1.27-6.32) | (0.30-2.85) | (0.31-2.95) | (0.32-3.00) | (0.32-4.31) |
| Temporary childcare | n=95 010 | | | n=94 453 | | | n=66 786 |
| Traditional | 1.04 | 0.91 | 1.14 | 0.86 | 0.79 | 0.80 | 0.82 |
| -pronounced | (0.85-1.28) | (0.74-1.11) | (0.85-1.52) | (0.68-1.09) | (0.62-1.00) | (0.63-1.02) | (0.64-1.06) |
| Traditional | 0.93 | 0.89 | 0.94 | 0.89 | 0.88 | 0.89 | 0.94 |
| -moderate | (0.73-1.19) | (0.69-1.14) | (0.66-1.36) | (0.68-1.17) | (0.67-1.16) | (0.68-1.16) | (0.71-1.24) |
| Equal couples | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Untraditional | 0.96 | 1.00 | 1.06 | 1.00 | 0.98 | 0.97 | 0.94 |
| -moderate | (0.72-1.27) | (0.75-1.33) | (0.72-1.56) | (0.73-1.37) | (0.71-1.35) | (0.71-1.34) | (0.67-1.32) |
| Untraditional | 1.26 | 1.23 | 1.09 | 1.20 | 1.25 | 1.24 | 1.23 |
| -pronounced | (1.01- 1.56) | (0.98-1.55) | (0.80-1.48) | (0.91-1.58) | (0.95-1.65) | (0.94-1.64) | (0.92-1.65) |

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Model I: controls for age, taxable income and absolute levels of income (for income), occupational position (for occupational position), parental leave (for parental leave) and temporary childcare (for temporary childcare)
Model II: I + restricted population using the criteria that parents and child were alive during exposure, and controls for educational level, occupational position, born outside Sweden and work-related income before parenthood
Model III: II + controls for being cohabiting (married or not), having earlier/later children and partner's educational level
Model IV: III + controls for overweight, inpatient care, and sickness absence before parenthood
Model V: IV + restriction of population using the criteria of being categorised as equal/unequal in all four indicators

**Table 4** Males and females: associations (OR) between being traditional versus equal in one indicator (1988-1991) and mortality (1992-2008) by strata of being traditional or equal in other indicators (95% CI)

| STRATA: | Income | | Occupational position | | Parental leave | | Temporary childcare | |
|---|---|---|---|---|---|---|---|---|
| | Equal n=27 500 OR* | Traditional n=36 775 OR* | Equal n=39 281 OR* | Traditional n=18 909 OR* | Equal n=1 686 OR* | Traditional n=64 361 OR* | Equal n=10 948 OR* | Traditional n=37 024 OR* |
| **MALES** | | | | | | | | |
| Income | | | | | | | | |
| Equal | | | 1 | 1 | 1 | 1 | 1 | 1 |
| Traditional | - | - | 0.88 | 0.79 | 0.61 | 0.854 | 0.75 | 0.73 |
| | | | (0.75-1.04) | (0.63-1.01) | (0.25-1.50) | (0.74-0.96) | (0.54-1.04) | (0.62-0.87) |
| Occupational position | | | | | | | | |
| Equal | 1 | 1 | | | 1 | 1 | 1 | 1 |
| Traditional | 1.62 | 1.17 | - | - | 1.77 | 1.30 | 1.30 | 1.30 |
| | (1.26-2.09) | (0.94-1.45) | | | (0.59-5.30) | (1.11-1.53) | (0.83-2.04) | (1.06-1.58) |
| Parental leave | | | | | | | | |
| Equal | 1 | 1 | 1 | 1 | | | 1 | 1 |
| Traditional | 0.71 | 1.38 | 1.02 | 0.96 | - | - | 2.33 | 0.95 |
| | (0.38-1.31) | (0.66-2.91) | (0.56-1.87) | (0.39-2.34) | | | (0.64-8.44) | (0.47-1.90) |
| Temporary childcare | | | | | | | | |
| Equal | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Traditional | 1.04 | 1.10 | 1.22 | 1.07 | 4.57 | 1.06 | - | - |
| | (0.80-1.36) | (0.82-1.48) | (0.95-1.58) | (0.73-1.56) | (0.95-21.95) | (0.88-1.29) | | |
| **FEMALES** | | | | | | | | |
| Income | | | | | | | | |
| Equal | | | 1 | 1 | 1 | 1 | 1 | 1 |
| Traditional | - | - | 1.06 | 0.70 | 1.89 | 0.94 | 0.93 | 0.86 |
| | | | (0.83-1.36) | (0.47-1.04) | (0.32-11.05) | (0.77-1.15) | (0.57-1.51) | (0.66-1.11) |
| Occupational position | | | | | | | | |
| Equal | 1 | 1 | | | 1 | 1 | 1 | 1 |
| Traditional | 0.80 | 0.98 | - | - | 1.28 | 0.88 | 0.61 | 0.82 |
| | (0.56-1.15) | (0.72-1.33) | | | (0.11-15.31) | (0.70-1.10) | (0.34-1.09) | (0.61-1.11) |
| Parental leave | | | | | | | | |
| Equal | 1 | 1 | 1 | 1 | | | 1 | 1 |
| Traditional | 2.96 | 0.81 | 1.46 | 1.52 | - | - | 1.66 | 1.10 |
| | (0.92-9.47) | (0.39-1.70) | (0.67-3.17) | (0.36-6.41) | | | (0.39-7.08) | (0.44-2.75) |
| Temporary childcare | | | | | | | | |
| Equal | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Traditional | 0.97 | 0.78 | 0.84 | 0.88 | 1.05 | 0.86 | - | - |
| | (0.68-1.37) | (0.56-1.08) | (0.62-1.13) | (0.54-1.43) | (0.12-8.93) | (0.68-1.09) | | |

* after controls for age, taxable income, absolute levels of income (for income), occupational position (for occupational position), parental leave (for parental leave) temporary childcare (for temporary childcare); restricted population by the criteria that parents and child were alive during exposure, controls for educational level, occupational position, born outside Sweden, work-related income before parenthood; controls for being cohabiting (married or not), having earlier/later children, partner's educational level; controls for over-weight, inpatient care, sickness absence before parenthood; restriction of population using the criteria of being categorised as equal/unequal in all four indicators