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## Cohabitation and marital status as predictors of mortality— an eight year follow-up study

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### Abstract

In a follow-up study of 1265 women and men aged 50, 60 and 70 years, we analysed how mortality was associated with cohabitation status (living alone/not living alone), living with/without a partner, and marital status respectively. Data originate from a longitudinal questionnaire study of a random sample of people born in 1920, 1930 and 1940 with baseline in 1990. Survival time for all individuals were established during the next 8 years until May 1998. Multivariate Cox analysis stratified by age and gender showed that individuals living alone experienced a significantly increased mortality compared to individuals living with somebody  $HR = 1.42(1.04-1.95)$  adjusted for functional ability, self-rated health, having children, smoking, diet and physical activity. Similar analyses were performed for the variable living with/without a partner  $HR = 1.38(1.01-1.88)$  and marital status  $HR = 1.25(0.93-1.69)$ , adjusted for the same covariates. Inclusion of the health behaviour variables—smoking, diet and physical activity—one by one to a model with functional ability, self-rated health and one of the three determinants (cohabitation status, living with/without partner, marital status) showed no effect on the association with mortality. Hereby, we found no evidence of an indirect effect of health behaviours on the association between living arrangements and mortality. In contrast to many previous studies, we found no significant gender and age differences in the association between living arrangement and mortality. We suggest that in future studies of social relations and mortality, cohabitation status is considered to replace marital status as this variable may account for more of the variation in mortality. © 2002 Elsevier Science Ltd. All rights reserved.

**Keywords:** Cohabitation status; Marital status; Mortality; Social support; Social relations; Health behaviour; Denmark

### Introduction

Cohabitation status and marital status are important aspects of an individual's social relations but they are not identical entities. Many studies use these indicators as predictors in the analyses of the association between social relations and health outcomes but with conflicting findings.

A rather large number of population studies have demonstrated a higher mortality for unmarried, for people who live alone, people who are divorced or never married among both men and women (Seeman, Kaplan, Knudsen, Cohen, & Guralnik, 1987; Trovato & Lauris, 1989; Hu & Goldman, 1990; Reuben, Rubenstein, Hirsch, & Hays, 1992; Sorlie, Backlund, & Keller, 1995; Tucker, Friedman, Wingard, & Schwartz, 1996; Joung, Glerum, Poppel, Kardaun, & Mackenbach, 1996; Sundquist & Johansson, 1997; Nakanishi et al., 1998). Likewise, an increased mortality among the unmarried has been demonstrated in studies of patient

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populations (Goodwin, Hunt, Key, & Samet, 1987; Johansen, Schou, Soll-Johanning, Mellemgaard, & Lynge, 1998).

Some studies, however, have failed to demonstrate an association among women. Berkman et al. found in their study in Alameda county that married males had lower age-adjusted mortality rates than unmarried males. In contrast, there was no increased mortality among the unmarried females (Berkman & Syme, 1979). Likewise, Bauman et al. (Baumann, Filipiak, Stieber, & Lowel, 1998) found that single, divorced and widowed men showed a significantly higher mortality, which could not be demonstrated among women. In a recent Danish study, Avlund et al. demonstrated an increased mortality among men living alone but not among women (Avlund, Damsgaard, & Holstein, 1998). Other studies have demonstrated an association among women but not among men (Schoenbach, Kaplan, Fredman, & Kleinbaum, 1986; Davis, Moritz, Neuhaus, Barclay, & Gee, 1997; Lund, Modvig, Due, & Holstein, 2001).

In contrast, a couple of studies on women with breast cancer have demonstrated that married women and those living with their spouse showed an increased mortality (Waxler-Morrison, Hislop, Mears, & Kan, 1991; Moritz & Satariano, 1993).

Furthermore, a couple of population studies have not been able to find the association between cohabitation/marital status and mortality. A study by Dalgard and Håheim (1998) demonstrated the independent effect of marital status on mortality neither among women nor men. Likewise, in a study of Swedish men, Welin et al. found no association between marital status and mortality (Welin et al., 1985) and in addition, Davis et al. found no association between living alone and mortality either among men or women (Davis et al., 1997).

The association between marital status/cohabitation status and mortality has been studied in all age groups, but the major part has been focused on middle-aged and elderly people. Sorlie et al. found that the association between marital status as well as household size, and mortality generally was weaker among 65+ year olds than among the younger individuals (Sorlie et al., 1995). Likewise, the association between marital status and morbidity is shown to be weaker after the age of 60 (Macintyre, 1986).

The conflicting results may have several explanations: (1) there are real differences in the effects of cohabitation and marital status on mortality; (2) there may be real differences between women and men in the strength of the association between mortality and cohabitation or marital status; (3) differences between countries may be due to different cultural norms for cohabiting persons (4) the differences may be due to differences in designs and selection of covariates included in the multivariate analyses, which may influence the effect of marital status

differently; (5) also various analytical strategies may reveal different results, for e.g. some researchers decide from the beginning to analyse women and men, and different age groups separately, while others test if it is necessary to do so, this may result in conflicting conclusions about gender differences.

Cohabitation status, living with/without a partner and marital status are different measures of social relations as they differ on several points. Among these are the degree of intimacy which is supposed to be the highest for those living with a spouse or a partner, and the degree of 'legitimacy' which is highest for the married.

Differences in health behaviours between marital groups is one of the frequently proposed explanations for the differences in mortality among married and unmarried. Several studies have found that negative health behaviours such as smoking, excessive alcohol consumption, substance abuse and other risk-taking behaviour is less frequent among the married compared to the unmarried (Umberson, 1987; Umberson, 1992; Miller-Tutzauer, Leonard, & Windle, 1991). Similar positive influences on health behaviours of a cohabiting person or a partner seems plausible and the effect of different health behaviours on the association between three dimensions of living arrangements and mortality is also a focus of this paper.

It is the aim of this study to analyse which of the three dimensions of living arrangements is the most important predictor of mortality at older ages. The three dimensions are: marital status, living with or without a partner, living alone or not living alone. Furthermore it is the aim to analyse if the associations are different for women and men and in different age groups and to analyse if there is evidence of an indirect effect of cohabitation status as well as living with/without a partner and marital status via health behaviours on mortality.

## Methods

### *Study population*

The total population for this study originates from the Danish Longitudinal Health Behaviour Study (DLHBS) based on a random sample within five age cohorts born in 1920, 1930, 1940, 1965 and 1975 ( $N = 2846$ ). The material has been described earlier (Due & Holstein, 1998; Due, Holstein, Lund, Modvig, & Avlund, 1999). Baseline data collection was carried out by self-administered questionnaires in 1990. The material for the present analyses is based on the three oldest cohorts 50-, 60- and 70-years old ( $N = 2043$ ), and is based on individuals participating in the baseline study in 1990 with participation of 63% of the initial sample ( $N = 1291$ ). The largest drop-out was reported among the 60-

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