Gender, living arrangements and social circumstances as determinants of entry into and exit from long-term institutional care at older ages – a six-year follow-up study of older Finns

Pekka Martikainen

Heta Moustgaard

Michael Murphy

Elina Einiö

Seppo Koskinen

Tuija Martelin

Anja Noro

A final version of the paper is published in The Gerontologist 2009

Abstract

Purpose: Due to population ageing the need for long-term institutional care is increasing. We study the potentially modifiable socio-demographic factors that affect the rate of entry into and exit from long-term care.

Design and Methods: A 40% sample from the population registration data of Finns aged 65+ living in private households at the end of 1997 (n = 280,722) was followed for first entry into (n = 35,926) and subsequent exit – due to death or return to the community – from long-term institutional care until the end of 2003.

Results: Being female, old, living alone, and of low socioeconomic status increased the risk of entering long-term care. Exit was affected by the same factors, but the associations were weaker and, with the exception of age, in the opposite direction. Women's higher risk of entry was due to older age and greater likelihood of living alone. The effects of living arrangements and socioeconomic factors on entry were stronger among men, and were attenuated after adjustment for each other and for health status. The mean duration of care was 1064 days among women and 686 among men.

Implications: Gender, age, living arrangements and socioeconomic status are major determinants of institutional residence. Women and certain other population groups, e.g. those living alone, are likely to spend a longer time in institutional care because of higher rates of entry and lower rates of exit. These results have implications for the financing of long-term care, and for targeting of interventions aimed at delaying it.

Introduction

For most elderly people long-term institutional care is often the last resort when physical and mental functioning fail, but it could be considered an unpopular choice as a living arrangement. Furthermore, publicly funded long-term care takes up, on average, about one percent of GDP in OECD countries, and this may more than double by 2050 (OECD, 2006). Thus, in terms of considering policy choices and estimating future long-term care costs, it is of utmost importance to understand the determinants of entry, exit, and length of stay. The broad aim of this study is to assess the effects of socio-demographic determinants of entry to and exit from long-term institutional care.

Simultaneous analyses of entry into long-term institutional care and subsequent exit – as a consequence of either death in the institution or return back to the community – in the same cohort could be considered particularly important as they allow for a much better understanding of the experience of institutional care over the life-course of the individual. Such studies will also facilitate valid comparison of the determinants of entry and exit, and assessment of the possible cumulative or compounded effects - in other words whether certain population sub-groups have higher rates of entry and lower rates of exit, and thus on average stay longer in long-term care than others. Length of stay is an important determinant of the total burden and cost of care, and thus is of major significance in terms of long-term planning (Freedman, 1993; Kemper & Murtaugh, 1991; Liu, Coughlin, & McBride, 1991; Spence & Wiener, 1990; Spillman & Lubitz, 2002). Furthermore, many studies of exit from institutional care have been based on limited information on pre-entry socio-demographic and health characteristics. Given the data limitations, most previous studies on risk of entry and exit have not been carried out simultaneously on the same study subjects. In addition, most of this research is based on US data from the 1980s and 1990s, and much of it was carried out on specific populations in need of care at baseline.

According to previous literature, individual characteristics increasing the risk of entry into institutional care include old age, poor physical and mental functional status, living without a partner, and low socioeconomic status (Aguero-Torres, von Strauss, Viitanen, Winblad, & Fratiglioni, 2001; Banaszak-Holl et al., 2004; Branch & Jette, 1982; Breeze, Sloggett, & Fletcher, 1999; Gaugler, Duval, Anderson, & Kane, 2007; Grundy & Glaser, 1997; Grundy & Jitlal, 2007; Nihtilä et al., 2007; Nihtilä & Martikainen, 2008a; Nihtilä & Martikainen, 2008b; Nuotio, Tammela, Luukkaala, & Jylhä, 2003; Shapiro & Tate, 1988; Tomiak, Berthelot, Guimond, & Mustard, 2000; Wolinsky, Callahan, Fitzgerald, & Johnson, 1992). Similar factors have been shown to determine exit from care – either through death or return back to the community – but these effects are weaker, less consistent, and often in the opposite direction (Engle & Graney, 1993; Flacker & Kiely, 2003; Greene & Ondrich, 1990; Mehr, Williams, & Fries, 1997; Wolinsky et al., 1992). These less consistent findings may reflect smaller statistical power to detect effects, as well as the greater homogeneity of the population in long-term institutional care as compared with the population living in the community.

Men and women living alone have been identified as being more likely to enter into institutional care (Branch & Jette, 1982; Breeze et al., 1999; Gaugler et al., 2007; Grundy & Jitlal, 2007; Nihtilä & Martikainen, 2008b; Wolinsky et al., 1992). Poorer socioeconomic circumstances of those living alone may partly explain these effects. More importantly, however, it has been suggested that the higher chances of entry among those living alone are also associated with a lesser likelihood of having access to informal care within the household.

It is thus possible that those living alone enter institutions in better physical health and are consequently less likely to die there. Furthermore, among those in long-term care not having access to emotional support and task help in the household of potential return may also make it more difficult to contemplate return to independent living. It is thus likely that persons living alone before entry remain in institutions for a longer time than those who have a spouse or partner (Freedman, 1993; Kemper & Murtaugh, 1991; Spillman & Lubitz, 2002).

Similar processes may underlie the effects of socioeconomic factors on entry to and exit from long-term institutional care. Previous literature has established housing tenure and household income as two important socioeconomic factors that may be important for long-term care utilization (Breeze, Sloggett & Fletcher, 1999; Nihtilä & Martikainen, 2008a). Although both indicators reflect material conditions of life these associations are likely to imply somewhat different social pathways. For most individuals house ownership reflects wealth accumulated over the life-course, and it is thus likely that the lower chances of entry to care among owner-occupiers are related to the accumulation of early and current material benefits. Furthermore, higher rates of exit after extended stays in hospital or long-term care may be associated with the security of returning back to owner-occupied housing. Persons on inadequate income, on the other hand, may find it impossible to purchase private home care when living in the community (Nihtilä and Martikainen, 2008a), and may also find it economically unfeasible to return to the community once institutionalized. The associations of both factors with long-term care use may also be due to their associations with poor health.

Female gender is also a significant factor determining long-term institutional care. The reasons for this are not fully understood, but the greater likelihood of women being institutionalized may reflect differences not only in age, health and functioning status, but also in socio-economic circumstances and living arrangements. In particular, men are more likely than women to have access to informal care from their spouses, and thus to be able to remain in the community for a longer period (e.g., Katz, Kabeto, & Langa, 2000; Larsson & Thorslund, 2002). However, much of this difference may relate to differences in living arrangements (Blomgren et al., Submitted manuscript), and men may enter institutional care in poorer health than women. Gender may also modify the impact of other factors on entry and the different modes of exit.

Aims and context of the study

The focus of this paper is on the effects of three important socio-demographic factors – living arrangements, housing tenure and household income – on entry to and exit from long-term institutional care. Previous literature has shown, that these factors are important determinants of long-term institutional care, and that their effects are strongly intertwined and are likely to be mediated by health status. Gender acts as an important determinant and a modifier of these effects. Our specific aims were to: (1) assess how gender, age, living arrangements, housing tenure and household income are associated with the risk of entry into and exit from long-term institutional care – either through death or return to the community, (2) assess whether these associations are independent of each other and mediated by health status, (3) evaluate, in particular, why gender is associated with institutionalization and how it modifies the impact of other variables, and (4) estimate the mean number of days spent in institutional care. To assess these aims we analyzed population-registration-based longitudinal data over a six year follow-

up period in a random sample of Finns aged 65 and above living in private households at the end of 1997.

The Finnish social services and health care system is characterized by universalistic principles in the provision of services. A central aim of the elderly care policy is to promote functioning, support living independently, and prevent and delay long-term institutional placement. Institutional care is mostly organized and provided by the municipalities in health centre wards and nursing homes with about 75% of long-term care episodes starting in health centres or hospitals (Nihtilä & Martikainen, 2008a). The services are financed mainly through general taxation and partly by client fees that can be up to 80% of disposable income. Client fees constitute less than 20% of the net expenditure on long-term institutional care. (Care and Services for Older People 2005, 2007). Access to public care is determined by need rather than ability to pay or accesses to informal care. Decisions on placement to long-term care are based mostly on expert evaluations of care needs. (Care and Services for Older People 2005, 2007).

Design and methods

Data

The data used for these analyses consist of a 40% random sample of the Finnish population aged 65 or over at the end of 1997 drawn from population registration data. We excluded those in long-term institutional care at baseline. The remaining 280,722 persons were followed for first entry into long-term care after 31st of December 1997 until the end of September 2003, and death until the end of 2003. Over the follow-up period we observed 35,926 first institutionalizations, and of these 15,302 left because of death and 10,101 returned to the community. These data were linked with population registration data on socio-demographic characteristics, and with information on chronic health conditions at baseline. Statistics Finland provided data on basic socio-demographic characteristics and dates of death, the National Research and Development Centre for Welfare and Health (STAKES) provided information on long-term institutional care, date of exit, and principal cause of prior hospitalization, and the Social Insurance Institution provided information on purchases of prescription medication and on entitlement to reimbursement for drug costs on account of the disease in question. Information on income came from the registers of the Finnish Tax Administration. The data linkage was carried out in Statistics Finland using personal identification codes (permission TK 53-576-04 and TK 53-499-05).

Definitions of long-term institutional care and length of stay

An institution was defined as a care unit providing long-term care and 24-hour assistance, including nursing homes, service homes with 24-hour assistance, hospitals, health centers, and rehabilitation care. Long-term psychiatric care was also included. Long-term care was defined as care that had lasted for over 90 days, or had been confirmed by a long-term care decision made by the municipal service providers. The over-90-days criterion was met if the patient had been at the same institution for the time required, or successively at several institutions without returning back to the community.

We studied the determinants of first entry into institutional care and subsequent exit. The majority of the institutionalized participants had had only one continuous long-term care episode, although about 20% had had at least two, often separated by only a few days. We thus also allowed for a maximum 30-day period back in the community between episodes. We thus defined them as a single episode because these periods in the community were considered temporary and also included short holidays. Given this definition, about 88% of those institutionalized had only one long-term-care episode during the follow-up.

The exact exit date was not available for 5.6% of all first long-term care episodes. In these cases we knew from the end-of-year patient censuses that the person had resided in an institution at the end of a particular year but not at the end of the following year. If the person had not died during the intervening year (3.9%), we assumed he or she had returned to the community at its mid-point (the end of June). If the person had died (1.7%), we defined him or her as having died in the institution, and in that case the exit date was the same as the date of death.

Living arrangements

The unit of analysis used for defining living arrangements was the household in which the person under study lived, comprising all persons living in the same dwelling unit. Sub-tenants (less than 0.5%, Tilastokeskus, 1994) are thus defined as part of the household, and more than one family may live in the same unit. Living arrangements were categorized as: (1) living with a spouse or a cohabiting partner, (2) living alone, (3) living in other private households.

Socioeconomic status

We used two measures of socioeconomic status. Household disposable income per consumption unit was used as an income measure. This comprises all taxable income received by the household members, including wages, capital income and income transfers, but excluding direct taxes. In calculating the household consumption units we gave the first household member a weight of 1.0 unit and any others 0.7 units. This corresponds to the OECD equivalence scale (OECD, 1982), with the exception that children below 18 years of age were weighted as adults here. Having co-resident minor children in this kind of study population is very rare. Income was divided into quartiles with cut-off points calculated from the combined data for men and women.

Home ownership was categorized in two classes: owner occupiers and others. The classification was based on the occupancy status of the dwelling.

Health at baseline

We formed 18 dichotomous indicators of chronic health conditions assessed during a two-year period preceding the baseline and these were used as dummies in the analyses. These conditions were: cancer (prevalence 4%), diabetes (10%), dementia (1%), psychosis (2%), depressive symptoms (9%), other mental-health disorders (5%), Parkinson's disease (2%), other neurological diseases (4%), heart disease (28%), stroke (2%), chronic asthma or chronic obstructive pulmonary disease (7%), other respiratory diseases (3%), arthritis (4%), osteoarthritis (3%), hip fracture (1%), other conditions related to accident or violence (4%),

other hospital diagnoses (26%), and other chronic diseases (39%) qualifying for reimbursement of drug costs under the Special Refund Categories that cover 75% or 100% of the cost of a single drug purchase.

We used two main register sources to assess chronic diseases and conditions: 1) the principal cause of hospitalization during 1996–1997, and 2) the right to reimbursement for drug costs under the Special Refund Categories for certain diagnosed chronic medical conditions during 1997. The individuals studied were categorized as having a chronic condition according to at least one of these sources. In addition, we supplemented the data on the following six categories of medical conditions with information on the purchase of prescription medication during 1996–1997: cancer, diabetes, Parkinson's disease, depressive symptoms, and other mental health problems. The principal cause of hospitalization was based on the Tenth Revision of the International Classification of Diseases (STAKES, 1999), purchases of prescription medication were based on the Anatomical Therapeutic Chemical Classification (National Agency for Medicines, Lääkelaitos, 1997; Lääkelaitos, 1998), and the right to reimbursement for drug costs under the Special Refund Categories was based on the Finnish disease classification of the Social Insurance Institution (Social Insurance Institution, 1998). For more details see Nihtilä et al. (2007).

Statistical methods

The descriptive analyses are based on directly standardized rates. Age adjustment was applied in five-year age groups (age at baseline), using the combined male and female population for 1997 as the standard. Cox proportional hazard models were used in analyzing the determinants of entry to and exit from long-term care for those living in private households at baseline. These models are well suited for our purposes as they deal appropriately with survival data that are left truncated and right censored, and the models do not make assumptions about the baseline hazard function. STATA was used for all of the calculations (Stata Corporation, 2003). In evaluating the study aims we adopted the following modeling strategy. In order to establish the magnitude of the associations of housing tenure, income and living-arrangement on transitions to and from long-term care for men and women separately (Tables 3 and 4) we fitted models that included each indicator and age (M1). At the following stage we aimed to determine the effects of each indicator net of the other, and thus fitted models with all these indicators (M2). At the final stage we assessed the possible mediating effects of health by including 18 dichotomous variables describing chronic conditions (M3). In the analyses of gender differences on transitions to and from long-term care (Table 5) we estimated the effects of all explanatory variables individually and then jointly in a 'full model'.

For our last research aim we wanted to estimate mean values for length of stay in institutions according to the explanatory variables. However, the non-parametric baseline hazard function of Cox regression models does not provide estimates beyond the maximum period of follow-up in our data of six years, and thus a part of the care episodes are not followed until their termination. In order to obtain the means, we used values from a parametric Weibull survival model fitted to these data to produce estimates of the full distribution of completed duration spells. In these models the parametric baseline hazard function is assumed to follow the Weibull-distribution with two parameters and is estimated from the data. Institutionalization is defined as spells that last at least 90 days or are explicitly defined as long-term care, in which case they may be of shorter duration: return from institutions to the community in the first 90

days is thus rare. We concluded from the preliminary analyses that because of this discontinuity at 90 days a single Weibull model would not be appropriate. We therefore obtained the overall mean time by combining separate Weibull models fitted to durations of less than 90 days and 90 days or more. In practice, few people remain in institutions for more than six years, and thus the results reported in this paper are relatively insensitive to assumptions beyond that period. We decided not to present hazard ratios from the Weibull models as it is methodologically not straightforward to combine the estimates from two separate models and as Cox regression models are better suited for obtaining these hazard ratios because they make no assumptions on the baseline hazard function.

Results

Overall, 11.1% of the men and 13.6% of the women were institutionalized over the five-year follow-up period (Tables 1 and 2). Of the institutionalized men, 49.3% died in institutions, 28.4% returned to the community, and 22.3% were still residing in institutions at the end of the follow-up period. Among the women the corresponding percentages were 39.6, 28.1 and 32.3. For both men and women advanced age, living alone, not owning a home, and having a low income were associated with entry into institutional care. Among those institutionalized, being male and older was particularly strongly associated with death in the institution, and being younger was associated with return to the community. The last column of Tables 1 and 2 also show mean durations of care according to the explanatory variables. Women entering institutions can expect to stay in long-term institutional care for 1064 days on average, and men for 686 days. We also observed clear sub-group differences in length of stay, which was longer among those living alone and those of low socioeconomic status. For example, adjusted for age, those living with a spouse at baseline can expect to spend about 100 days less in care than those living alone.

The age patterns in rates of entry and exit for men and women are shown under Model 1 in Tables 3 and 4 (the model includes the effects of age unadjusted for any other variables). The effects of age are larger among the women for both entry and death in an institution, but the gender differences in returning back to the community are small. Model 1 also presents the age-adjusted effects of living arrangements and socioeconomic status on the risk of entry and exit (the model includes the effects the each explanatory variable separately adjusted for age). Living alone, not owning a home and low income were all associated with higher chances of entry into institutional care, the effects being stronger for the men than for the women (p-value < 0.05 for gender interactions). These explanatory factors were in many cases – sometimes only weakly – associated with death in the institution and return back to the community, but were also in many cases opposite to those observed for institutional entry. For example, persons living alone did not return to the community as often as those having a spouse, neither did they die as quickly.

Further adjustment for all of the other three explanatory variables simultaneously (Model 2), and also for chronic conditions at baseline (Model 3), attenuated the effects on entry considerably. However, even after adjustment for the other socio-demographic characteristics and health status, men living alone were 55% more likely to enter institutions than those living with a partner, and those who were not home owners had an almost 40% excess risk of entry. Among the women, the corresponding figures were 25% and 20%. In the three lowest income quartiles, the men were 20–30% more likely to enter long-term institutional care than those in the highest income quartile, while among the women the corresponding excess was smaller,

about 10%. Adjusting for the other socio-demographic variables and health had practically no impact on the effects of these risk factors on exit.

The 42% higher chance of entry into institutional care among the women was mainly attributable to their being older than the men (Table 5). However, adjusting for living arrangements also attenuated the effects of gender on entry, mainly because fewer women than men lived with a spouse. After full adjustment for all explanatory factors women had a slightly lower risk of entry than men (hazard ratio 0.94; 95% confidence interval 0.91 to 0.96). The 34% lower age-adjusted risk of death in an institution among the women was only slightly affected by adjustment for other explanatory factors. Gender differences in terms of returning to the community were attenuated after adjustment for age in particular, and in the fully adjusted model the women were about 10% less likely to return.

Discussion

In most previous research on the determinants of long-term institutional care the determinants of entry and of exit have been assessed independently. Furthermore, in most cases the studies are based on disabled elderly people, thus limiting the generalizability of the findings. We followed a large and fully defined population-based sample of community-dwelling individuals into institutional care and subsequent exit from it through death or return to the community. It is only a combined analysis that will foster a better understanding of the use of overall long-term care, and facilitate a fuller comparison of the determinants of entry and exit.

Determinants of first entry

Our results show that older women are more than 40% more likely to enter institutional care than older men. Almost three quarters of this excess risk is purely due to the older age of women. Much of the rest is due to the greater proportion of women living without a spouse – i.e. living alone or with others than a spouse: both of these living arrangements were associated with higher rates of institutional entry. The fully adjusted model indicates a slight protective effect of the female gender. This observation is consistent with findings from a recent meta-analysis of US studies (Gaugler et al., 2007), but in the UK women appear to have a small excess risk of institutionalization even after adjustment (Grundy & Jitlal, 2007).

The analyses corroborate previous findings of a higher likelihood of long-term institutional entry among those not living with a spouse, not owning a home, and with a low household income (Branch & Jette, 1982; Gaugler et al., 2007; Grundy & Jitlal, 2007; Himes, Wagner, Wolf, Aykan, & Dougherty, 2000; Lakdawalla & Schoeni, 2003; Mustard, Finlayson, Derksen, & Berthelot, 1999; Nihtilä & Martikainen, 2008a; Nihtilä & Martikainen, 2008b; Wolinsky et al., 1992). There is rich research evidence concerning possible explanations for these findings. In terms of living alone these relate to a lack of informal care and emotional support (Freedman, 1996), control of unhealthy behaviors (Umberson, 1992), and an inferior socioeconomic position (Nihtilä & Martikainen, 2008b), for example. The last-mentioned is supported by our data in that about 20–25% of the excess rate of entry is explained by home ownership and income.

Our findings also confirm the independent effects of home ownership on institutionalization (Breeze et al., 1999; Gaugler et al., 2007; Grundy & Jitlal, 2007; Tomiak et al., 2000). We believe that in the case of home ownership – which is a measure of social

position obtained over decades and possibly across generations – the results point to causes that are associated with both early and current material advantages. The protective effects of a higher income may also be associated with better-quality housing (Nihtilä & Martikainen, 2008a), and possibly with the ability to purchase home care.

The effects of all the predictors on first entry were stronger among the men than among the women both before and after adjustment for other factors. The reasons for these gendered effects are not fully understood. In the case of living arrangements the differences may relate to the specific advantages that having a partner imply among men: better access to confiding relationships (Hughes & Waite, 2002; Ross, Mirowsky, & Goldsteen, 1990), and support in everyday tasks and material needs (Hughes & Waite, 2002; Ross et al., 1990). Accordingly, absolute institutionalization percentages calculated from these data show that men with a partner are clearly less likely to require institutionalization than women with a partner (9.6 % vs. 12.1%), while the gender differences are very small for those living alone or with others. The stronger effects of home ownership and income on first entry among the men in these data were partly attenuated following adjustment for living arrangements and chronic conditions. However, it remains possible that some of these stronger effects of different socioeconomic indicators on institutionalization relate to larger socioeconomic differences in functional capacity among men, which are not fully visible in these data.

Determinants of death in the institution and return back to the community

The burden and cost of long-term care are determined by both entry into and exit from it (Freedman, 1993; Kemper & Murtaugh, 1991; Spillman & Lubitz, 2002). Our results show that exit is most likely to be attributable to death, although many elderly people do return to the community. Overall, we observed a 35% greater age-adjusted rate of exit from institutions among the men compared with the women. This was attributable mainly to a 50% age-adjusted excess of death in the institution, but also to a 10% greater chance of returning to the community. Although our multivariate models could account for the gender differences in first entry into institutional care, they could not account for this, with the exception that about half of the gender difference in return to the community was due to the older age of the female patients.

Death in the institution is also consistently associated with advanced age, although more weakly than for first entry. This finding – as well as that of greater male mortality in institutions – reflects well the known mortality differences in the general population. Home ownership and household income were only weakly and inconsistently associated with death in the institution, but both men and women living alone before institutional entry had a consistent – albeit relatively small – survival advantage. We believe that this lower mortality may largely result from the fact that elderly persons living alone are more likely to enter institutions in better physical health than elderly people living with a spouse, as is suggested by the analyses presented in the previous section. This conclusion is indirectly supported by observations of increased mortality among those living alone in the general population (Koskinen, Joutsenniemi, Martelin, & Martikainen, 2008).

A younger age was associated with returning to the community, although this effect was relatively weak. Return to the community after long-term institutional care may not be considered a real alternative by health-care professionals, relatives or patients, as admission may be seen as the final solution. However, the provision of informal family care may be a prerequisite, and our finding of greater chances of return among men and women with a spouse

at baseline seems to support this. Another resource needed for return after a potentially lengthy care episode is the availability of accommodation, and again our finding (see also Greene & Ondrich, 1990) of greater chances of return among those owning a house or flat corroborates this.

In Finland the same underlying policy objectives apply to community discharge than do to entry; people should have the chance of living independently for as long as possible. In the data we present, return to the community is partly from nursing homes but also – and possibly more importantly – return from hospital and rehabilitation care. For example, among the elderly the 90 day criterion that we use for long term care is often fulfilled in the case of hip replacement operation or stroke, both conditions requiring lengthy hospital care often followed by rehabilitation care. Particularly in the case of rehabilitation care community discharge is the stated objective of care. However, closer analyses of care patterns and chains of care before community discharge are beyond the objectives of this study.

Overall, the fact that determinants of entry are stronger than determinants of exit – regardless of the mode of exit – may reflect the greater homogeneity in terms of health and functioning status among the population in long-term institutional care than among the population living in the community. A likely explanation for this observation relates to the working of the health-care system. The screening process and the decisions of health professionals to keep patients in or transfer them to long-term care are made mostly on medical grounds (especially in the case of hospital care), and thus those entering into care are likely to be more homogenous in terms of health and functioning status largely irrespective of their socio-demographic characteristics.

Methodological considerations

Large population-based longitudinal data linking different administrative registers carry several major advantages. They facilitate the continuous follow-up of entry into and exit from institutional care, thus allowing unbiased estimation of the effects of various factors on these transitions. We also had detailed information on household income. Furthermore, we had no loss to follow-up and no missing values or mis-reporting, which are serious problems with survey-based data. Our data also carried sufficient power to enable accurate detection of the effects of determinants that are relatively rare.

Our data on disease prevalence is based on registration data on hospital and medication use. In general, the prevalence rates we found were quite close to those derived from population-based clinical examinations and other sources (e.g., Aromaa & Koskinen, 2004). The two most notable exceptions were dementia and osteoarthritis, both of which were underestimated in our study. Information on both conditions was based on hospital-use data, and is thus likely to represent the most severe cases. Similarly, cancers that were not being actively treated, or had been cured, were excluded from our study. The chronic disease data is thus likely to underestimate physical and cognitive functional difficulties in the population (for a more thorough discussion see Nihtilä et al., 2007), and thus the unexplained effects of living arrangements and socioeconomic indicators may be partly due to unmeasured health differences between these groups.

Conclusion and policy implications

We have shown that in a large population-based sample of elderly Finns living in private households at baseline first entry into institutional care is strongly determined by female gender, although older age, living alone, and lower socioeconomic status also play important roles. The contribution of these factors was particularly strong in terms of predicting entry among men. Exit from institutional care is determined by these same factors, but the associations are mostly inverse and weaker. The data also show that women and certain other population groups, such as those living alone, are likely to spend a much longer time in institutional care given the higher likelihood of entry and the lower likelihood of exit. In an ageing population these results have implications for interventions aiming to delay the need for long-term care, for its targeting and financing, and for devising alternative forms of care.

Most current projections of the need for and cost of long-term care take account of the projected size of future populations and their age and gender distributions. More recently, alternative scenarios about the development of disability and functioning have been incorporated into the projections (Murray & Lopez, 1997; OECD, 2006). However, the future distribution of populations according to living arrangements and socioeconomic status has not been effectively incorporated, although our results show that these aspects are important. For example, although the proportion of the elderly living alone has increased in the past 20–30 years in many Western countries, it is likely that this trend will be reversed. An expected increase in life expectancy, and particularly a reduction in gender differentials in mortality, and higher proportions of married cohorts now entering the elderly phase, may help to bring about this potential reversal in the proportion living alone (Kalogirou & Murphy, 2006). Furthermore, with the ageing of the current post-war baby boom generations those entering old age will in many countries be better educated and likely to enjoy higher incomes in retirement. These future trends of higher proportion of future elderly living with a partner and enjoying better socioeconomic circumstances coupled with our findings of shorter duration of care among these sub-groups may ease pressure on the public health and social care systems providing long term institutional care.

References

Aguero-Torres, H., von Strauss, E., Viitanen, M., Winblad, B., & Fratiglioni, L. (2001). Institutionalization in the elderly: the role of chronic diseases and dementia. Cross-sectional and longitudinal data from a population-based study. *Journal of Clinical Epidemiology, 54*, 795—801.

Aromaa, A., & Koskinen, S. (2004). *Health and functional capacity in Finland. Baseline Resuls of the Health 2000 Health Examination Survey.* Publications of the National Public Health Insitute No. B12. Helsinki: National Public Health Insitute.

Banaszak-Holl, J., Fendrick, A. M., Foster, N. L., Herzog, A. R., Kabeto, M. U., Kent, D. M., et al. (2004). Predicting nursing home admission: estimates from a 7-year follow-up of a nationally representative sample of older Americans. *Alzheimer Disease and Associated Disorders, 18*, 83—89.

Blomgren, J., Koskinen, S., Martikainen, P., Martelin, T., Sainio, P., & Breeze, E. (Submitted manuscript). Help from spouse and from children among older people with functional limitations: comparison of England and Finland.

Branch, L. G., & Jette, A. M. (1982). A prospective study of long-term care institutionalization among the aged. *American Journal of Public Health, 72*, 1373—1379.

Breeze, E., Sloggett, A., & Fletcher, A. (1999). Socioeconomic and demographic predictors of mortality and institutional residence among middle aged and older people: results from the Longitudinal Study. *Journal of Epidemiology and Community Health, 53*, 765—774.

Engle, V. F., & Graney, M. J. (1993). Predicting outcomes of nursing home residents: death and discharge home. *Journal of Gerontology, 48*, 269—275.

Flacker, J. M., & Kiely, D. K. (2003). Mortality-related factors and 1-year survival in nursing home residents. *Journal of the American Geriatrics Society, 51*, 213—221.

Freedman, V. A. (1993). Kin and nursing home lengths of stay: a backward recurrence time approach. *Journal of Health and Social Behavior, 34*, 138—152.

Freedman, V. A. (1996). Family structure and the risk of nursing home admission. *The journals of Gerontology. Series B, Psychological Sciences and Social Sciences, 51*, 61—69.

Gaugler, J., Duval, S., Anderson, K., & Kane, R. (2007). Predicting nursing home admission in the U.S: a meta-analysis. *BMC Geriatrics, 7*, 13.

Greene, V. L., & Ondrich, J. I. (1990). Risk factors for nursing home admissions and exits: a discrete-time hazard function approach. *Journal of Gerontology, 45*, 250—258.

Grundy, E., & Glaser, K. (1997). Trends in, and transitions to, institutional residence among older people in England and Wales, 1971-91. *Journal of Epidemiology and Community Health, 51*, 531—540.

Grundy, E., & Jitlal, M. (2007). Socio-demographic variations in moves to institutional care 1991-2001: a record linkage study from England and Wales. *Age and Ageing, 36*, 424—430.

Himes, C. L., Wagner, G. G., Wolf, D. A., Aykan, H., & Dougherty, D. D. (2000). Nursing home entry in Germany and the United States. *Journal of Cross-Cultural Gerontology, 15*, 99—118.

Hughes, M. E., & Waite, L. J. (2002). Health in household context: living arrangements and health in late middle age. *Journal of Health and Social Behavior, 43*, 1—21.

Kalogirou, S., & Murphy, M. (2006). Marital status of people aged 75 and over in nine EU countries in the period 2000–2030. *European Journal of Ageing, 3*, 74-81.

Katz, S. J., Kabeto, M., & Langa, K. M. (2000). Gender disparities in the receipt of home care for elderly people with disability in the United States. *The Journal of the American Medical Association, 284*, 3022—3027.

Kemper, P., & Murtaugh, C. M. (1991). Lifetime use of nursing home care. *The New England Journal of Medicine, 324*, 595—600.

Koskinen, S., Joutsenniemi, K., Martelin, T., & Martikainen, P. (2008). Mortality differences according to living arrangements. *International Journal of Epidemiology, 36*, 1255–1264.

Lääkelaitos. (1997). *Lääkkeiden luokitus (ATC) ja määritellyt vuorokausiannokset (DDD) (Classification of medicines and defined daily portions)*. Helsinki: National Agency for Medicines.

Lääkelaitos. (1998). *Lääkkeiden luokitus (ATC) ja määritellyt vuorokausiannokset (DDD) (Classification of medicines and defined daily portions)*. Helsinki: National Agency for Medicines.

Lakdawalla, D. N., & Schoeni, R. F. (2003). Is Nursing Home Demand Affected by the Decline in Age Difference Between Spouses? *Demographic Research, 8*, 279—304.

Larsson, K., & Thorslund, M. (2002). Does Gender Matter?: Differences in Patterns of Informal Support and Formal Services in a Swedish Urban Elderly Population. *Research on Aging, 24*, 308—336.

Liu, K., Coughlin, T., & McBride, T. (1991). Predicting nursing-home admission and length of stay. A duration analysis. *Medical Care, 29*, 125—141.

Mehr, D. R., Williams, B. C., & Fries, B. E. (1997). Predicting discharge outcomes of VA nursing home residents. *Journal of Aging and Health, 9*, 244—265.

Murray, C. J., & Lopez, A. D. (1997). Alternative projections of mortality and disability by cause 1990-2020: Global Burden of Disease Study. *Lancet, 349*, 1498—1504.

Mustard, C., Finlayson, M., Derksen, S., & Berthelot, J. M. (1999). What determines the need for nursing home admission in a universally insured population? *Journal of Health Services Research & Policy, 4*, 197—203.

Nihtilä, E., & Martikainen, P. (2008a). Household income and other socio-economic determinants of long-term institutionalisation among older adults. *Population Studies,* In Press.

Nihtilä, E., & Martikainen, P. (2008b). Why older people living with a spouse are less likely to be institutionalised: the role of socio-economic factors and health characteristics. *Scandinavian Journal of Public Health,* In Press.

Nihtilä, E., Martikainen, P., Koskinen, S., Reunanen, A., Noro, A., & Häkkinen, U. (2007). Chronic conditions and the risk of long-term institutionalization among older people . *European Journal of Public Health,* Epub.

Nuotio, M., Tammela, T. L., Luukkaala, T., & Jylhä, M. (2003). Predictors of institutionalization in an older population during a 13-year period: the effect of urge incontinence. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences, 58*, 756—762.

OECD. (1982). *The OECD List of Social Indicators*. Paris: OECD.

OECD. (2006). *Projecting OECD Health and Long-Term Care Expenditures: What Are the Main Drivers?* OECD Economics Department Working Papers No. 477. Paris: OECD Publishing.

Ross, C. E., Mirowsky, J., & Goldsteen, K. (1990). The impact of the family on health: the decade in review. *Journal of Marriage and the Family, 52*, 1059—1078.

Shapiro, E., & Tate, R. (1988). Who is really at risk of institutionalization? *The Gerontologist, 28*, 237—245.

Social Insurance Institution. (1998). *Statistical Yearbook of the Social Insurance Institution, Finland, 1997*. Helsinki: Social Insurance Institution.

Spence, D. A., & Wiener, J. M. (1990). Nursing home length of stay patterns: results from the 1985 National Nursing Home Survey. *The Gerontologist, 30*, 16—20.

Spillman, B. C., & Lubitz, J. (2002). New estimates of lifetime nursing home use: have patterns of use changed? *Medical Care, 40*, 965—975.

STAKES. (1999). *Second edition of Finnish version of the International Statistical Classification of Diseases and Related Health Problems, tenth revision. Volume 1*. Helsinki: STAKES.

STAKES. (2007). *Care and Services for Older People 2005*. Helsinki: Official Statistics of Finland (OSF) Social Protection.

Stata Corporation. (2003). *Stata Statistical Software. Release 8.0. College Station TX*. Stata Corporation.

Tilastokeskus. (1994). *Väestölaskenta 1990:9. Vuoden 1990 väestölaskennan luotettavuustutkimus (Reliability study on the 1990 census)*. Helsinki: Statistics Finland.

Tomiak, M., Berthelot, J. M., Guimond, E., & Mustard, C. A. (2000). Factors associated with nursing-home entry for elders in Manitoba, Canada. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences, 55*, 279—287.

Umberson, D. (1992). Gender, marital status and the social control of health behavior. *Social Science & Medicine, 34*, 907—917.

Wolinsky, F. D., Callahan, C. M., Fitzgerald, J. F., & Johnson, R. J. (1992). The risk of nursing home placement and subsequent death among older adults. *Journal of Gerontology, 47*, 173—182.

Table 1. institutionalization, mode of exit from institution and mean length of stay in 1998-2003 among Finnish men aged 65+ living in the community at the end of 1997

	Total (N=108474)		Those institutionalized (N=10815)		
	N	% institutionalized[a]	% died in institution[a]	% returned to the community[a]	Mean length of stay (days)[b]
Age					
65-69	41715	4.2	34.0	41.6	558
70-74	31942	7.7	40.8	33.5	577
75-79	18843	13.5	45.9	29.6	679
80-84	10334	22.2	52.8	24.4	704
85-90	4504	29.5	60.4	21.9	715
90+	1136	38.6	73.1	18.2	752
Living arrangement					
with spouse	78151	9.6	49.2	28.4	645
alone	23734	15.1	49.5	28.1	746
other	6589	13.6	49.6	28.5	719
Home ownership					
yes	90943	10.3	48.7	28.9	666
no	17531	15.5	51.4	26.9	751
Household income					
1. Quartile (high)	31943	9.6	48.3	29.4	660
2. Quartile	30461	11.0	49.4	29.4	641
3. Quartile	25474	12.2	49.4	27.7	719
4. Quartile (low)	20596	12.5	50.2	27.1	722
Total	108474	11.1	49.3	28.4	686

[a] Adjusted for age

[b] Obtained from parametric Weibull survival analyses

Table 2. institutionalization, mode of exit from institution and mean length of stay in 1998-2003 among Finnish women aged 65+ living in the community at the end of 1997

	Total (N=172248)		Those institutionalized (N=25111)		
	N	% institutionalized[a]	% died in institution[a]	% returned to the community[a]	Mean length of stay (days)[b]
Age					
65-69	51231	4.0	24.3	43.1	831
70-74	46784	8.8	29.0	34.3	845
75-79	36040	16.9	35.2	27.9	1028
80-84	23300	28.9	42.6	25.1	1066
85-90	11598	39.3	54.0	20.6	1105
90+	3295	47.0	66.3	15.7	1150
Living arrangement					
with spouse	62751	12.1	39.1	28.7	994
alone	86151	14.7	39.3	27.6	1105
other	23346	13.9	40.4	28.8	991
Home ownership					
yes	134594	12.7	38.8	28.6	1045
no	37654	16.5	41.6	26.8	1103
Household income					
1. Quartile (high)	38627	12.0	37.8	28.7	1076
2. Quartile	40427	12.8	40.7	27.9	1018
3. Quartile	43652	14.1	40.3	28.0	1062
4. Quartile (low)	49542	15.0	39.2	27.8	1078
Total	172248	13.6	39.6	28.1	1064

[a] Adjusted for age

[b] Obtained from parametric Weibull survival analyses

Table 3. institutionalization and mode of exit from institution in 1998-2003 among Finnish men aged 65+ living in the community at end of 1997. Hazard ratios by living arrangement, home ownership and income

	Total (N=108474)			Those institutionalized (N=10815)								
	First entry			Died in institution			Returned to the community			Total exit		
Age	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3
65-69	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
70-74	1.96 *	1.90 *	1.83 *	1.05	1.05	1.03	0.73 *	0.73 *	0.72 *	0.87 *	0.87 *	0.86 *
75-79	3.78 *	3.59 *	3.24 *	1.13 *	1.13 *	1.10	0.63 *	0.63 *	0.62 *	0.85 *	0.85 *	0.83 *
80-84	7.41 *	6.64 *	5.83 *	1.21 *	1.21 *	1.17 *	0.49 *	0.49 *	0.48 *	0.82 *	0.82 *	0.79 *
85-89	12.24 *	10.18 *	8.67 *	1.37 *	1.39 *	1.33 *	0.44 *	0.45 *	0.43 *	0.87 *	0.88 *	0.85 *
90+	21.53 *	16.68 *	15.22 *	1.75 *	1.81 *	1.77 *	0.38 *	0.39 *	0.37 *	1.00	1.04	1.01
Living arrangement												
with spouse	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
alone	1.72 *	1.57 *	1.55 *	0.89 *	0.90 *	0.91 *	0.90 *	0.94	0.93	0.89 *	0.91 *	0.92 *
other	1.55 *	1.57 *	1.50 *	0.91	0.91	0.92	0.94 *	0.95	0.93	0.92 *	0.92 *	0.93
Home ownership												
yes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
no	1.70 *	1.50 *	1.37 *	0.95	0.98	0.98	0.85 *	0.88 *	0.88 *	0.90 *	0.93 *	0.94 *
Household income												
1. Quartile (high)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2. Quartile	1.19 *	1.19 *	1.18 *	1.04	1.04	1.03	0.99	0.99	0.99	1.02	1.02	1.01
3. Quartile	1.38 *	1.29 *	1.29 *	0.97	0.98	0.97	0.90 *	0.92	0.91	0.95	0.96	0.95
4. Quartile (low)	1.39 *	1.24 *	1.18 *	0.98	0.99	0.99	0.86 *	0.90 *	0.88 *	0.93 *	0.95	0.95

M1= age adjusted, M2= age + living arrangement + house ownership + household income, M3= M2 + health status, * $p<0.05$

Table 4. institutionalization and mode of exit from institution in 1998-2003 among Finnish women aged 65+ living in the community at end of 1997. Hazard ratios by living arrangement, home ownership and income

	Total (N=172248)			Those institutionalized (N=25111)								
	First entry			Died in institution			Returned to the community			Total exit		
Age	M1	M2	M3	M1	M2	M3	M1	M2	M3	M1	M2	M3
65-69	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
70-74	2.30 *	2.19 *	2.10 *	1.06	1.07	1.03	0.73 *	0.73 *	0.72 *	0.85 *	0.85 *	0.83 *
75-79	4.87 *	4.42 *	4.02 *	1.18 *	1.19 *	1.12 *	0.56 *	0.57 *	0.55 *	0.78 *	0.79 *	0.76 *
80-84	9.78 *	8.52 *	7.43 *	1.38 *	1.41 *	1.32 *	0.49 *	0.50 *	0.49 *	0.82 *	0.83 *	0.79 *
85-89	16.73 *	14.19 *	12.05 *	1.73 *	1.76 *	1.65 *	0.40 *	0.41 *	0.40 *	0.89 *	0.91 *	0.86 *
90+	27.65 *	22.93 *	19.89 *	2.23 *	2.28 *	2.15 *	0.31 *	0.32 *	0.31 *	1.02	1.04	0.99
Living arrangement												
with spouse	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
alone	1.34 *	1.25 *	1.25 *	0.93 *	0.93 *	0.94 *	0.93 *	0.94	0.94 *	0.93 *	0.93 *	0.93 *
other	1.24 *	1.25 *	1.22 *	1.00	1.00	1.01	0.97	0.98	0.97	0.98	0.99	0.99
Home ownership												
yes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
no	1.35 *	1.28 *	1.20 *	1.00	1.01	1.00	0.90 *	0.91 *	0.91 *	0.96 *	0.97	0.97
Household income												
1. Quartile (high)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2. Quartile	1.09 *	1.08 *	1.06 *	1.08 *	1.08 *	1.08 *	0.99	0.99	0.99	1.04	1.04	1.04
3. Quartile	1.22 *	1.16 *	1.13 *	1.06	1.07 *	1.07 *	0.98	1.00	0.99	1.02	1.04	1.04
4. Quartile (low)	1.28 *	1.17 *	1.09 *	1.03	1.05	1.04	0.95	0.99	0.98	1.00	1.02	1.01

M1= age adjusted, M2= age + living arrangement + house ownership + household income, M3= M2 + health status, * $p<0.05$

Table 5. Hazard ratios (women vs. men) of institutionalization and mode of exit from institution in 1998-2003 among Finns aged 65+ living in the community at the end of 1997

	Total (N=280722)		Those institutionalized (N=35926)					
	First entry		Died in institution		Returned to the community		Total exit	
Model	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
unadjusted	1.42	(1.39 - 1.45)	0.70	(0.68 - 0.72)	0.81	(0.78 - 0.84)	0.74	(0.72 - 0.76)
age-adjusted	1.12	(1.10 - 1.15)	0.66	(0.64 - 0.69)	0.89	(0.86 - 0.93)	0.75	(0.73 - 0.77)
age+living arrangement	0.97	(0.95 - 1.00)	0.68	(0.66 - 0.71)	0.92	(0.88 - 0.96)	0.77	(0.75 - 0.79)
age+household income	1.10	(1.07 - 1.12)	0.67	(0.64 - 0.69)	0.90	(0.86 - 0.94)	0.75	(0.73 - 0.77)
age+home ownership	1.09	(1.07 - 1.12)	0.66	(0.64 - 0.69)	0.90	(0.86 - 0.94)	0.75	(0.73 - 0.77)
age+health status	1.08	(1.06 -1.11)	0.67	(0.65 - 0.69)	0.88	(0.85 - 0.92)	0.75	(0.73 - 0.77)
full model	0.94	(0.91 - 0.96)	0.68	(0.66 - 0.71)	0.91	(0.87 - 0.95)	0.77	(0.75 - 0.79)