

Living Arrangements, Changes in Living Arrangements, and Survival among Community Dwelling Older Adults

ABSTRACT

Objectives. This study examines whether living arrangements and changes in living arrangements are associated with survival among older community-dwelling adults, and whether differences in health status account for observed differences in survival.

Methods. The sample consisted of 5085 persons aged 70 years or older who had participated in the Longitudinal Study of Aging in 1984 and 1986. Proportional hazards models were used to examine associations of survival time through 1990 with living arrangements in 1984 and with changes in living arrangements from 1984 to 1986.

Results. Women who lived with someone other than a spouse at baseline or who changed from living with a spouse to living with someone other than a spouse were at greater risk of dying than women in other living arrangements, independent of health status or functioning. Among men, survival time was not generally associated with baseline living arrangements.

Conclusions. Older adults who live alone or who change from living with someone to living alone do not have an increased mortality risk. However, living with or changing to living with someone other than a spouse may be associated with increased mortality risk. (*Am J Public Health*. 1997;87:371-377)

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Introduction

Both the number and proportion of older community-dwelling adults who live alone have increased dramatically since 1960.^{1,2} In general, the ability to remain independent and live alone is associated with a high quality of life among older adults.³ However, there is concern that older adults living alone may be particularly vulnerable to poverty, social isolation, adverse health outcomes, and mortality.⁴⁻⁶

Several factors may cause older adults to change their living arrangements. These include the death of a spouse⁷ or other household member, divorce, a change in economic circumstances,^{8,9} change in health or functional status,^{10,11} the availability and needs of children or relatives,^{12,13} and personal preferences.^{11,14} Previous research has examined the effects of living arrangements on health, well-being, and survival,¹⁵⁻¹⁷ however, the conclusions have been limited by the lack of longitudinal studies; the inconsistent categorization of living arrangements; and the exclusion of men, ethnic minorities, or the oldest old, who are at greatest risk of living alone and having poor health. Furthermore, little longitudinal research has examined whether changes in living arrangements are associated with a decrease in survival among older adults. Therefore, the purpose of this study was to examine the association of living arrangements and changes in living arrangements with survival among a representative sample of US community-dwelling men and women aged 70 years and older who had participated in the Longitudinal Study of Aging (LSOA).^{18,19} We examined whether morbidities and functional status account for observed

differences in survival by living arrangement.

Methods

Sample Selection

The baseline data for the LSOA came from the 1984 Supplement on Aging, an extensive questionnaire that was added to the ongoing National Health Interview Survey.¹⁸ Thereafter, three Longitudinal Study follow-up interviews—in 1986, 1988, and 1990—were administered. Data were analyzed for 5151 people who were aged 70 years and over at the time of the 1984 Supplement and were eligible to be interviewed at all three follow-ups. Blacks, Hispanics, and the oldest-old and their family members were intentionally oversampled from the Supplement.¹⁸ Whereas baseline interviews were conducted in person, follow-up interviews were conducted by telephone. Proxy interviews (usually provided by a relative¹⁸) were provided for people who were unavailable or unable to respond (10% of participants at baseline). Details of the LSOA and the Supplement appear elsewhere.^{18,19}

Measures

Mortality. Vital status and dates of death were determined from the LSOA

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TABLE 1—Distribution of and Changes in Living Arrangements by Sex: Longitudinal Study of Aging, 1984 and 1986

| | Women | | Men | |
|---|-------|----------------|------|----------------|
| | No. | % ^a | No. | % ^a |
| Living arrangements in 1984, total sample | | | | |
| n | 3260 | | 1825 | |
| With spouse | 916 | 29.9 | 1294 | 73.2 |
| Alone | 1561 | 48.3 | 338 | 17.7 |
| With other ^b | 783 | 21.9 | 193 | 9.1 |
| Changes in living arrangements between 1984 and 1986, total sample | | | | |
| n | 2632 | | 1380 | |
| No change | 2176 | 83.5 | 1195 | 88.0 |
| Change | | | | |
| With spouse to alone | 92 | 3.3 | 68 | 4.2 |
| With other ^b to alone | 101 | 4.0 | 19 | 1.3 |
| With spouse to with other ^b | 30 | 1.1 | 23 | 1.8 |
| Alone to with other ^b | 93 | 3.4 | 21 | 1.2 |
| Community to institution | 129 | 4.2 | 43 | 2.8 |
| Other change | 11 | 0.5 | 11 | 0.7 |

^aPercentages were calculated with the Longitudinal Study of Aging sample weights.

^bSomeone other than a spouse.

TABLE 2—Distribution of Demographic and Health Characteristics by Living Arrangements and Sex: Longitudinal Study of Aging, 1984

| | Women (n = 3260) | | | Men (n = 1825) | | |
|--|------------------|-------|-------------------------|----------------|-------|-------------------------|
| | With Spouse | Alone | With Other ^a | With Spouse | Alone | With Other ^a |
| Mean age, y | 75.0 | 77.9 | 79.0 | 75.7 | 77.9 | 78.2 |
| African American, % | 6.3 | 6.8 | 14.5 | 7.5 | 9.0 | 13.3 |
| <12 years education, % | 51.5 | 54.2 | 58.8 | 57.7 | 61.7 | 76.8 |
| Chronic conditions | | | | | | |
| Cardiovascular condition(s), % | 58.5 | 60.0 | 65.1 | 54.5 | 43.2 | 49.1 |
| Musculoskeletal condition(s), % | 62.3 | 64.4 | 65.5 | 47.1 | 48.8 | 38.2 |
| Diabetes, % | 9.8 | 8.5 | 14.1 | 10.1 | 6.0 | 14.5 |
| Cancer, % | 12.0 | 11.7 | 11.8 | 13.5 | 11.5 | 16.9 |
| Activities of daily living, % | | | | | | |
| One | 8.8 | 11.0 | 11.5 | 8.7 | 13.0 | 9.6 |
| Two or more | 14.9 | 18.9 | 30.6 | 10.2 | 10.4 | 22.9 |
| Instrumental activities of daily living, % | | | | | | |
| One | 18.1 | 18.1 | 17.7 | 11.4 | 13.6 | 9.9 |
| Two or more | 13.3 | 17.3 | 32.6 | 8.0 | 7.9 | 24.3 |
| Functioning difficulties, % | | | | | | |
| One | 14.0 | 15.0 | 9.3 | 13.6 | 17.7 | 8.8 |
| Two or more | 47.4 | 54.3 | 65.5 | 38.7 | 43.7 | 49.3 |
| Use of proxy respondent, % | 7.3 | 2.5 | 23.8 | 10.2 | 2.1 | 25.1 |

Note. Means and percentages were calculated with the Longitudinal Study of Aging sample weights.

^aSomeone other than a spouse.

interest in examining the independent effects of those arrangements and marital status, and in assessing whether *any* change in living arrangements represents a risk factor for mortality. Reported living arrangements in 1984 were categorized as follows: living alone, living with a spouse (with or without children), or living with someone other than a spouse. The change in living arrangement variables used 1984 and 1986 living arrangements and were categorized as follows: change from living with a spouse to living alone, from living with someone other than a spouse to living alone, from living with a spouse to living with someone other than a spouse, from living alone to living with someone other than a spouse, and no change.

Health conditions. Two summary variables, indicating the presence of one or more conditions within the category, characterized health conditions at baseline: (1) cardiovascular disease (ever had coronary heart disease, angina pectoris, heart attack, or hardening of the arteries, or had an aneurysm in the past year), and (2) musculoskeletal disease (ever had osteoporosis or a broken hip, or had arthritis in the past year). In addition, single items were cancer (ever had) and diabetes (had in the past year).

Functioning. Three summary variables characterized difficulties in physical functioning: (1) limitations in activities of daily living,²⁰ defined as difficulty in doing or inability to perform any of the following: bathing, dressing, eating, transferring, walking, going outside, or using the toilet; (2) limitations in instrumental activities of daily living, defined as difficulty in preparing meals, shopping for personal items, managing money, or using the phone, based on the instrumental activities of daily living scale of the Older Americans Resources and Services Survey²¹; and (3) functional limitations, based on items from the Nagi disability scale²²: inability or difficulty in walking short distances, walking up 10 stairs, standing, sitting, stooping, reaching overhead, reaching out, using fingers, lifting light weights, and lifting heavy weights.

Demographic variables included age, race (White/Black), sex, education (0 to 11 years, 12+ years), and two indicators of income (family income, and family income in relation to the poverty level).

Analyses

Our initial sample included 5085 persons (as 66 persons whose race was

“best estimate” of the sample person’s status. This estimate was based on linkage to the National Death Index along with information provided by contact persons.

Follow-up time ended with the last 1990 interview.

Living arrangements. Our categorization of living arrangements reflects our

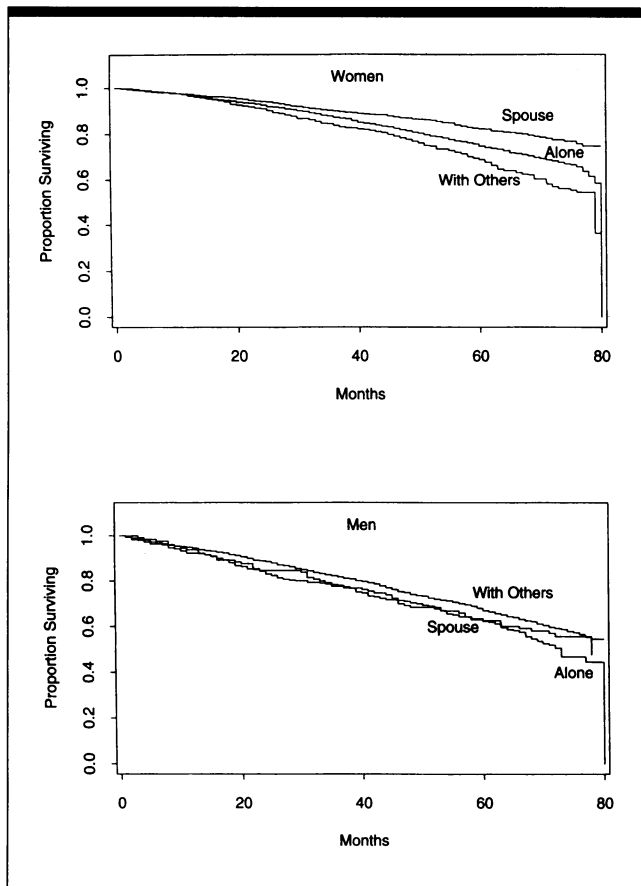


FIGURE 1—Kaplan-Meier survival curves from 1984 to 1990, by living arrangements and sex, for the Longitudinal Study of Aging.

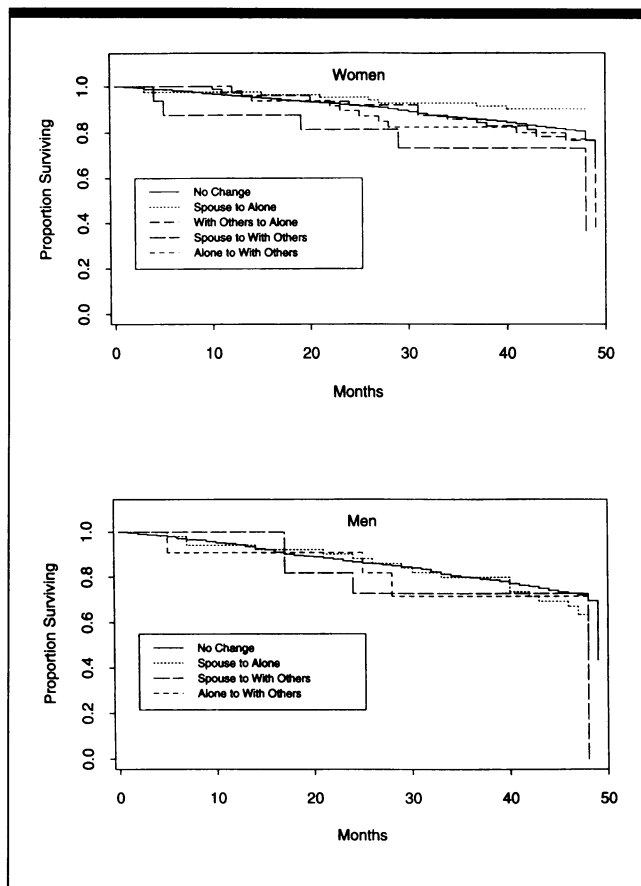


FIGURE 2—Kaplan-Meier survival curves for change in living arrangements between 1984/86 and 1990, by living arrangements and sex, for the Longitudinal Study of Aging.

other than Black or White were excluded). Our analytic sample for the baseline survival analysis (Figure 1 and Table 3) included persons who had responded for themselves in 1984 and had complete data ($n = 4260$). For the change in living arrangements analysis (Figure 2 and Table 4), our sample included the 2849 persons who in 1986 were alive, responded for themselves, were noninstitutionalized, and had complete covariate data.

Roughly 10% of respondents had proxy interviews at baseline, and the associations of living arrangements with survival were examined separately for those respondents and for those who had responded for themselves. The patterns of association of living arrangements with survival were quite different for the two groups. Because combining data from groups that exhibit different patterns of association can potentially introduce bias²³ and because most of the sample gave interviews themselves, the data are presented only for the sample that responded

for themselves. (Data for the proxy respondents are available upon request.)

With the use of the PHREG procedure in SAS (Tables 3 and 4), the association of living arrangements and changes in living arrangements with subsequent survival were examined with Kaplan-Meier curves²⁴ (Figures 1 and 2) and Cox proportional hazard models.²⁵ Separate models were fit by sex. Parallel analyses were carried out to assess the association of survival with living arrangements in 1984 (covariates were from the 1984 interview) and with changes in living arrangements from 1984 to 1986 (all covariates except chronic conditions were from the 1986 interview). Plots of the log-minus-log survivor function²⁵ by each living arrangement group or living arrangement change group by sex suggested that the proportional hazards assumption was reasonable.

Estimates of the age- and race-adjusted relative hazards corresponding to living arrangements and change in living

arrangements were computed and then adjusted for comorbidities and functioning. Interactions between the living arrangement variables and the comorbidity and functioning variables were examined by including products of these variables in the proportional hazard models and testing the statistical significance of the interaction terms with the use of likelihood ratio tests. No interactions were detected.

The LSOA sampling design was incorporated into our analyses by weighting the sample means and proportions in Tables 1 and 2, and by fitting separate proportional hazards for men and women and including the design variables of age and race as covariates for multivariate analyses. Since the standard error calculations that incorporated the cluster design^{26,27} yielded design effects for the Cox regression coefficients very close to 1, Tables 3 and 4 use variance estimates calculated under the assumption of independence within clusters.

TABLE 3—Relative Hazards (RHs) of Death (Longitudinal Study of Aging, 1990), by Sex, for Baseline Living Arrangements* (Longitudinal Study of Aging, 1984), Adjusted for Demographic and Health Characteristics (n = 4260)

| Demographic/Health Characteristics | Alone | | With Other | |
|---|-------|-------------------------|------------|-------------------------|
| | RH | 95% Confidence Interval | RH | 95% Confidence Interval |
| Women | | | | |
| Age and race | 1.15 | 0.96, 1.38 | 1.53 | 1.24, 1.89 |
| Age, race, and education | 1.16 | 0.96, 1.39 | 1.57 | 1.27, 1.94 |
| Age, race, and chronic conditions | 1.16 | 0.97, 1.40 | 1.52 | 1.23, 1.87 |
| Age, race, and no. of activities of daily living | 1.14 | 0.95, 1.37 | 1.49 | 1.21, 1.83 |
| Age, race, and no. of instrumental activities of daily living | 1.15 | 0.96, 1.39 | 1.43 | 1.16, 1.77 |
| Age, race, and no. of functional limitations | 1.11 | 0.93, 1.33 | 1.47 | 1.20, 1.82 |
| All variables above | 1.15 | 0.96, 1.39 | 1.45 | 1.17, 1.79 |
| Men | | | | |
| Age and race | 1.13 | 0.94, 1.37 | 1.02 | 0.77, 1.34 |
| Age, race, and education | 1.10 | 0.91, 1.34 | 0.99 | 0.74, 1.31 |
| Age, race, and chronic conditions | 1.19 | 0.98, 1.44 | 0.98 | 0.74, 1.30 |
| Age, race, and no. of activities of daily living | 1.12 | 0.92, 1.35 | 1.01 | 0.77, 1.34 |
| Age, race, and no. of instrumental activities of daily living | 1.13 | 0.94, 1.37 | 0.98 | 0.74, 1.30 |
| Age, race, and no. of functional limitations | 1.11 | 0.92, 1.35 | 0.99 | 0.75, 1.31 |
| All variables above | 1.12 | 0.92, 1.36 | 0.91 | 0.68, 1.21 |

*Persons living alone or living with someone other than a spouse vs those living with a spouse.

Results

Men were substantially more likely than women to be living with a spouse at baseline; the majority of men and women remained in the same living arrangement in 1984 and 1986 (Table 1). Among both men and women, those living with someone other than a spouse were more likely than those in either of the other living arrangements to be older, be African American, have lower education, have diabetes, report difficulty with two or more activities of daily living or instrumental activities of daily living, and have a proxy respondent (Table 2).

Women who lived with others at baseline, or who changed between 1984 and 1986 from living with a spouse to living with someone other than a spouse, had poorer survival experiences than those in the other living arrangements. Figures 1 and 2 show no substantial differences in survival by living arrangement or by change in living arrangement among men.

Multivariate analyses generally confirm the findings of Figures 1 and 2. After adjustment was made for demographic and health variables, women who lived

with someone other than a spouse at baseline were at greater risk of dying than those living with a spouse (Table 3). Among men, neither those living alone nor those living with someone other than a spouse were at elevated mortality risk compared with those living with a spouse.

Women who changed between 1984 and 1986 from living with a spouse to living with someone other than a spouse were at elevated mortality risk (Table 4). However, adjustment for the covariates reduced somewhat the magnitudes of the effects compared with adjustment for age and race alone. Among women, the change from living with a spouse to living alone was found to be protective although the association is not statistically significant. Among men, although change in living arrangements was not significantly associated with survival, there is a suggestion of an increased mortality risk for those who changed from living with a spouse to living with someone other than a spouse.

We also examined the potentially confounding effects of income on the association of survival with living arrange-

ment and living arrangement change by including family income and its relationship to the poverty level in the Cox models. We conducted this analysis for the subsample with valid income data. Neither of the income variables confounded the association of living arrangements or change in living arrangements with survival.

Discussion

We found that living alone does not have a detrimental influence on survival. This finding is encouraging for the many older women who live alone; it adds to evidence from several previous studies that suggests there is no particular disadvantage in health or mortality for middle-aged or older women living alone.^{15-17,28} It is possible that individuals who are able to live alone are healthier than those in other living arrangements; otherwise, they would be unable to live alone. If so, then our measures of health and functioning do not capture this advantage since respondents living alone have similar health profiles to those living with a spouse. It is also possible that when older adults live alone, they develop better coping mechanisms and contingency plans, such as the use of formal health services²⁹⁻³¹ and more extensive or accessible social networks, than those who live with someone. Use of formal health services by older adults living alone could help to maintain independent living until deteriorating health required a change in living arrangement, most likely to an institution. Previous studies report an increased risk of institutionalization for older adults living alone.^{16,32,33}

We also found that women who lived with someone other than a spouse at baseline or who changed from living with a spouse to living with someone other than a spouse were at a greater risk of death than those in other living arrangements. There are several possible explanations for this elevated mortality risk. It is likely that whether one lives alone or with others after the death of a spouse reflects living arrangements, sociodemographic characteristics, childbearing patterns, and family composition prior to widowhood that influence the change in living arrangements after the death of a spouse^{13,18,34,35} and potentially subsequent mortality. Previous research suggests that children's needs play a dominant role vis-à-vis coresidence with older parents,^{13,34} and thus the needs of frail older women may not be the primary determinant of these

TABLE 4—Relative Hazards (RHs) of Death (Longitudinal Study of Aging, 1990), by Sex, for Change in Living Arrangements (Longitudinal Study of Aging, 1984–1986) Compared with No Change in Living Arrangements, Adjusted for Demographic and Health Characteristics (n = 2849)

| Demographic/Health Characteristics | With Spouse to Alone | | With Other to Alone ^a | | With Spouse to with Other | | Alone to with Other | |
|--|----------------------|-------------------------|----------------------------------|-------------------------|---------------------------|-------------------------|---------------------|-------------------------|
| | RH | 95% Confidence Interval | RH | 95% Confidence Interval | RH | 95% Confidence Interval | RH | 95% Confidence Interval |
| Women | | | | | | | | |
| Age and race | 0.51 | 0.25, 1.03 | 1.24 | 0.76, 2.01 | 2.49 | 1.11, 5.58 | 1.11 | 0.59, 2.09 |
| Age, race, and education | 0.51 | 0.26, 1.04 | 1.26 | 0.77, 2.06 | 2.11 | 0.87, 5.14 | 1.11 | 0.59, 2.08 |
| Age, race, and chronic conditions | 0.53 | 0.26, 1.06 | 1.16 | 0.71, 1.90 | 2.68 | 1.19, 6.01 | 1.04 | 0.55, 1.95 |
| Age, race, and no. activities of daily living | 0.52 | 0.26, 1.06 | 1.13 | 0.69, 1.85 | 2.30 | 1.02, 5.17 | 1.05 | 0.56, 1.96 |
| Age, race, and no. instrumental activities of daily living | 0.51 | 0.26, 1.04 | 1.13 | 0.69, 1.85 | 2.44 | 1.09, 5.47 | 0.99 | 0.52, 1.85 |
| Age, race, and no. functional limitations | 0.51 | 0.25, 1.03 | 1.19 | 0.73, 1.95 | 2.47 | 1.10, 5.54 | 1.03 | 0.55, 1.93 |
| All variables above | 0.53 | 0.26, 1.08 | 1.08 | 0.66, 1.76 | 2.05 | 0.84, 5.01 | 0.93 | 0.50, 1.76 |
| Men | | | | | | | | |
| Age and race | 1.24 | 0.77, 2.01 | | | 1.92 | 0.71, 5.21 | 0.90 | 0.29, 2.83 |
| Age, race, and education | 1.23 | 0.76, 1.99 | | | 2.04 | 0.75, 5.56 | 0.82 | 0.26, 2.58 |
| Age, race, and chronic conditions | 1.16 | 0.72, 1.88 | | | 1.81 | 0.67, 4.91 | 1.07 | 0.34, 3.37 |
| Age, race, and no. activities of daily living | 1.20 | 0.74, 1.94 | | | 1.65 | 0.61, 4.50 | 1.07 | 0.34, 3.39 |
| Age, race, and no. instrumental activities of daily living | 1.21 | 0.75, 1.95 | | | 1.51 | 0.55, 4.12 | 1.03 | 0.33, 3.25 |
| Age, race, and no. functional limitations | 1.27 | 0.78, 2.05 | | | 1.58 | 0.58, 4.31 | 0.99 | 0.31, 3.10 |
| All variables above | 1.11 | 0.68, 1.80 | | | 1.40 | 0.51, 3.85 | 1.12 | 0.35, 3.57 |

^aSample of men was of insufficient size for analysis.

women's household composition. It is also possible that women living with others retain the accustomed homemaker and caregiving roles even if they are no longer physically up to the tasks. Furthermore, women living with someone other than a spouse may be less likely to use health services³⁰ or to partake in social activities or interactions outside the home. Finally, they may live with others because they suffer from illnesses (e.g., dementia) and disabilities not captured by our indicators of health and functioning.

Our findings are not wholly consistent with those of a previous report from the National Health and Nutrition Examination Survey (NHANES) Epidemiologic Follow-up Study.¹⁵ In that analysis, living arrangement was associated with survival time among men but not women. Men who lived alone or with someone other than a spouse had a higher mortality risk than those who lived with a spouse. Several methodological differences might account for the differences between those findings and the ones reported here. First,

it is likely that the impact of social factors on survival may vary by age,³⁶ and the LSOA sample is substantially older than the NHANES sample. Second, the NHANES follow-up time was much longer (10 to 15 years) than the LSOA follow-up time. It is reasonable to expect that living arrangements would have different effects on relatively short-term survival (as in the LSOA) compared with longer-term survival (as in NHANES) because many factors influencing survival—in particular, health, functioning, and additional living arrangement changes—are likely to change when the follow-up period is longer. Finally, the NHANES sample was representative of the US population in 1971 whereas the LSOA was representative of the US elderly population in 1984. Patterns of living arrangement have changed substantially over that period, with living alone being more commonplace among older adults as they age. As living alone becomes more "normative," its negative influence on

health and well-being may become less powerful.

A unique aspect of this analysis is the examination of changes in living arrangements in conjunction with baseline living arrangements. We were somewhat surprised to find that individuals who changed from living with a spouse were not consistently at an increased risk of death since a substantial body of research indicates an increased mortality risk following bereavement, particularly among men.^{37,38} However, most of the bereavement literature is based on younger samples, and the effects of bereavement may diminish as age increases.³⁹ Furthermore, the most consistent effects of bereavement have been found in the first year following the death of a spouse.^{39,40} Among women in our analysis, not only was there no increased mortality risk among those who changed from living with a spouse to living alone, but the risk of dying was smaller (albeit nonsignificantly) than that among women who did not experience a change in living

arrangement. If a woman was living with and providing care to a spouse who was seriously ill, this may have had negative consequences for her own health,⁴¹ which may then have improved following the spouse's death.

Although our focus was on living arrangement changes among community-dwelling adults, to fully understand the association of these changes with mortality, it is also important to assess the impact of changes from community living arrangements to a nursing home. Wolinsky and colleagues³³ have previously reported on this assessment using the LSOA data. They found that the odds of dying were 2.7 times greater among respondents who went to a nursing home than among those remaining in the community. Older adults who changed from living in a nonmulti-generational household to living in a nursing home had a higher risk of dying than those who had lived in a multigenerational household. Although living alone was a risk factor for nursing home placement, it was not necessarily a risk factor for subsequent death following nursing home placement.

It is important to keep in mind that changes in living arrangements and health are part of an ongoing process that is particularly germane to older people. It is likely that the health and well-being of older individuals experiencing changes in living arrangements reflect both past life circumstances³⁵ and expectations regarding the future, neither of which can be measured in a simple survey such as the LSOA.

Because this report focused on those who had self-reports, generalizability of our findings is limited to older adults who are able to respond for themselves. It is unclear why the association of living arrangements with survival differed for people with proxy reports. However, it is also not possible to examine the reasons for these differences, as proxy interviews were done for a variety of reasons, including poor health, inability to locate respondents, and unavailability of respondents.

In conclusion, we found that older US adults who live alone or change from another living arrangement to living alone are not at an increased risk of mortality. However, older women who live with someone other than a spouse or who change from living with a spouse to living with someone other than a spouse are at elevated mortality risk, independent of adjustments for health conditions and functional status. □

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Aging in Today's World: A Call for Papers for the October 1997 Journal

The Journal has joined with some 80 others in a coordinated global effort to publish papers on the topic of *Aging in October 1997*. The final deadline for *acceptance* for this Journal will be in mid *June 1997*. Hence, first submissions should not be delayed. The peer-review process and subsequent revisions can seldom be completed in less than 16 weeks. As always, a first criterion for proceeding to peer review will be relevance to public health.

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