Do Seniors Understand Their Risk of Moving to a Nursing Home?

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Objective. To determine whether seniors understand their risk of moving to a nursing home.

Data Sources. We used longitudinal data from the Asset and Health Dynamics Among the Oldest Old (AHEAD) database. AHEAD is a nationally representative survey ($n = 8{,}203$) of community dwellers aged 70+ years and their spouses.

Study Design. We followed respondents for 5 years from the date of the first interview fielded in 1993. Our primary dependent variable was whether respondents moved to a nursing home within 5 years of baseline; self-assessed probability of moving to a nursing home within 5 years, also assessed at baseline, was the primary explanatory variable.

Principal Findings. We found that seniors who believed they were more likely to move to a nursing home within 5 years were indeed more likely to do so, and that most elders overestimated their likelihood of moving to a nursing home.

Conclusions. Low rates of private long-term care insurance are not plausibly a result of seniors underestimating their personal risk of moving to a nursing home; such an assumption is inherent in many strategies to plan for the future long-term care needs of the baby boom generation.

Key Words. Nursing home, long-term care, risk perception, insurance

How to best provide long-term care services for the aging U.S. population is one of the most difficult public policy challenges of the twenty-first century (Feder, Komisar, and Niefeld 2000). Nursing home care is a subset of long-term care,[1] but one that receives a great deal of policy attention because of the public expenditure of funds via Medicaid after "spend-down" (Taylor, Sloan, and Norton 1999). Individuals are responsible for financing nursing home care until virtually all financial assets have been exhausted through spend down. The likelihood of spending some time in a nursing home is relatively high (around 40 percent of 65 year olds spend some time in a nursing home prior to death) (Liu 1994; Murtaugh et al. 1997), so elderly individuals and their families face potentially catastrophic financial outlays given that annual nursing home costs range from $40,000–$100,000 per year (Moody 2002). Nursing home expenditures are projected to be $180 billion in 2005 (Burner

and Waldo 1995) with out-of-pocket payments and Medicaid expected to remain the most important sources of funding. Private long-term care insurance is available, but less than 5 percent of seniors nationally have such insurance (Cohen 2003), and it covers a relatively small proportion of the total national nursing home bill.

A number of studies have identified important predictors of seniors moving to nursing homes (Cohen, Tell, and Wallack 1988; Murtaugh, Kemper, and Spillman 1990; Kemper and Murtaugh 1991; Murtaugh, Kemper, and Spillman 1995; Murtaugh et al. 1997; Cagney and Agree 1999). Moving to a nursing home has consistently been found to be more likely among persons who are older and those who have serious disabilities (e.g., larger number of limitations in Basic and Instrumental Activities of Daily Living [BADL and IADL]). African Americans, married persons, and men are less likely to be institutionalized than are whites, single persons, and women (Coughlin, McBride, and Liu 1990; Wolinsky et al. 1992; Murtaugh et al. 1997).

Given the substantial risk of needing such expensive care, it may appear surprising that private long-term care insurance is not more commonly purchased (Feder, Komisar, and Niefeld 2000).[2] Do elderly persons not correctly assess their personal risk of moving to a nursing home? Providing an empirical answer to this question is the motivation of this paper. If seniors systematically underestimate their personal risk of moving to a nursing home, then this could at least partially explain low rates of private long-term care insurance and imply that information campaigns designed to increase awareness of the risk of such care could increase the purchase of long-term care insurance. If they do understand their personal risks, then low rates of private long-term care insurance exist in spite of their understanding, and information campaigns designed to improve awareness of risk are not likely to be fruitful.

Subjective and Objective Probability of Moving to a Nursing Home

An individual's belief about their likelihood of moving to a nursing home is plausibly related to their actual move to a nursing home since such a belief

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likely contains information about a respondent's need, preferences, and intentions. The key test for whether such a belief is an important predictor of moving to a nursing home is whether it remains a predictor after controlling for other factors known to be linked to nursing home admission. Such beliefs and expectations are generally not measured, but are measured in the database used in this study allowing for such a test. Individuals' beliefs about their own longevity have been found to remain a significant predictor of their actual mortality after controlling for other factors known to influence mortality (Smith, Taylor, and Sloan 2001). We term individual's beliefs regarding their likelihood of moving to a nursing home within a certain time period (5 years in this study) a nursing home risk perception.

Two recent papers have analyzed nursing home risk perception measures similar to the one used in this paper in order to better understand the properties of those measures and to assess their usefulness in modeling life-cycle decision making and behavior (Holden, McBride, and Perozek 1997; Lindrooth, Hoerger, and Norton 2000). Both papers used a single cross-section of their respective database: the Health and Retirement Study (Holden, McBride, and Perozek 1997) and the Asset and Health Dynamics Among the Oldest Old (AHEAD) database, which we also used (Lindrooth, Hoerger, and Norton 2000) to investigate the correlates of the nursing home risk perception measure. In both cases, the nursing home risk perception measure correlated in a plausible manner with observed variables known to influence nursing home entry, leading the authors to conclude that the measure was likely a useful tool for understanding decision making related to nursing home entry. For example, Lindrooth, Hoerger, and Norton (2000) found that persons with more limitations in BADLs reported a higher nursing home risk perception, meaning persons who were more disabled thought they had a higher likelihood of moving to a nursing home within 5 years, which is plausible. While cross-sectional analyses such as these are useful in identifying the potential value of a nursing home risk perception measure, their cross-sectional design does not allow one to document the predictive validity of the measure, or determine the extent to which the risk perception would remain a significant predictor of nursing home entry net of other observed variables known to predict entry.

This paper addresses two related research questions. Do individual's beliefs about their likelihood of moving to a nursing home predict their actual move to a nursing home; and do individuals, on average, over- or underestimate their actual likelihood of moving to a nursing home? Both questions are central in the current debate over how to finance nursing home care, an expensive component of long-term care. Our longitudinal approach allows us to move beyond the

cross-sectional analyses of nursing home risk perceptions completed in the past (Lindrooth, Hoerger, and Norton, 2000) and provide a more complete assessment of the predictive power of the nursing home risk perception variable.

METHODS

Study Sample

AHEAD is an omnibus survey of elderly Americans. It was mainly designed to (1) monitor transitions in physical, functional, and cognitive health in advanced age, (2) examine changes in physical and cognitive health in light of patterns of "dissaving" and income flows, (3) relate changes in health to economic resources and intergenerational transfers, and (4) examine how the mix of economic, family, and programmatic resources affects key outcomes including institutionalization, dissaving, and health status (Soldo et al. 1997; see entire May 1997 issue of the *Journals of Gerontology: Social Sciences*). The AHEAD sample focused on persons aged 70+ years at baseline; spouses were interviewed regardless of their age. All respondents to the 1993 baseline AHEAD survey lived in the community.

The baseline survey of the AHEAD database was conducted in 1993; we used data from the 8,203 respondents who were aged 50 years and older (19 spouses less than 50 years were excluded) and followed them for 5 years (1,826 days) in order to determine whether they moved to a nursing home within that time period. Follow-up time was the same number of days for each respondent, but not the exact same time period since baseline interviews were done

Table 1: Sample Attrition from Baseline to 5 Years after Initial Interview Date

	Baseline AHEAD (8,203)					
	Moved to a Nursing Home (N= 792)			*Did Not Move to a Nursing Home (N= 7,411)*		
Status 5 Years after Initial Interview	*Dead*	*Alive*	*Lost*	*Dead*	*Alive*	*Lost*
N	244	543	5	1,101	5,291	1,019
Mean nursing home risk perception	0.185	0.19	0	0.163	0.131	0.123
n with nonmissing nursing home risk perception	140	370	2	774	4,401	659

AHEAD, Asset and Health Dynamics Among the Oldest Old.

over a period of several months in 1993. Date of death information was available for all respondents. At the end of the 5-year study period, all AHEAD baseline respondents were classified as dead, alive, or lost to follow-up, and subdivided according to whether they had moved to a nursing home or not prior to the censor date (see Table 1).

Dependent Variable

The dependent variable was whether a person moved to a nursing home within 5 years of the baseline interview. This information was self-reported by respondents or their proxy at the 1995 and 1998 AHEAD interviews. In some cases, the respondent was actually interviewed while in a nursing home if that was their current place of residence. For a subset of those who moved to a nursing home, the date of the move was available, also reported by respondents or their proxy. Date of moving to a nursing home (month and year) was missing for some persons because of the skip pattern of the survey (only when persons lived in a nursing home at an interview was the date of admission asked), and for others because they or their proxy did not recall the date. For persons who died between waves, there was a decedent interview in which a family member was asked whether the study subject moved to a nursing home and when. Sensitivity analyses were conducted with this smaller sample of persons that have self-reported dates of nursing home entry, but the main analyses were conducted with the larger sample of individuals that included those who were known to have been in a nursing home for some period prior to the study censor date, but for whom the date of move was not available.

Main Explanatory Variable

The individuals' nursing home risk perception was the primary explanatory variable of interest. It was measured at the baseline AHEAD interview using the following question. "Now, no one likes to think about moving to a nursing home, but sometimes it is necessary. Where 0 equals no chance, and 100 equals near certainty, what do you think are the chances that you will move to a nursing home within 5 years?" We re-scaled this variable to take values between 0 and 1.0, as would a probability. Past work using the AHEAD database and a companion survey, the Health and Retirement Survey, found that mortality risk perception variables fielded in these surveys behave similarly to probabilities (e.g., see Schoenbaum 1997;

Smith, Taylor, and Sloan 2001; Smith et al. 2001; Smith, Sloan, and Taylor 2003).

The distribution of the nursing home risk perception variable is nonnormal. The mean value of the nursing home risk perception is 0.139 (SD 0.234). The median value for those responding to this question ($n = 6{,}346$) was 0.0, with just over half of the respondents giving an answer that they felt they had no chance of moving to a nursing home within 5 years. The 75 percentile value was 0.2, with the 90 percent percentile being 0.5. Around 1 percent of the sample gave an answer of 1.0, saying they were absolutely certain that they would move to a nursing home within 5 years.[3]

Behavioral Model of Health Services Use

We adapted the Behavioral Model of Health Services Use proposed by Andersen (1968) to organize the other variables we use to explain why sample respondents move to a nursing home. The Andersen model generally holds that the use of health care services is a function of predisposing, enabling, and need variables. The relative importance and interrelationship of these three types of variables vary primarily according to the degree to which the service being considered is viewed as discretionary. For example, having an operation for an acute appendicitis is not discretionary, so the need for the surgery predominates the decision to utilize health services, with little or no regard for enabling variables (such as insurance) or predisposing factors.

Recently, the Andersen model has been applied to long-term care, and it was determined that psychosocial factors, such as attitudes, knowledge, and social norms are important predictors of the use of long-term care, and may be particularly important in explaining racial/ethnic differences in use of such care (Bradley et al. 2002). However, the decision to move to a nursing home is quite different from the decision to do an appendectomy. The need for nursing home care typically has a gradual onset. In some cases an acute event (such as a hip fracture) may result in a less discretionary admission, but even in that case home care could often be arranged either on a formal or informal (unpaid, provided by family) basis. There clearly is some discretion when deciding whether to enter a nursing home, and there are many options to providing long-term care other than a nursing home. The relatively low rates of institutionalization among the elderly (4.2 percent of those 65 years and older in 1995) illustrate the discretionary nature of nursing home care (Bishop 1999). Therefore, predisposing, enabling and need variables were all expected to have a direct influence on the decision to move to a nursing home.

Predisposing variables determine the propensity of an elderly person to move to a nursing home. The key explanatory variable, nursing home risk perception, was hypothesized to be a predisposing variable, but could also be considered a type of psychosocial variable following Bradley et al. (2002). Other predisposing variables were sex, age, and race. Gender and race are considered predisposing variables because of the differential rates of use of nursing home care across gender and racial groups, particularly a lower rate of utilization among African Americans.

Enabling variables are those that allow persons to act upon their desires to obtain a type of health care. In our analysis, the most important enabling variable is marital status. Persons who are married are much more likely to maintain their independence in a community setting because the presence of a spouse in the home provides a readily available informal caregiver. Spousal caregivers are the most common type of informal caregivers in the United States (Biegel, Sales, and Schulz 1991; Moody 2002). Income and wealth are other enabling variables for nursing home admission. Lower income (binary variable equal to 1 when household income was in the lowest quartile) was expected to increase nursing home admission for two reasons: lower income would make it harder to finance community long-term options out-of-pocket, and low income levels are linked to Medicaid, a major financer of nursing home care. Total wealth and housing wealth were also controlled for separately. Finally, we included a respondent's Medicaid eligibility status at baseline. Being eligible for Medicaid at baseline would be expected to increase the likelihood of admission, and the income and wealth measures included provide information regarding how likely such qualification is in the future.

The third type of variable measures an individuals *need* for nursing home care. Variables that represent the degree of disability of the individual, both in completing BADL and IADL were included as count variables. These are the key measures of need, and have been shown to be highly predictive of nursing home entry in the literature (Miller and Weissert 2000). Individuals were coded as having a limitation in an ADL if they reported difficulty in completing an activity, and the variable was operationalized as a count variable taking a value ranging from 0 to 6 at each wave. Inability to complete several of these activities indicates that a person needs a large amount of daily care to survive, which is the common reason an individual enters a nursing home. The number of IADL that a person reported having difficulty completing took values ranging from 0 to 5 at each wave. An individual needing help with these activities would not likely need constant support and supervision, but would likely need help completing these activities which are necessary for an

individual to live an independent life. We also used an indicator variable for persons who completed the baseline survey using a proxy respondent. Often persons with serious cognitive impairment would need such a proxy. Persons with proxy respondents at baseline were not asked the nursing home risk perception question.

Structure of Analyses

The nursing home risk perception question asked respondents how likely they were to move to a nursing home within 5 years. Therefore, we identified the actual date of the baseline AHEAD interview and assessed whether a person moved to a nursing home within 5 years, or 1,826 days from the baseline (365×5 plus 1 day for leap year). This allowed us to compare the subjective probability to the actual or observed (measured via self-report) probability of moving to a nursing home. We also compared mean values of the nursing home risk perception to mean values of self-reported moving to a nursing home stratified by key observed variables such as gender, race, and level of disability (as measured by ADL) in order to determine whether, on average, individuals under- or overestimated their likelihood of moving to a nursing home.

We used logistic regression to analyze whether respondents moved to a nursing home within 5 years of their initial AHEAD interview. The key relationship of interest was whether the nursing home risk perception remained a significant predictor of living in a nursing home. For the subset of cases in which an actual date that a person moved to a nursing home was available, we estimated a multivariate hazard model (Weibull) to determine whether the nursing home risk perception predicted time to admission. We conducted a series of sensitivity analysis checks that are noted in the results section.

RESULTS

Seven hundred and ninety-two (9.7 percent) of the 8,203 wave 1 respondents moved to a nursing home within 5 years of their initial AHEAD interview (Table 1). Two hundred and forty-four of the respondents who moved to a nursing home, subsequently died before the 5-year study period ended, while 543 persons were alive and living in nursing homes 5 years after their initial AHEAD interview. Death prior to moving to a nursing home within 5 years of the initial interview (1,101 persons, 14.4 percent) was a more common study outcome than was moving to a nursing home; nearly as many persons were

lost to follow-up within 5 years (1,019, 12.4 percent) without AHEAD recording whether they had moved to a nursing home.

The nursing home risk perception variable was missing for 1,857 (22.6 percent) respondents; the missing pattern is not random. For example, the proxy respondents ($n = 839$, 10.2 percent) were not asked the risk perception question, and these respondents were more likely than others to actually move to a nursing home within 5 years. Table 1 provides the mean nursing home risk perception value for each of the six study groups (dead, alive, lost to follow-up) for individuals who did, and did not ever move to a nursing home during the study period. The lowest mean nursing home risk perception value (i.e., subjects thought they were less likely to move to a nursing home within 5 years) was found among those persons lost to follow-up.

Table 2: Comparing Those Who Moved to a Nursing Home within 5 Years to Those Who Did Not

	Moved to a Nursing Home within 5 Years?		
	No	*Yes*	*p**
Key explanatory variable			
Nursing home risk perception (0.0–1.0)[†]	0.14	0.19	<.001
Need			
ADL limitations (0–6)	0.61	1.32	<.001
IADL limitations (0–5)	0.50	1.05	<.001
Proxy respondent (0/1)	0.10	0.17	<.001
Predisposing			
Age 75–84 years (0/1)	0.43	0.52	<.001
Age 85+ years (0/1)	0.11	0.30	<.001
Male (0/1)	0.38	0.28	<.001
White (0/1)	0.84	0.86	.36
Less than high school education (0/1)	0.43	0.49	<.001
College or more education (0/1)	0.12	0.09	<.001
Enabling			
Income, lowest quartile (0/1)	0.24	0.35	<.001
Housing wealth ($10,000s)	7.7	4.8	<.001
Total wealth ($10,000s)	22.2	14.6	<.001
Medicaid (0/1)	0.10	0.13	.01
Private insurance (0/1)	0.74	0.70	.002
Married (0/1)	0.57	0.34	<.001
N	7,411	792	

**p* is for *t*-test of means, or for proportion for binary variables.

[†]Number in parentheses are the range of the variable; 0/1 represents a binary variable.

IADL, instrumental activities of daily living.

Do Nursing Home Risk Perceptions Predict Moving to a Nursing Home?

Persons who moved to a nursing home within 5 years of baseline had a significantly higher mean risk perception at baseline, 0.19 versus 0.14 ($p<.001$, Table 2). Likewise, persons who moved to a nursing home differed from those who did not on nearly all of the observed variables that we used to compare these groups. Those who moved to a nursing home were more disabled, older, less likely to be married, more likely to be eligible for Medicaid, and had lower levels of both housing and total wealth, all measured at baseline.

Persons who thought they were more likely to move to a nursing home within 5 years were more likely to do so after controlling for plausible

Table 3: Persons Who Thought They Were More Likely to Move to a Nursing Home within 5 Years Were More Likely to Do So

	Logistic Regression OR (95% CI)	*Weibull Survival Regression Hazard Ratio (95% CI)*
Key explanatory variable		
Nursing home risk perception*	1.04 (1.00–1.08)	1.04 (1.01–1.09)
Need		
ADL limitations	1.26 (1.16–1.37)	1.14 (1.04–1.26)
IADL limitations	1.05 (0.93–1.18)	1.23 (1.08–1.39)
Predisposing		
Age 75–84 years	2.61 (2.05–3.32)	3.60 (2.56–5.06)
Age 85+ years	4.60 (3.41–6.20)	7.80 (5.33–11.41)
Male	0.87 (0.70–1.08)	0.99 (0.76–1.30)
White	1.23 (0.91–1.66)	1.32 (1.05–1.66)
Less than high school education	0.83 (0.67–1.03)	0.94 (0.73–1.21)
College or more education	0.76 (0.55–1.05)	0.96 (0.64–1.42)
Enabling		
Income, lowest quartile	1.14 (0.92–1.43)	1.25 (0.97–1.60)
Housing wealth ($10,000s)	0.98 (0.97–0.99)	0.98 (0.97–1.00)
Total wealth ($10,000s)	1.00 (0.99–1.00)	1.00 (0.99–1.00)
Medicaid	0.71 (0.49–1.02)	0.61 (0.41–0.90)
Private insurance	0.90 (0.70–1.16)	0.61 (0.46–0.80)
Married	0.55 (0.44–0.69)	0.53 (0.40–0.70)
N	6,346	5,996
N moved to nursing home	508	314
Pseudo-R^2	0.10	
LR χ^2 ($p<.001$)		375.0

*The nursing home risk perception variable was rescaled (multiplied by 10). The OR shows the effect of a 0.1 increase in the nursing home risk perception on the odds of moving to a nursing home. A 0.1 change in the nursing home risk perception would be a change from 0.15 to 0.25, for example.

confounders of the bivariate relationship between these two variables (Table 3). A 0.1 increase[4] (for example, from 0.05 to 0.15) in the nursing home risk perception corresponded to a 4 percent greater likelihood of an individual moving to a nursing home within 5 years (OR 1.04, 95 percent CI 1.00–1.08). Many of the potential confounding variables retained an independent statistically significant predictive effect of nursing home admission. For example, an increase of one ADL limitation increased the likelihood of moving to a nursing home by one-fourth (OR 1.26, 95 percent CI 1.16–1.37). Age also had a very powerful effect, with persons who were between 75 and 84 years being over two-and-a-half times as likely to move to a nursing home (OR 2.61, 95 percent CI 2.05–3.32) compared with persons aged 50–74 years. The oldest old (age 85+ years) were nearly five times as likely to move to a nursing home as the youngest group (OR 4.60, 95 percent CI 3.41–6.20). A linear probability model estimation of the same model yielded the same basic conclusions (not shown).

We estimated a multivariate hazard model that tested the effect of nursing home risk perceptions on time to nursing home entry and the results confirmed the findings from the logistic regression model: persons with a higher baseline nursing home risk perception were more likely to have moved to a nursing home within 5 years. The hazard model could only be estimated using the subsample of persons who moved to a nursing home for whom the date of move was available (314 moves, total $n = 5{,}996$), since all persons reporting nursing home use did not have dates for their nursing home stays.[5]

Do Persons Over- or Underestimate Their Likelihood of Moving to a Nursing Home?

Elderly individuals generally overestimate their personal likelihood of moving to a nursing home within 5 years (Table 4). When considering only those respondents who answered the nursing home risk perception question ($n = 6{,}346$) at baseline, the sample mean of the nursing home risk perception question was 0.14, and the actual probability of living in a nursing home within 5 years was 0.08 ($p < .001$).[6] Both males and females as well as African Americans and whites overestimated their probability of moving to a nursing home, with all comparisons significant at $p < .001$. Persons aged 50–74 years greatly overestimated their likelihood of going to a nursing home (0.12 subjective probability versus 0.03 observed, $p < .001$), as did those who were 75–84 years (0.15 versus 0.10, $p < .001$). However, the subjective probability was not statistically different from the actual probability among those persons aged 85+ years (0.19 versus 0.21, $p = .19$). Persons who were relatively healthy (0 or 1 limitations in ADL) overestimated their likelihood of moving to a nursing

Table 4: Individuals Overestimated Their Actual Probability of Moving to a Nursing Home within 5 Years of Baseline

		Probability of Moving to Nursing Home		*Difference in Difference*		
	N	*Mean Perception*	*Actual Probability*	*p**	*Mean*	*p*†
Full sample	6,346	0.14	0.08	<.001		
Female	4,022	0.14	0.09	<.001	Ref‡	
Male	2,324	0.14	0.06	<.001	+0.023	.01
White	5,526	0.14	0.08	<.001	Ref	
Black	724	0.14	0.08	<.001	−0.0041	.77
Other	96	0.15	0.08	.09	+0.011	.75
Age (years)						
50–74	2,993	0.12	0.03	<.001	Ref	
75–84	2,714	0.15	0.10	<.001	−0.033	<.001
85+	639	0.19	0.21	.19	−0.11	<.001
ADL limitations						
0	4,802	0.12	0.06	<.001	Ref	
1	789	0.17	0.13	.008	−0.028	.02
2	339	0.21	0.19	.51	−0.049	.006
3	188	0.19	0.19	.98	−0.066	.005
4	112	0.21	0.21	.95	−0.069	.02
5 or 6	116	0.28	0.16	.01	+0.045	.13

**p* is for the *t*-test of means, comparing the mean nursing home risk perception to the probability of actually moving to a nursing home (self-reported) for each row in the table.

†*p* is for the *t*-test of means, comparing the mean difference in the difference between the risk perception and probability for each level of a given variable. For example, the difference between the mean risk perception for males and the observed probability of moving to nursing home is 0.08; it is 0.05 for females. The difference is 0.023. The significant *p*-value shows that males overestimate their likelihood of moving to a nursing home more than females do. The mean risk perception and observed probabilities for each row have been rounded.

‡Ref is the referrent group for the statistical test.

ADL, activities of daily living.

home. Persons with no ADL limitations had a mean nursing home risk perception of 0.12 compared with the actual probability of moving to a nursing home of 0.06 ($p < .001$). Persons with 1 limitation in ADL also overestimated, 0.17 versus 0.13 ($p = .008$). Those with moderate/severe levels of disability at baseline (2–4 ADL limitations) were generally more accurate in assessing their chances of moving to a nursing home than were those who had little or no disability as measured by I/ADL. However, the most disabled groups (5 or 6 ADL limitations) also greatly overestimated their likelihood of moving to a nursing home (0.28 versus 0.16, $p = .01$).

We also assessed the degree to which the difference between the subjective and observed probability of moving to a nursing home within 5 years varied across *levels* of particular variables such as gender (e.g., comparing males versus females differed in their degree of overestimation). This showed that males overestimated their likelihood of moving to a nursing home more than did females ($p = .01$, final column of Table 4). We also found that younger sample members (aged 50–74 years) overestimated to a greater degree than did older persons ($p < .001$ for comparisons with both the 75–84 and 85+ years age group), and those who were less disabled overestimated more than did those with more limitations in ADL. Whites and African Americans did not differ in terms of their degree of overestimation of the probability of moving to a nursing home.

DISCUSSION

Persons who reported a higher probability of moving to a nursing home within 5 years were more likely to actually do so within 5 years. This is strong evidence that the nursing home risk perception variable contains information that reflects an individual's need, preferences, and intent with respect to moving to a nursing home in the medium term. This effect remains after controlling for a series of potential confounders and was robust to both estimation technique and specification, including dropping short-stay nursing home admissions, showing that the information contained in this measure is distinct from that contained in measures such as ADL limitations, gender, and age. Other predictors of moving to a nursing home were generally similar to those found in the literature.

The second key test of the nursing home risk perception is how similar the subjective probabilities are to actual or objective probabilities. We found that elderly individuals systematically overestimated their own probability of moving to a nursing home during the 5-year follow-up period—they were less likely to move to a nursing home than they thought they were. This was true overall for men and women and among African Americans and whites. The oldest individuals, as well as those who were moderately/severely disabled, had more accurate assessments on average (the magnitude of their overestimates was smaller and nonsignificant), than did younger and less disabled persons.

Our findings cast doubt on the view that low rates of private long-term care insurance among seniors is because of lack of understanding or information among elderly persons about their personal risk of moving to a nursing

home. This is a common premise of many who advocate increasing the private long-term care insurance share of the national nursing home bill. We concur with Lindrooth, Hoerger, and Norton (2000) that the totality of the evidence gleaned from the nursing home risk perception measure suggests that low rates of private long-term care insurance coverage exist among elderly persons who generally have a good understanding of how likely they are to move to a nursing home. However, our longitudinal test of the predictive validity of the nursing home risk perception question is an improvement over past cross-sectional work; the longitudinal nature of our study is its primary advantage.

Why might persons overestimate their personal likelihood of moving to a nursing home? First, moving to a nursing home is an event that is feared by most persons. This means that they tend to vividly recall when persons they know have moved to a nursing home, causing them to overestimate their own probability of doing so. The process of overestimating the likelihood of an uncertain future event under such circumstances is often called an availability heuristic, and could explain the observed overestimation of the likelihood of moving to a nursing home in our study (Tversky and Kahneman 1973). Second, persons may overestimate their likelihood of moving to a nursing home because they fail to investigate the other possibilities available for long-term care such as informally provided care or home health until they are actually faced with considering a move to a nursing home. Finally, overestimation may be conceptually similar to precautionary savings given the uncertainty of age at death. There are several sources of uncertainty when individuals judge their future likelihood of moving to a nursing home; not only their own life span and disability level during later years, but also the life span and ability of their spouse and/or child(ren) to provide care that could forestall the need for them to move to a nursing home. Given these multiple uncertainties, respondents may overestimate their personal risk of moving to a nursing home. Better understanding of how such overestimations influence how persons prepare for their potential need for nursing home care and long-term care generally is needed, both among persons in the age group we studied, as well as among younger persons.

The limitations of our paper include the fact that we used self-reported nursing home use data which may be inaccurate. Self-reported health care utilization is subject to recall bias, but recall of moving to a nursing home would not seem to be as large an issue as it would be for recall of something more common, such as a physician visit. In addition, recall bias may have affected the dates given by respondents or their proxies who did provide a date of nursing home entry. Further, it is possible that some persons who were lost

to follow-up may have moved to a nursing home during the study period; if true, this would result in an undercount of the observed rate of moving to a nursing home in our sample. We observed around 10 percent of our sample moving to a nursing home within 5 years; the likelihood of a 70-year-old community-dweller moving to a nursing home prior to death is around 42 percent (Murtaugh et al. 1997, their Table 5). However, the expected time to admission for a 70-year old is nearly 15 years, about three times longer than our 5-year study period. Given that the likelihood of moving to a nursing home is not linear with increasing age, it seems that our observed probability of moving to a nursing home is not unreasonable, but is perhaps a bit low. If all lost-to-follow-up persons had actually moved to a nursing home, then our 5-year probability of doing so would be around 22 percent, which seems high in light of published work (Murtaugh et al. 1997). Finally, our study could only assess medium-term (5 years) probabilities of moving to a nursing home, and does not say anything about the views of younger persons regarding their understanding of the risk of moving to a nursing home in the future. This is an important group to understand given that long-term care insurance is much cheaper for those in their 40–50s compared with those in their 60s and older.

A private, free-market solution to the policy problem of how to provide long-term care for the aging baby boomers assumes that consumers understand their risks of needing nursing home care, and that they are able to use this information to make wise decisions regarding the purchase of insurance. Many assume that seniors do not correctly understand the risks of moving to a nursing home since rates of private long-term care insurance coverage are so low. However, we do not find there to be an information problem among the elderly with respect to their personal likelihood of moving to a nursing home in the medium term, making the common goal of increasing private long-term care insurance coverage to be even more difficult than many imagine. This implies that other factors must be important in keeping the prevalence of such policies low. More understanding both of the decision to purchase and not to purchase private long-term care insurance is needed in order to clarify the role such insurance is likely to play in financing nursing home care in the future. This is especially true for persons in their 40s and 50s, when the cost of such insurance is seemingly more affordable.

ACKNOWLEDGMENT

This study was funded by a grant from the National Institute on Aging, National Institutes of Health, 1RO1-15868 (Perception of Risk and Behavior in the Elderly).

NOTES

1. The cost of informal caregiving has been estimated to be between $117 and $292 billion (1998) dollars, much larger than the total societal cost for nursing home care ($83 billion) and home health that is paid for by insurers such as Medicare and Medicaid ($32 billion) (Arno, Levine, and Memmott 1999). This cost estimate was based on the replacement cost of purchasing caregiving services in the market. Thus, it likely overstates the cost associated with informal caregiving for some informal caregivers who would not work if they were not caregiving; it likely underestimates it for others who may have quit jobs or reduced hours of market work to such an extent that replacement cost is lower than the true cost of wages foregone because of caregiving. On the whole, the estimate is almost certainly an underestimate of the true cost of informal caregiving because it fails to account for the burden that caregiving imposes on caregivers in terms of emotional and physical health and social isolation (e.g., Schulz 2000). Such burdens are assigned a cost of 0 by this approach.
2. There is some evidence that the purchase of private long-term care insurance is increasing. The recent tax code changes that make the premiums of certain types of policies tax deductible represent a policy initiative of the federal government to increase the purchase of this insurance.
3. Past work dealing with risk perceptions has identified the nonnormality and the "lumpiness" of risk perception values as worthy of various corrections or adjustments. For example, Smith, Sloan, and Taylor (2003) sometimes categorized mortality risk perceptions into thirds (lowest, middle, and highest). Smith et al. (2001) employed a correction adjustment for persons giving "focal" responses to mortality risk perceptions, defining focal as missing values and 0.5 or 1.0. In the case of nursing home risk perceptions, we decided to use the variable as it was reported since the actual probability of moving to a nursing home was around 0.10, ruling out the use of categorizing the nursing home risk perception into thirds, for example. The selection correction employed by Smith et al. (2001) would not be feasible in this sample, because of the large number of proxy respondents which was a large source of missing values. In the middle-aged sample analyzed by Smith et al. (2001) differences in cognition had some explanatory power for focal responses. In this analysis, only the respondents with reasonable cognition received the nursing home risk perception question.
4. The nursing home risk perception variable was rescaled (multiplied by 10) because of the very small change that a 0.01 change in the nursing home risk perception represents. A change of 0.1, from 0.05 to 0.15, for example, is a more meaningful change to be evaluated.
5. For all models estimated we conducted several types of sensitivity analyses. First, persons with a missing risk perception variable were recoded to 0 for this variable, and a binary variables equal to 1 when they were missing on the risk perception variable was included. In all such models, the nursing home risk perception variable remained a significant predictor that showed that persons who thought they were more likely to move to a nursing home within 5 years at

baseline, were in fact more likely to do so. The term for missing nursing home risk perception was always positive and significant, showing that persons who did not have a response to this question were also more likely to move to a nursing home within 5 years. In other sensitivity analyses we determined that interactions between nursing home risk perception and race and gender were not statistically significant. Finally, we also estimated all models after removing persons with short nursing home stays, variously defined as less than 90, 30, and 10 days. The conclusion of our analyses remained unchanged under all three of these scenarios.

6. The likelihood of moving to a nursing home for the full sample ($N = 8{,}203$) was 0.097, illustrating that those persons with missing values had a higher likelihood of actually moving to a nursing home compared with those answering the risk perception question as noted earlier.

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