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Work, Health, and Family at Older Ages in Japan

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The authors investigated ways in which the relationship between health and labor force exit at older ages is moderated by family characteristics. Using two waves of data from a national sample of older Japanese men collected in 1999 and 2002, the authors estimated logistic regression models for labor force exit beyond age 63 as a function of health change, family characteristics, and their interactions. Poor health was strongly associated with labor force exit and evidence showed that moderating influences of family context depend on the level of health. However, the results were only partially consistent with hypotheses that the relationship between health and the likelihood of labor force exit should be stronger for (1) those with good health and family incentives to exit the labor force and (2) those with poor health and family incentives to remain in the labor force.

Keywords: *employment; retirement; health; family*

Employment beyond typical ages of retirement (i.e., 60 to 65 years) is a subject of growing interest to policy makers, employers, and scholars in rapidly aging industrialized societies. Recognizing that older men and women will need to work longer to limit the economic impact of changes in population age structure, many countries have begun to implement policy changes designed to encourage continued economic activity at older ages (Clark and Quinn 2002). Other changes in the context of retirement also suggest the possibility of increasing labor force attachment beyond typical retirement ages. In the United States, for example, changes in the nature of private pension plans, inadequate financial preparation for retirement, and changing attitudes and expectations suggest that more older Americans will continue to work beyond retirement.

Recent studies have documented important changes in retirement behavior, including the slowing or reversal of the long-term trend toward earlier retirement (Friedberg 2007) and increases in both gradual retirement and postretirement returns to the labor force (Mutchler et al. 1997; Ruhm 1990). Unfortunately, however, we currently know very little about the correlates of work transitions beyond typical retirement ages. The scarcity of relevant research likely reflects the fact that levels of labor force participation at older ages are very low in most industrialized countries. In the United States, for example, the labor force participation rates above age 65 were only 18% for men and 9% for women in 2000. In most Western European countries, the corresponding figures are substantially lower (Kinsella and Velkoff 2001).

Japan is an exception to this general pattern. The majority of men remain in the labor force beyond age 60, the age of mandatory retirement for nearly all private company employees. A sizable minority also continue to work beyond age 65, the age of full eligibility for public pension benefits. In 2000, the labor force participation rate of Japanese men was 72% at ages 60 to 64 and 35% at ages 65 and older. The corresponding figures for women were also relatively high, at 39% and 14%, respectively. In combination with other distinctive social and economic characteristics discussed below, these high rates of labor force participation make Japan a potentially rich source of insight about work behavior beyond typical retirement ages.

In this study, we focused on the labor force transitions of older Japanese men to further our understanding of the relationship between health and employment at older ages in two important ways. First, we paid attention to the ways in which relationships between health decline and labor force exit beyond age 63 may be moderated by family incentives to either exit or remain in the labor force. Second, we considered whether moderating influences of family circumstances depend on the level of health. As we discuss below, it may be that older men who remain in good health have a higher

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probability of leaving the labor force in response to health decline if they also have family incentives to exit the labor force (e.g., caregiving responsibilities). In contrast, poor health may increase the probability of labor force disengagement most for those with family incentives to continue working (e.g., financial responsibilities).

Background

The Changing Context of Retirement

Rapid population aging in industrialized countries is projected to result in labor shortages as well as shortfalls in existing public pension and health care systems (e.g., Gruber and Wise 1999, 2001; National Research Council 2001). Long-term trends toward earlier retirement among older men (Kohli et al. 1991) and increasing longevity have magnified concerns about the impact of changes in population age structure. Many countries have begun to address these concerns by shifting away from long-standing policy efforts to encourage earlier retirement in favor of efforts to encourage continued economic activity at older ages (Organisation for Economic Co-operation and Development 2006). These policy changes include increasing the age of full eligibility for public pension benefits, lengthening the period of required contributions, reducing benefit levels, and removing tax disincentives to continued employment (Burtless and Quinn 2001; Organisation for Economic Co-operation and Development 1998).

At the same time, the increasing prevalence of defined contribution pension plans (Burtless and Quinn 2001; Munnell, Cahill, and Jivan 2003), inadequate financial preparation for complete withdrawal from the labor force (Munnell, Golub-Sass, and Webb 2007), increasing variation in pathways to retirement (Mutchler et al. 1997), and greater interest in working beyond typical retirement ages (AARP 2004) all suggest potential increases in labor force participation among older Americans. These changes underscore the importance of better understanding labor force transitions at older ages. For example, assuming continued improvements in health at older ages (e.g., Manton and Gu 2001), it is important to know for whom and under what circumstances this trend is most likely to contribute to higher levels of labor force participation. Evidence of widespread intentions to work beyond retirement also points to the importance of better understanding the kinds of legislation or workplace policies that might be implemented to facilitate continued attachment to the labor force. Currently, we

know a good deal about pension incentives and other correlates of early and “on-time” retirement (e.g., Leonisio 1996; Quinn and Burkhauser 1994) but very little about the correlates of work at older ages.

The small body of existing research on the correlates of labor force transitions beyond typical retirement age demonstrates the importance on non-institutional factors, such as work commitment, family circumstances, and especially health (Haider and Loughran 2001; Hayward, Hardy, and Liu 1994; Maestas 2004; Parnes and Sommers 1994; Williamson and McNamara 2001). The powerful role of health reflects both linkages between health and retirement timing (Deschryvere 2005) and the primary motivations for employment beyond typical retirement age. For example, economic necessity and the desire to remain active and engaged with work presumably provide strong incentives to remain in the labor force until changes in health necessitate exit. These previous studies offer important insights into the roles of health, family, attitudes, and other key correlates of employment beyond retirement age, but the selective nature of later-life work in the United States and most other countries limits our ability to generalize observed relationships. The relatively high levels of labor force participation of older Japanese men thus provide a valuable opportunity to begin filling this gap in our understanding, thereby facilitating informed speculation about future trends in labor force participation at older ages.

Work, Health, and Family at Older Ages in Japan

In addition to the relatively high levels of labor force participation, several other distinctive features of work, health, and family circumstances at older ages make Japan a potentially informative setting. First, Japan has the longest life expectancy in the world, implying relatively good health among the young-old and relatively strong financial incentives to continue working beyond retirement (Clark and Ogawa 1997). Among 65- to 69-year-old men surveyed in recent years, 19% reported that health conditions affected their daily life (Ministry of Health, Labor, and Welfare 2004), while 62% reported that they were working primarily for financial reasons (Ministry of Health, Labor, and Welfare 2002). Nonfinancial motivations to work are also important, with 50% of 60- to 69-year-old men reporting that they want to work as long as physically possible (Economic Planning Agency 1990). This strong desire to continue working is thought to reflect the centrality of work to many older men’s identity in Japan, where many cite *ikigai*, or purpose in life, as a primary reason for working (Seike and Yamada 2004).

Second, the family structure and family relationships of older Japanese differ in important ways from those of their counterparts in Western societies. The most striking difference is the prevalence of coresidence with adult children. Intergenerational coresidence has declined over the past 30 years but remains common, with 49% of those aged 65 years and older living with children in 1995 (Raymo and Kaneda 2002). Relationships between living arrangements and employment at older ages presumably depend on the motivations for coresidence and the relative economic circumstances of older parents and their adult children. On one hand, coresident children are an important source of economic support, thus facilitating parents' labor force exit at older ages. On the other hand, children are a major economic responsibility and may thus represent a strong incentive to remain in the labor force. Ogawa (2000) found evidence for both relationships, with the labor force participation of 60- to 64-year-old men highest among those coresiding with financially dependent children and lowest among those coresiding with financially independent children.

Third, the institutional context of later-life work in Japan differs markedly from that in most other industrialized countries. Unlike in the United States, phased retirement and postretirement employment are not new patterns in Japan. For most wage employees, the retirement process typically begins at age 60 with mandatory retirement (*teinen taishoku*; Seike 1998; Seike and Yamada 2004). Among 65- to 69-year-old men surveyed in 2000, 65% had experienced mandatory retirement (Ministry of Health, Labor, and Welfare 2002). At the time of mandatory retirement, almost all private employees receive lump-sum severance payments that are, on average, equivalent to approximately three years of earnings (Clark and Mitchell 2002). Because retirees are not eligible for full public pension benefits until age 65 (Seike 1998), a large proportion of current cohorts of older Japanese have embarked on second careers from which they "re-retire" at a variety of ages (Kimura and Oka 2001). Pathways into these postretirement jobs depend to a large extent on characteristics of career jobs. For those retiring from larger companies with lifetime employment policies and reemployment programs, it is not uncommon to continue working for the same companies or to be transferred to affiliated companies (Kimura and Oka, 2001). Others may find employment in different types of work, perhaps in self-employment or perhaps via work agencies (Bass 1996).

Self-employment is very common among older Japanese. Data from the 2000 population census of Japan indicate that 44% of male labor force participants aged 60 years and older were self-employed. Among the self-employed, 65% were working in either primary sector or retail occupations

(Raymo et al. 2004). High levels of self-employment reflect the prevalence of self-employment across the life course of current cohorts of older men and women as well as transitions into self-employment subsequent to retirement. Because self-employed workers are eligible only for the relatively limited benefits provided by the basic public pension plan starting at age 65 (Yashiro and Oshio 1999), economic necessity is an important reason for higher levels of labor force attachment among the self-employed. Relatively high levels of self-employment among older Americans (Karoly and Zissimopoulos 2003), growth in "nonstandard" employment earlier in the life course (Tilly 1996), and large proportions of preretirement Americans whose postretirement plans include self-employment (AARP 2004) suggest the general relevance of the Japanese case.

In sum, distinctive features of work, family, and health circumstances at older ages in Japan provide us with a unique opportunity to extend our understanding of the conditions under which poor health affects labor force exit beyond typical retirement ages. Existing studies of work and health at older ages in Japan are extremely limited in comparison with research on retirement in the United States. However, two recent studies based on longitudinal data demonstrated the powerful effect of poor health on labor force exit (Clark et al. 2004; Raymo et al. 2004). A small number of studies have focused on the role of family characteristics (see Nagase 1999; Ogawa 2000; Raymo et al. 2004), but potentially important moderating influences of family characteristics on the relationship between health and labor force participation have yet to be examined.

Health Decline, Family Context, and Labor Force Exit at Older Ages

It is surprising that existing work has paid little attention to the ways in which the impact of health on labor force exit at older ages may be conditioned by other factors. Studies of early and "on-time" retirement have repeatedly demonstrated that the relationship between poor or declining health and labor force exit depends on individual characteristics such as age, race, financial circumstances, job characteristics, and family characteristics (Bound, Schoenbaum, and Waidmann 1996; Burr et al. 1996; Hayward, Friedman, and Chen 1998; Hayward and Grady 1990; Hayward et al. 1989; Mutchler et al. 1999). We expect similar relationships to be important for understanding behavior beyond typical retirement ages. Not only are the family circumstances of older men and women more heterogeneous than at younger ages, they are also projected to change significantly

in the coming years as cohorts who have experienced dramatic changes in fertility, divorce, and remarriage approach retirement age (Hughes and O'Rand 2004). Increasing longevity of older parents and smaller sibship size are also expected to result in important changes in family obligations (Pavalko and Henderson 2005).

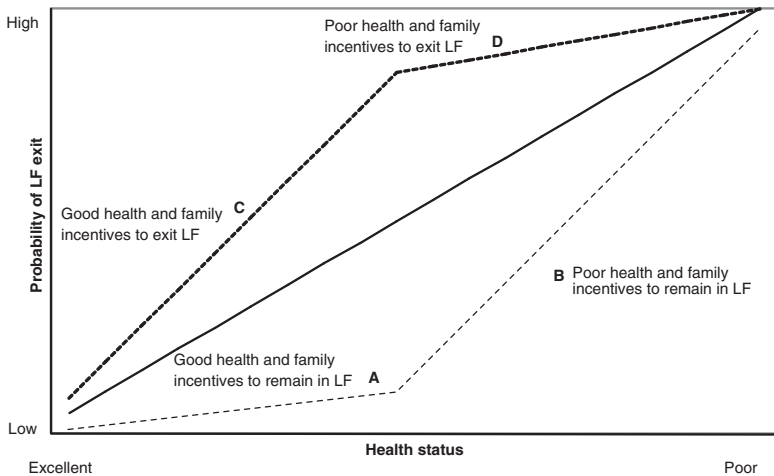
Past research has identified several ways in which family relations and obligations influence the attractiveness or necessity of continued work relative to full retirement. For example, the retirement-promoting effects of caregiving and the provision of other forms of instrumental support are thought to reflect the incompatibility of work and caregiving roles (Dentinger and Clarkberg 2002; Pavalko and Artis 1997). Similarly, the negative association between labor force exit and the presence of economically dependent family members (Szinovacz, De Viney, and Davey 2001) is thought to reflect obligations to provide financial support. Studies of spousal influences on retirement suggest that joint retirement and the positive association between marital quality and labor force exit reflect a desire for shared leisure (Gustman and Steinmeier 2002).

How do these family incentives to remain in or exit the labor force moderate the impact of health decline? In one of the only studies to address this question, Mutchler et al. (1999) concluded that the marginal impact of poor health or health decline on the decision to stop working is strongest for those with incentives "to pursue work attachment as long as health does not become so poor as to intervene" (p. S253). Conversely, the association between poor health and labor force exit was found to be weaker among those with incentives to leave the labor force (e.g., having a nonworking spouse). We adopted these findings as our baseline hypothesis.

We also extended this baseline hypothesis by recognizing that the moderating influences of family characteristics may depend on the level of health. As depicted in Figure 1, we posited that interactive relationships between health change and family characteristics for those who remain in relatively good health might be different than for those in worse health. The 45° line is a stylized representation of the well-established positive relationship between poor health (horizontal axis) and the probability of leaving the labor force at older ages (vertical axis). This line can be thought of as representing the expected relationship between health and the likelihood of labor force exit for those without family incentives to either exit or remain in employment.

For those with family incentives to exit or remain in employment, we posited a nonlinear relationship between health and the likelihood of labor force exit. The thin broken line in Figure 1 represents the posited relationship between health and labor force exit for those with family incentives to

Figure 1
Hypothesized Interactive Influences of Health and Family Context
on the Likelihood of Labor Force (LF) Exit at Older Ages



remain in the labor force. For those in relatively good health, the relationship was expected to be relatively weak, as minor health problems are endured to fulfill economic obligations (segment A of Figure 1). This hypothesis would be consistent with a negative coefficient for the interaction between health and family incentives to remain in the labor force for those who remain below some threshold of poor health. However, as demonstrated by Mutchler et al. (1999), the relationship between health and employment may become particularly strong beyond a threshold at which poor health makes it difficult or impossible for those with incentives to continue working to do so. As described by segment B in Figure 1, this hypothesis would be consistent with a positive coefficient for the interaction between health and family incentives to remain in the labor force for those beyond this threshold of poor health.

In contrast, small differences in health may have a large impact on the probability of exit for those with incentives to leave employment, even among those who remain in relatively good health (segment C of Figure 1). This hypothesis would be consistent with a positive coefficient for the interaction between health and family incentives to exit the labor force below

some threshold of poor health. Beyond this threshold, however, health may become less important relative to other factors (e.g., job satisfaction), although the likelihood of exit remains relatively high (segment D of Figure 1). This would be consistent with a process in which older workers most likely to respond to changes in health (among those with family incentives to exit the labor force) are progressively removed from risk for exit, leaving a subgroup of respondents who are less responsive to changes health. We thus posited that the estimated coefficient for the interaction between health and family incentives to exit the labor force would be negative beyond the threshold of poor health.

It is important to recognize that if the moderating influences of family characteristics do indeed operate as depicted in Figure 1, previous studies may have failed to identify these relationships. If the exit-dampening (or exit-accelerating) effects of incentives to remain in (or exit) the labor force for those in relatively good health are offset by contrasting relationships for those in relatively poor health, estimated coefficients for the interaction between health and family (or other nonfamily) incentives to remain in or exit the labor force may be close to zero. This scenario would be consistent with the relatively limited evidence of moderation found by Mutchler et al. (1999) across a range of posited incentives to remain in or exit the labor force.

Methods

Data

We evaluated the hypothesized interactive relationships between health, family circumstances, and the likelihood of labor force exit using data from the National Survey of Japanese Elderly (NSJE), a longitudinal survey of a nationally representative sample of noninstitutionalized men and women aged 60 years and older conducted at three-year intervals beginning in 1987. Supplementary samples were added in 1990 (60 to 62 years old), 1996 (60 to 65 years old), and 1999 (70 years and older). Compared with the data used in previous studies of later-life labor force participation in Japan, the NSJE data possess three notable strengths. First, the survey's panel design allowed us to examine relationships between work status transitions and changes in health. Second, the NSJE also contains a comprehensive array of health measures, whereas most previous analyses have relied exclusively on measures of self-rated health (Ogawa 2000; Ōishi and Oshio 2000; Seike and Yamada 2004). Third, available information on family structure and family relationships is richer than in other surveys.

Because questions about family exchanges were not asked in earlier waves, we based our analyses on data from waves 5 (1999) and 6 (2002). Wave 5 respondents included surviving members of the previous survey in 1996 (aged 63 years and older in 1999) and a supplemental sample of respondents aged 70 and older. The sample size for this survey was 3,483, and the response rate was 75%. Among these wave 5 respondents, 75% were observed again in 2002, 7% ($n = 247$) died before the wave 6 survey, 11% ($n = 373$) were lost to follow-up, and information on another 7% ($n = 234$) was obtained through proxy interviews. Because respondents aged 70 and older were oversampled in wave 5, we weighted the data to reflect the age distribution of noninstitutionalized men aged 63 and older in the 2000 census. We based our analyses on the subsample of male respondents who were working at wave 5 ($n = 522$). The weighted proportion employed at wave 5 (0.40) was similar to the corresponding figure for men aged 63 and over in the 2000 census (0.39).

Measures

The primary variables of interest were labor force exit, health, and family characteristics. Our measure of labor force exit classified respondents into three categories: those no longer working at wave 6 (i.e., aged 66 years and older), those remaining in the labor force at wave 6, and those who died or were lost to follow-up. As shown in the first three rows of Table 1, 58% remained in the labor force, 26% were no longer working, and 17% died or were lost to follow-up between waves.

We measured health as the predicted probability of being in fair or poor health from an ordered logistic regression model of self-rated health (on a scale ranging from 1 to 5) as a function of several objective measures of health status, including Nagi's (1976) index of functional limitations (ranging from 0 to 7), the number of serious diseases or conditions (ranging from 0 to 5), the number of chronic conditions (ranging from 0 to 15), and a modified version of Pfeiffer's (1975) index of cognitive functioning (ranging from 0 to 9). The results of this model (not shown) indicated that these four objective measures were strongly related to self-rated health. Coefficients for each were large in magnitude and statistically significant. The pseudo- R^2 value for the model was .12.

This approach to measuring health is a simplified version of the method implemented by Bound et al. (1996, 1999) and is appealing for several reasons. First, it provides a single-value summary of the theoretically relevant information on objective health status available in the survey. Because we

Table 1
Sample Characteristics (N = 522)

Variable	Proportion/Mean	<i>SD</i>
Labor force transition		
Remain in labor force	0.58	
Exit labor force	0.26	
Lost to death, follow-up, or proxy interview	0.17	
Predicted probability of fair or poor health		
1999	9.43	10.93
2002	12.08	15.10
Provided financial assistance		
Yes	0.17	
No	0.83	
Provided caregiving		
Yes	0.10	
No	0.90	
Provided instrumental support		
Yes	0.46	
No	0.54	
Coresidence with unmarried children		
Yes	0.28	
No	0.72	
Coresidence with married children		
Yes	0.28	
No	0.72	
Spouse's work status		
Not married	0.07	
Married and spouse not working	0.43	
Married and spouse working	0.50	
Age	68.76	5.27
Education		
Elementary school (0 to 6 years)	0.05	
Middle or high school (7 to 12 years)	0.81	
College (≥ 13 years)	0.14	
Employment type		
Employee	0.40	
Self-employed	0.60	
Retired between ages 50 and 60		
Yes	0.32	
No	0.68	
Per capita household income (million yen)	2.59	1.67
Household income missing		
Yes	0.25	
No	0.75	

(continued)

Table 1 (continued)

Variable	Proportion/Mean	<i>SD</i>
Earnings (million yen)	2.30	2.75
Earnings missing		
Yes	0.28	
No	0.72	
Financial satisfaction		
Satisfied	0.90	
Not satisfied	0.10	

Note: The analytic sample described in this table consists of men aged 63 years and older who were working at the time of the 1999 survey. With the exception of labor force transitions and the predicted probability of fair or poor health in 2002, all variables were measured in 1999.

were interested in assessing the extent to which family context moderates the relationship between health decline and labor force exit in a relatively small sample, it was essential that we measure health parsimoniously. Second, using predicted values in this way limits potential measurement problems associated with self-rated health. Because we were interested in assessing the differential impact of health across family characteristics that are theoretically linked with normative incentives to remain in or exit the labor force, it was important to reduce the potential bias associated with a tendency to report worse health as a “justification” for not working. Stated differently, we used more objective measures of health to predict self-rated health to reduce variation associated with individual differences in the subjective scale on which respondents evaluated their health (Bound 1991). Third, predicted probabilities provide an intuitively meaningful metric with which to measure health status.

Table 1 indicates that the predicted probability of being in one of the two worst categories of self-rated health was 9% at baseline and 12% three years later. This relatively small average increase in the probability of being in fair or poor health reflects the fact that health decline was offset to some extent by improvement in health. One third of our sample experienced a decline across waves in the predicted probability of being in fair or poor health.

We considered six measures of family structure and family relationships, all of which were measured in 1999. Three dichotomous measures of family exchanges indicate whether or not respondents (1) provided living expenses to children in the previous year, (2) provided instrumental support (shopping, domestic work, child care) to family members on a weekly basis during the past year, or (3) provided physical care to family members during the past year. Financial support to children is a potentially important

incentive to remain in the labor force, whereas the provision of instrumental support and caregiving both represent potential incentives to exit the labor force. Table 1 shows that the proportions providing financial assistance to children (0.17) and caregiving to family members (0.10) were relatively low. The provision of instrumental support was much more common, with 46% of older employed men reporting that they provided assistance with child care, shopping, or housework on a weekly basis during the previous year.

Two dichotomous measures of living arrangements indicated whether respondents were coresiding with unmarried children or married children in 1999. We distinguished between married and unmarried coresident children in an attempt to represent children as both potential recipients of financial support or caregiving and potential sources of economic, physical, and emotional support for older parents (Ogawa 2000; Raymo et al. 2004). We posited that unmarried children are more likely to represent financial obligations to remain in the labor force to the extent that they are younger, less financially secure, and have yet to receive parental assistance with wedding expenses and the transition to independent living. In contrast, coresidence with married children may provide incentives to exit the labor force to the extent that married children are older, more economically capable of supporting the household, and more likely to need or desire grandparental provision of child care. Slightly more than one fourth of the employed men in our sample were coresiding with unmarried children, and a similar proportion were coresiding with married children.

Finally, we constructed a three-category variable that classified respondents according to marital status and spouse's employment status in 1999: not married, married and spouse not working, and married and spouse working. Only a small minority of the sample (7%) were unmarried and, among those who were married, 54% had working spouses. Older men's identification with the role of primary provider should provide a strong incentive to continue working as long as their wives remain in the labor force. We therefore posited that the association between health decline and labor force exit for men with working wives would be relatively weak for those in relatively good health and/or relatively strong for those in relatively poor health at follow-up.

We controlled for several characteristics related to work status at older ages, including age, education, employment type, mandatory retirement experience, and economic circumstances, all of which were measured in 1999. Because the sample size was not large ($n = 522$), we represented these baseline characteristics as parsimoniously as possible. We specified age as a

linear spline with a knot at age 77 (i.e., age 80 at follow-up in 2002). The relationship between age and the log odds of labor force exit was thus assumed to be linear between ages 63 and 77 and linear with a different slope beyond age 77. This specification was based on preliminary, descriptive analyses indicating a relatively steady increase in the probability of labor force exit through age 77 and large fluctuations in exit probabilities for the small number of respondents remaining in the labor force beyond age 77. Educational attainment had three categories: elementary school, middle school or high school, and college. Employment type distinguished self-employed respondents from employees, and a dichotomous indicator of whether a respondent retired from a job between the ages of 50 and 60 years was included as a proxy for the experience of mandatory retirement.

We expected that economic need and flexible work would contribute to a lower likelihood of labor force exit among the self-employed, whereas higher pension wealth, shorter job tenure, and the relatively low pay and limited job security associated with postretirement jobs (Kimura and Oka 2001) would result in a higher likelihood of exit among those who had previously retired. We included three measures of economic status: respondents' earnings, per capita household income, and self-stated satisfaction with financial circumstances. The measure of respondents' earnings referred to income from employment and was constructed using the midpoints of categorical income response categories. Per capita income was constructed by dividing the midpoints of the categorical values of total household income by the number of individuals reported on the household roster. For both of these income measures, we assigned the mean value to those who did not respond to the question and included dichotomous indicators of missing data. Satisfaction with financial circumstances was measured dichotomously, with those who were not satisfied distinguished from those who were satisfied or neutral. We anticipated that economic need would be reflected in a relatively lower likelihood of labor force exit among those with lower per capita household incomes as well as those who were dissatisfied with their financial circumstances, whereas higher opportunity costs of retirement would be reflected in a relatively lower likelihood of labor force exit among those with higher earnings.

Models

Because nonrandom attrition due to either death or nonresponse might result in biased estimates of the correlates of labor force exit (Hayward et al. 1989), we treated loss to death or follow-up between waves as a competing

risk by estimating multinomial logistic regression models. We began by estimating the following baseline model:

$$\ln(p_{ij2002}/p_{i02002}) = \alpha_j + \beta_{1j}h_{i1999} + \beta_{2j}h_{i2002} + \delta'_j\mathbf{X}_{i1999} + \gamma'_j\mathbf{Y}_{i1999}, \quad (1)$$

where p_{ij2002} is the probability that the i th respondent is in labor force status j (out of the labor force or dead, nonresponse, proxy response) in 2002, and p_{i02002} is the probability that the i th respondent remained in the labor force. To assess the role of health decline in prompting labor force exit, we included both health status in 1999 (h_{i1999}) and health status at follow-up (h_{i2002}). \mathbf{X} includes the measures of age, education, self-employment status, retirement experience, and economic circumstances, and \mathbf{Y} includes the six family characteristics summarized above. This baseline model established the average associations of health and family circumstances with the likelihood of labor force exit between waves. The coefficient of primary interest in this baseline model was β_2 , the difference in the log odds of labor force exit between waves associated with a one percentage point increase in the predicted probability of being in poor health, net of baseline health. We expected this linear relationship between poor health and labor force exit to be positive.

To evaluate the hypothesized moderating influences of family characteristics, we first extended the baseline model to include interactions between health at follow-up and family characteristics:

$$\begin{aligned} \ln(p_{ij2002}/p_{i02002}) = & \alpha_j + \beta_{1j}h_{i1999} + \beta_{2j}h_{i2002} + \delta'_j\mathbf{X}_{i1999} \\ & + \gamma'_j\mathbf{Y}_{i1999} + \eta'_j(h_{i2002} \times \mathbf{Y}_{i1999}). \end{aligned} \quad (2)$$

Because the sample size is small, we estimated separate models for interactions between health in 2002 and each of the six family characteristics. We evaluated the posited moderating influences of family characteristics by examining the direction, magnitude, and statistical significance of η in the contrast between exiting and remaining in the labor force. Our baseline hypothesis suggested that η should be positive when health is interacted with family incentives to remain in the labor force (e.g., providing financial support) and negative when health is interacted with family incentives to exit the labor force (e.g., caregiving).

Finally, we estimated a series of models in which the interactive relationships between health and family characteristics were allowed to vary by the level of health. On the basis of the shape of the interactive relationships posited in Figure 1, we specified the predicted probability of being in fair or poor health at follow up (h_{i2002}) as a linear spline with one knot. For each

model, this allowed us to calculate four separate slopes for the relationship between health and labor force exit. “Main effects” represented relationships between health and labor force exit for those without family incentives to remain in or exit the labor force. For this group, we expected slopes to be similar for those in good health and those with higher predicted probabilities of being in fair or poor health. Interaction coefficients indicated the extent to which slopes associated with better and worse health differed depending on family circumstances. We thus expected that η associated with the segment representing better health would be negative for family incentives to remain in the labor force (segment A of Figure 1) and positive for family incentives to exit the labor force (segment C of Figure 1). Similarly, we expected that η associated with the segment representing worse health would be positive for family incentives to remain in the labor force (segment B of Figure 1) and negative for family incentives to exit the labor force (segment D of Figure 1).

In the results presented below, we placed the knot connecting the two segments at a predicted probability of fair or poor health equal to 7%. This somewhat arbitrary threshold splits the sample into two groups of roughly equal size, with 53% of those observed in 2002 below this value and 47% above. To facilitate interpretation of the estimated interaction coefficients, we rescaled the predicted probability of poor health so that both segments of the spline were of equal length (i.e., by collapsing the 94 values in the 7% to 100% range into 8 values). Supplemental analyses (not shown) indicated that results were robust to small changes in the placement of the knot.

Results

Table 2 presents estimated coefficients for baseline models in which health in 2002 was specified as a single linear term (columns 1 and 2) and as a two-segment linear spline (columns 3 and 4). Coefficients represent the log odds of labor force exit or death, loss to follow-up, proxy interview (relative to remaining in the labor force) associated with a one-unit difference in the independent variables. As expected, health decline was strongly correlated with the risk for labor force exit. Net of baseline health, a one percentage point increase in the predicted probability of being in fair or poor health at follow-up was associated with a 6% increase in the odds of leaving the labor force. A one standard deviation increase in this measure of health status was thus associated with a doubling of the odds of leaving the labor force (i.e., $\exp[0.06 \times 15.10] = 2.47$). Poor baseline health was

Table 2
Estimated Coefficients From Baseline Models of LF Exit (*N* = 522)

Variable	Health in 2002: Linear		Health in 2002: Linear Spline	
	LF Exit vs. in LF	Death/NR vs. in LF	LF Exit vs. in LF	Death/NR vs. in LF
Predicted probability of fair/poor health				
1999	-0.03	0.00	-0.02	0.00
2002	0.06**	—		
2002 (0% to 7%)			0.43**	—
2002 (7% to 100%)			0.36**	—
Provided financial assistance ^a	0.51	0.48	0.37	0.47
Provided caregiving ^a	-0.71	-0.32	-0.73	-0.35
Provided instrumental support ^a	0.41	-0.18	0.18	-0.20
Coresidence with unmarried children ^a	-0.61 [#]	-0.06	-0.64*	-0.06
Coresidence with married children ^a	-0.02	-0.80*	-0.15	-0.79*
Spouse's work status ^b				
Not married	0.55	-0.58	0.57	-0.43
Married and spouse working	-0.64*	-0.63 [#]	-0.77*	-0.61 [#]
Age (years)				
63 to 77	0.11**	0.06 [#]	0.11**	0.06
≥77+	0.02	0.22**	0.03	0.22**
Education ^c				
Elementary school	-1.63**	-1.22*	-1.69**	-1.13*
College	-0.59	-0.70 [#]	-0.76 [#]	-0.70 [#]
Employment type ^d				
Self-employed	-1.09**	-0.13	-1.08**	-0.14
Retirement at ages 50 to 60 ^a	0.30	0.08	0.28	0.07
Per capita household income (million yen)	0.05	0.06	0.08	0.06
Per capita household income missing ^a	-0.03	0.52	0.06	0.54
Earnings (million yen)	-0.33**	-0.03	-0.33**	-0.03
Earnings missing ^a	-0.65*	0.10	-0.58 [#]	0.11
Financial satisfaction ^e				
Not satisfied	0.42	0.00	0.37	-0.05
Constant	-7.03**	-5.07 [#]	-9.10**	-4.96 [#]
<i>df</i>	39		40	
Pseudo <i>R</i> ²	.16		.19	

Note: LF = labor force; NR = non-response (death, loss to follow-up, proxy interview). Omitted categories were as follows:

a. No.

b. Married and spouse not working.

c. Middle or high school.

d. Wage employee.

e. Satisfied.

***p* < .01. **p* < .05. [#]*p* < .10.

unrelated to men's labor force behavior, in contrast to findings from the United States (Bound et al. 1999).

Treating health as a linear spline indicated that the positive relationship between poor health and the likelihood of labor force exit was approximately linear, with no statistical difference between the slopes of the two segments (0.43 and 0.36, respectively). The slopes of these two components of the linear spline were substantially larger than the slope for the linear measure of health in model 1 (i.e., 0.06) because the scale on which health was measured was compressed. The slope in the first model indicates change in the log odds of labor force exit for a one percentage point increase in the predicted probability of being in poor health on a scale of 0 to 100, whereas slopes in the second model are the differences in log odds associated with of a one-unit change in health on a scale of 0 to 16 (i.e., 0% to 7% in the first segment and an eight-point compression of 7% to 100% in the second segment).

Family characteristics were largely unrelated, on average, to labor force exit. Exceptions indicate that, consistent with older men's role as family providers, the likelihood of leaving the labor force was significantly lower for those coresiding with unmarried children and those with working wives. Coefficients for other variables in the model indicate that the likelihood of labor force exit was positively associated with age through age 77 and negatively associated with low education, high education, self-employment, and earnings. The relatively flat slope beyond age 77 (age 80 in 2002) reflects large fluctuations in the age-specific odds of labor force exit among the small number of men observed at these older ages. The likelihood of death, loss to follow-up, or proxy interview was higher at older ages and lower among those coresiding with married children, those with working spouses, and those with either relatively low or relatively high education.

Table 3 presents results of the interactive models. The estimated coefficients for health in 2002 (in italics) represent change in the log odds of labor force exit (relative to remaining in the labor force) associated with a one percentage point increase in the predicted probability of being in fair or poor health for respondents in the reference category of the family variable. The interaction coefficients thus represent the difference in the slope of the relationship between health and the log odds of labor force exit for a given category of the family variables relative to the reference category. Using a continuous measure of health in 2002, our baseline hypothesis was that these interaction coefficients would be positive for family incentives to remain in the labor force and negative for family incentives to exit the labor force (as summarized in column 1). However, the results of these models

Table 3
Odds Ratios for Labor Force Exit Versus
Remaining in the Labor Force

Model	Health in 2002: Linear Spline					
	Health in 2002: Linear		Segment 1: 0% to 7%		Segment 2: 7% to 100%	
	Expected	β_2 and η	Expected	β_2 and η	Expected	β_2 and η
Model 1: predicted probability of fair or poor health in 2002	$\beta_2 > 0$	0.05**	$\beta_2 > 0$	0.38**	$\beta_2 > 0$	0.39*
Provided financial assistance ^a	$\eta > 0$	0.03	$\eta < 0$	0.73*	$\eta > 0$	-0.33
Model 2: predicted probability of fair or poor health in 2002	$\beta_2 > 0$	0.06**	$\beta_2 > 0$	0.41**	$\beta_2 > 0$	0.38*
Provided caregiving ^a	$\eta < 0$	0.01	$\eta > 0$	0.34	$\eta < 0$	-0.37
Model 3: predicted probability of fair or poor health in 2002	$\beta_2 > 0$	0.05**	$\beta_2 > 0$	0.34**	$\beta_2 > 0$	0.45*
Provided instrumental support ^a	$\eta < 0$	0.01	$\eta > 0$	0.22 [#]	$\eta < 0$	-0.24
Model 4: predicted probability of fair or poor health in 2002	$\beta_2 > 0$	0.05**	$\beta_2 > 0$	0.37**	$\beta_2 > 0$	0.30*
Coresidence with unmarried children ^a	$\eta > 0$	0.05	$\eta < 0$	0.54*	$\eta > 0$	0.29
Model 5: predicted probability of fair or poor health in 2002	$\beta_2 > 0$	0.05**	$\beta_2 > 0$	0.49**	$\beta_2 > 0$	0.26*
Coresidence with married children ^a	$\eta < 0$	0.02	$\eta > 0$	-0.22	$\eta < 0$	0.39 [#]
Model 6: predicted probability of fair or poor health in 2002	$\beta_2 > 0$	0.08**	$\beta_2 > 0$	0.61**	$\beta_2 > 0$	0.40*
Not married ^b	?	0.02	?	-0.30	?	0.01
Married and spouse working ^b	$\eta > 0$	-0.04	$\eta < 0$	-0.35*	$\eta > 0$	-0.06

Note: Omitted categories were as follows:

a. No.

b. Married and spouse not working.

** $p < .01$. * $p < .05$. [#] $p < .10$.

provided no evidence that family incentives to remain in or exit the labor force moderated the relationship between health decline and labor force exit for men. All of the coefficients for health were positive, statistically significant, and of similar magnitude, but none of the interaction coefficients was significantly different from zero.

When health is specified as a linear spline, we expected the interaction coefficients to be consistent with the pattern described in Figure 1: negative

for combinations of family incentives to remain in the labor force and good health (segment A) and family incentives to exit the labor force and poor health (segment D) but positive for combinations of family incentives to remain in the labor force and poor health (segment B) and family incentives to exit the labor force and good health (segment C). These expected relationships are summarized in columns 3 and 5 of Table 3. In five of these six models, we found that the slope of the relationship between health and the log odds of labor force exit did depend on both family characteristics and the level of health. In some cases, these significant interaction coefficients were consistent with the relationships posited in Figure 1. For example, among those providing instrumental support (a posited incentive to exit the labor force), the association between health and labor force exit was stronger for those in relatively good health (model 3). Among men with working spouses (a posited incentive to remain in the labor force), the association between health and labor force exit was weaker for those in relatively good health (model 6).

At the same time, however, other significant interactive relationships were not consistent with our hypotheses. For example, coresidence with unmarried children (a posited incentive to continue working) was associated with a stronger relationship between health and exit for those in relatively good health (model 4). The provision of financial assistance is another posited family incentive to remain in the labor force that, contrary to our expectations, was associated with a stronger relationship between health decline and labor force exit among men in relatively good health (model 1). Similarly, coresidence with married children (a posited incentive to exit the labor force) was associated with a stronger relationship between health decline and labor force exit among those in relatively poor health (model 5).

Overall, our results suggest that family context plays an important role in moderating relationships between health and labor force attachment at older ages. The substantive importance of these relationships is highlighted by the magnitude of the interaction coefficients. The fact that significant interaction coefficients are at least half as large as the coefficients for health indicates that these family incentives to remain in or exit the labor force were associated with more than a 50% decrease or increase in the effect of a given difference in health status on the likelihood of labor force exit. Nonetheless, the nature of these relationships was only partially consistent with our hypotheses, suggesting the need to rethink either our hypotheses or the measurement of family context (or both). We discuss these possibilities in the next section.

Discussion

In this study, we have extended research on work beyond retirement ages by examining the extent to which family circumstances moderate the relationship between health decline and labor force exit among older Japanese men. Drawing on previous research on health and retirement in the United States, we began by evaluating the hypothesis that health decline should be a relatively strong correlate of labor force exit at older ages among those with incentives to remain in the labor force and a relatively weak correlate of exit for those with incentives to stop or reduce employment. We found no support for this hypothesis, but our conclusions changed considerably when interactions between health and family circumstances were estimated separately for those in relatively good health and those in relatively poor health. Indeed, we found significant interactions between health and family circumstances in five of the six models we estimated. These results were partially consistent with the posited relationships described in Figure 1. For example, we found that among those in relatively good health, the relationship between health and the likelihood of labor force exit was relatively strong for those providing instrumental support to family members (a posited incentive to exit the labor force) and relatively weak among those whose wife was also working (a posited incentive to remain in the labor force).

At the same time, however, three of the five interactive relationships that we identified were not consistent with the hypotheses summarized in Figure 1. For example, we found that the relationship between health decline and labor force exit was particularly strong among older men who remained in relatively good health and provided financial assistance to children or coresided with unmarried children. It is not difficult to provide interpretations of these results that would be consistent with our hypotheses. For example, it may be that provision of financial assistance to children is less indicative of financial need on the part of children than it is of unmeasured wealth, the reciprocation of financial assistance from children, or other financial circumstances that may facilitate labor force exit at older ages. Similarly, it may be that the circumstances of unmarried coresident children were more likely to change between waves than those of married children. The fact that 21% of men coresiding with unmarried children in 1999 were not doing so in 2002 suggests that unmarried children's transition to economic independence (e.g., graduating from school, marrying, achieving economic stability and independence) may remove an important incentive for older men to remain in the labor force. Although these post hoc interpretations are potentially informative, it is more important that our inconsistent

findings be reevaluated with data that allow for less ambiguous measurement of family incentives to exit or remain in the labor force beyond typical retirement ages.

The limitations of this study leave several important tasks for subsequent research. For example, direct measures of exchanges should be used to reevaluate our findings on the basis of indirect indicators such as coresidence with children and spouse's work status. The direct measures that we do have (the provision of physical care, instrumental support, and financial support) refer only to the year before the baseline survey, and subsequent studies should consider family transfers measured over a longer period of time, because these exchanges may signify longer term obligations that provide more powerful incentives to remain in or exit the labor force.

It is also important to note that our measures of exchange focused only on the provision of financial support and caregiving, although it is possible that family exchanges in the other direction may also moderate relationships between health decline and labor force exit. For example, the receipt of financial support from children or other family members may facilitate labor force exit in response to health decline, whereas the receipt of instrumental support may facilitate continued labor force attachment. An additional data limitation was our inability to precisely date interwave changes in labor force participation and health. Information on labor force status and health at two points in time represents a major improvement on the cross-sectional data used in most previous studies, but this information alone is not sufficient for conclusions about causal influences of health decline on labor force exit.

Our decision to focus on health decline was motivated by its clear theoretical and established empirical relationships with labor force participation at older ages as well as attitudinal survey data indicating that many older Japanese men hope to work as long as they are physically able (Seike 1998). It is certainly plausible that the strength of other correlates of labor force exit at older ages, such as economic well-being and job satisfaction, may also depend on family incentives to remain in or exit the labor force. Finally, it is important that our results be replicated with a sample large enough to allow for both the simultaneous estimation of interactions between health decline and multiple dimensions of family context and more precise estimation of coefficients for other correlates of labor force transitions. A larger sample would also allow for finer distinctions in the level of health at which family incentives to remain in or exit the labor force are most important. Although we found that our results were relatively insensitive to small shifts in the health threshold at which the nature of moderating relationships was allowed

to change, the ability to consider the role of family circumstances at more points in the health distribution (e.g., tertiles, quartiles) may shed further light on the nature of these interactive relationships. It may also be that the threshold at which the nature of moderating relationships changes depends on the type of employment or other characteristics, including space and time. We were not able to consider these higher order interactions with the available data.

Another important task for subsequent studies is to extend our focus on men to evaluate gender differences in relationships between health, family, and work at older ages. We chose to limit our focus to men for purposes of clarity and because Japanese women's labor force participation at older ages is more selective than that of men. Rapid increases in female labor force participation across the life course in most aging societies (including Japan) highlight the importance of understanding gender differences in relationships between work at older ages and its correlates including, but not limited to, health and family context.

We chose to focus on one industrialized country with substantial levels of postretirement employment, long life expectancy, high levels of self-employment at older ages, and a long-standing policy emphasis on promoting extended labor force attachment to provide some initial insights into the complex mechanisms through which family context influences later-life labor force transitions. Our results suggest, for example, that policies encouraging workplace accommodation of changes in older workers' health (e.g., see Daly and Bound 1996) may facilitate the continued employment of those who remain an important source of economic support for families. Similarly, our results also suggest that policies facilitating work-family balance (e.g., care leave, improved access to child care, the public provision of day care for frail family members) may contribute to continued employment among older employees who provide care and instrumental support to other family members (see, e.g., Pavalko and Henderson 2006). In addition to assessing the generality of our results by examining data from other countries, subsequent studies should take advantage of variation in exposure to these policies to evaluate the validity of our speculative conclusions.

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