

Relationships between Marriage and Women's Health in Japan

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Using nine waves of data from the Japanese Panel of Survey of Consumers (1994-2002, N = 5,266), we estimate relationships between women's health and marital status, net of baseline health. By constructing measures of psychological well-being and physical health, we evaluate the extent to which the impact of marriage depends on the dimension of health considered. We also evaluate alternative hypotheses about whether marriage is detrimental or is beneficial to women's health in Japan. Our results from random effects regression models indicate that marriage is associated with lower levels of psychological distress and better physical health among Japanese women. We also document the important moderating effects of perceived marital satisfaction on health among Japanese women. Study results are consistent with hypothesized protective effects of marriage and thus provide evidence of the generality of recent results found in the U.S. Given the scant empirical evidence on women's health and marriage in Japan, the findings in this study have important implications, particularly in comparative perspective and in the context of theoretical frameworks for understanding the benefits of marriage.

Recent studies have repeatedly found that marriage is associated with better psychological and physical well-being in the U.S. (Waite and Gallagher 2000) and other industrialized countries (Weissman et al. 1996). In contrast to earlier notions of “his and her” marriages (Bernard 1972), these studies have shown that marriage is beneficial for the health of both men and women (Simon 2002; Waite and Gallagher 2000). Japan presents a valuable opportunity to evaluate the generality of these findings. Relative to most other industrialized countries, the gender division of labor in Japanese marriages remains highly asymmetric (Tsuya et al. 2005), expectations of “intensive mothering” remain strong (Hirao 2001), and unmarried women express strong skepticism regarding the benefits of marriage (Tsuya, Mason, and Bumpass 2004).

In one of the only studies to examine linkages between marriage and women’s health in Japan, Inaba et al. (2005) find that, as in the U.S., marriage is associated with lower levels of depressive symptoms. We reevaluate and extend this earlier work in several ways. First, by using longitudinal data, we are able to examine relationships between health and marital status net of baseline health. This is a critical improvement in light of evidence that health has long played a strong role in selection into marriage in Japan (Goldman, Takashi, and Hu 1995). Second, we consider multiple measures of health to evaluate the extent to which the impact of marriage may depend on the dimension of well-being considered. There is evidence that marriage is beneficial for both physical and psychological health; but most studies have examined only one aspect of health, focusing either on physical health or on mental health. This is a potentially important limitation in light of results suggesting that psychological health and physical health affect each other (e.g., Mirowsky and Ross 1989; Waite and Gallagher 2000).¹ Therefore, it is important to evaluate different dimensions of health in order to fully understand

¹ But note that in their recent study on the relative benefits of marriage, Musick and Bumpass (2006) documented different findings.

the relationships between marriage and health. As described below, we construct indices for psychological well-being and physical health based on a large battery of questions asked across repeated waves of a nationally representative survey.

Theoretical and empirical background

Marriage, gender, and health

In the U.S., marriage as a social institution and its impact on health and well-being has long been of great interest and it is now widely accepted that marriage is beneficial for individual health and well-being. Married people fare better in terms of physical health such as morbidity, mortality, and longevity (Kiecolt-Glaser and Newton 2001). Also marriage is found to be positively associated with psychological well-being and mental health (e.g., Horwitz, White, and Howell-White 1996a; Marks and Lambert 1998; Simon 2002; Williams 2003). Some argue that married people have better health due to the selection effects (i.e., healthier people are more likely to marry and remain married) (e.g., Mastekaasa 1992) whereas others contend that marriage does protect people through institutionalization, social and emotional support, commitment, and greater resources (Waite 1995). Marriage also provides multiple social roles which are beneficial to health and add purpose and meaning of life (Gove 1973; Waite 1995). Therefore, studies based on cross-sectional designs are limited in their ability to explain to what extent the selection and causation is responsible for the observed association between marriage and health. To address this limitation, recent studies have used longitudinal data and have provided evidence for the causal effects of marriage on health while controlling for the selection effects (e.g., Horwitz, White, and Howell-White 1996a; Marks and Lambert 1998; Musick and Bumpass 2006). This cumulating evidence led to the wide recognition that people benefit from

marriage in terms of health (e.g., Waite and Gallagher 2000). It has also contributed to the promotion of public policies to strengthen marriage in the U.S. (Cherlin 2003).

However, outside the U.S., there is relatively little empirical evidence regarding associations between marriage and health. As an industrialized society with several distinctive features, Japan provides an important opportunity to test the generality of the marriage benefits in health documented in the U.S. Of particular importance are well documented differences in family and marriage behaviors between Japan and other countries with similar levels of economic development. For example, relatively late first marriage timing, very low levels of nonmarital fertility, a high degree of gender specialization within the household, and relatively low rates of employment among married women suggest that the meaning and function of marriage and the way it is institutionalized may be different in Japan (Rindfuss 2004). The distinctive gender dynamics of Japanese marriage provide a particularly valuable opportunity to evaluate the generality of recent findings from the U.S. indicating that, in contrast to results of earlier studies, marriage is beneficial for women's health.

In the U.S., the possibility that marriage is detrimental to women's health has long been discussed. For example, Gove and Tudor's sex role theory of mental health (1973) argued that role-related changes in modern industrialized societies have potentially detrimental implications for married women's mental health. In addition, feminist scholars have argued that marriage is an institution favorable to men and detrimental to women's well-being and health. According to Bernard's widely cited argument, the presence of gender inequality in the family and society results in relatively high psychological costs of marriage for women, thus making "her" marriage disadvantageous relative to "his" marriage (Bernard 1972).

In contrast, some argue that marriage is not necessarily detrimental to women's health. For example, there is some evidence that women are more likely than men to fare worse in terms of mental health regardless of marital status (e.g., Horwitz, White, and White 1996b). Related to these findings, some claim that higher levels of psychological distress among married women (relative to men) may reflect gender differentials in the manifestation in mental health. Because women tend to report more emotional or psychological problems such as depression while men are more likely to have problems as such substance use (e.g., Simon 2002), studies based on widely used measures of depressive symptoms (e.g., CES-D scales) may overstate mental health problems among married women (e.g., Aneshenel et al 1991). Further, many studies have found that the health benefits of marriage are equal for men and women: relative to their unmarried counterparts, married people have better mental health and psychological well-being (e.g., Perlin and Johnson 1977; Thoits 1986) and physical health (e.g., House et al 1988; Gordon and Rosenthal 1995), regardless of gender.

In evaluating the interrelationships between gender, marriage, and health, Japan is one setting in which the theoretical expectations of "his and her marriages" may hold given the gender inequality pervasive in its society and families. Patriarchal traditions of Japan's Confucianism heritage (Brinton 2001), the highly asymmetric gender division of domestic work (Tsuya, Bumpass, Choe, and Rindfuss 2005), and cultural norms emphasizing mother's role in childrearing and in children's educational success (Hirao 2001; Hirao 2007) suggest that there may be significant physical and psychological stressors associated with marriage for women. In particular, married women still do most of the housework and men's very limited participation in housework is relatively insensitive to wives' employment (e.g., Tsuya et al 2005). In light of the increase in married women's labor force participation (Brinton 2001; Sakai 2004), combinations

of work and family may interact to generate lower levels of health among married women. Increase in the proportions of women who have never married (Retherford, Ogawa, and Matsukura 1999) and skepticism about marriage among unmarried women (Tsuya and Bumpass 2004: 39-53) may reflect the burdens of marriage for women in Japan (Tsuya and Mason 1995).

However, at the same time, it is important to recognize that marriage may have protective effects beneficial to women's health in the Japanese context. Relative to the U.S. and other industrialized countries, Japan has, until recently, been a universal marriage society with fewer family alternatives to marriage. In addition, behaviors related to family and marriage in Japan, such as very low non-marital fertility and the strength of intergenerational ties indicate that the family remains a relatively strong social institution in Japan compared to many western industrialized societies. Under such circumstances, the social pressures and associated stress felt by those who do not follow a "normative" family life course may be greater in Japan. Recent ethnographic research on the working lives of women in large Japanese firms suggests that, beyond a certain age, those who remain single are often considered to be "weird" or to have something wrong (Ogasawara 2001). Married women who are in the socially sanctioned institution of marriage, however, may be exposed to fewer such emotional and psychological stressors. Public policies and labor practices also provide protection for married women. The Tax and Social Insurance Law, for instance, provides benefits for housewives who are either not working or have very low earnings (Nagase 2003). Companies also provide "spouse allowances" in addition to the regular salary of men with dependent wives, highlighting the view of married couples as a single economic unit (Nagase 2003). Such structural and policy factors are presumably one of the reasons for the relatively lower labor force participation of Japanese married women (Raymo and Lim 2007).

Also, the fact that a large proportion of women continue to exit the labor force upon marriage and childbearing suggests that employment may be an important factor in evaluating women's health in Japan. When considering the effects of work on married women's health it is important to recognize that relationships may run in both directions, with health impacting the likelihood of working (i.e., the selection of healthy people into employment) and work affecting health. Evidence is not conclusive, but many studies have produced evidence consistent with casual effects of work on health (e.g., Ross and Mirowsky 1995). How employment affects health likely varies depending on factors like job characteristics and working environment (e.g., support from co-workers and supervisors) (Repetti et al 1989). Given gender and age discriminations in the labor market (Brinton 2001) and high level of job demands (e.g., long work hours), employment may be associated with increased physical and psychological stress, especially among married women. It is thus possible that marriage may be associated with better health through the lower likelihood of employment in Japan.

Previous studies on marriage and health in Japan

While the health benefits of marriage are widely recognized in the U.S., few studies have been conducted in other societies. Research on East Asian countries including Japan is particularly scarce. In one of few studies on marriage and health in Japan, Goldman, Takahashi, and Hu (1995) used aggregate level data from 1975 to 1990 to document the importance of physical health in selection into marriage, particularly for arranged marriages. In another study, Inaba et al (2005) compared the distribution of depressive symptoms (using the CES-D scale) by gender, marital status, and SES in the U.S. and Japan. They found similar patterns in the two countries: the unmarried, women, and people with lower incomes report higher levels of depressive symptoms. The combined results of these two studies suggest that marriage is associated with

better health for women in Japan. However, we need more evidence substantiating these findings considering the limitations of these earlier studies (e.g., relatively old data, cross-sectional design, failure to consider potentially important factors such as marital quality).

Our study improves upon previous research in several ways. First, we use recently collected longitudinal data (from the 1990s and 2000s) to evaluate how marriage is associated with women's health while controlling for the baseline health. Second, we are able to take advantage of rich information on health to construct multi-item indices of both physical health and psychological well-being. Given that physical health and psychological health are closely related (Mirowsky and Ross 1989; Waite and Gallagher 2000) and that explanatory power may be limited in studies based on single outcomes (Marks & Lambert 1998), our use of multiple measures of health should more fully capture associations between marriage and health.

We also examine the role of employment and marital quality in moderating relationships between marriage and physical and psychological health. As noted above, the characteristics of the Japanese labor market (e.g., age and gender discrimination, unfriendly work environment toward married women) and family behaviors (e.g., husbands' limited participation in housework) suggest that marriage may be particularly detrimental to the health of women who are working outside the home. Previous studies also highlight the importance of considering the role of marital quality. People with higher marital satisfaction report better self-rated health regardless of gender (e.g., Ren 1997) and have less frequent physician visits (Prigerson, Maciejewski, and Rosenheck 1999). At the same time, lower marital quality itself is a major stressor (Conyne and DeLongis 1986) and those in troubled marriages show increased distress and more depressive symptoms (Beach, Fincham, & Katz 1998; Fincham and Beach 1999).

Also, people in unsatisfactory marriages are found to be less happy than the unmarried (Glenn & Weaver 1981).

We include divorced women in our analysis in an attempt to provide some of the first empirical evidence on the relative health well-being of this growing group of women. In the U.S., divorced people are more likely to engage in risky health behaviors (Umberson 1987) and to have higher mortality compared than their married counterparts (Lillard and Waite 1995). Divorced is also associated with greater psychological distress (Booth and Amato 1991), especially for women (Marks and Lambert 1998). Widely shared norms and attitudes surrounding marriage and family in Japan may contribute to psychological distress among divorced women. It is also probable that divorce is associated with worse health outcomes if unhealthy women are more likely to leave marriage via divorce. Severe economic consequences of divorce and the high labor force participation rates among divorced women (Ministry of Health Labour and Welfare 2005) also suggest the potentially detrimental effects of divorce on health. However, there are many factors that need to be considered in evaluating relationships between divorce and health including spousal relationship before divorce, financial conditions, and the presence and number of children. It is a research topic of great importance given the rising divorce rate in Japan but is beyond the scope of what we have done in the present study. We intend to pursue this in subsequent analyses.

Research hypotheses

Based on the theoretical background and empirical evidence discussed above, we evaluate alternative hypotheses regarding relationships between marriage and health among Japanese women. If the institutionalization, spousal and social support, and the pooling of

resources associated with marriage are beneficial for health, as appears to be the case in the U.S., we should also see a positive association between marriage and health in Japan. The results from the past studies (Goldman, Takahashi, and Hu 1995; Inaba et al 2005) provide some support for this hypothesis. Furthermore, given the importance of the family as a social institution in Japanese society, it is likely that married people are more protected by societal recognition while unmarried people are more likely to be exposed to stress due to social disapproval and normative pressures.

At the same time, however, the gender dynamics of Japanese families suggest that marriage may be detrimental to women's health. Factors including the rigid gender division of household work and strong normative emphasis on intensive mothering suggest that marital roles may be associated with several potential stressors for women. The gender division of labor between spouses may play a particularly important role in relationships between health and marriage. We do not pursue this hypothesis, however, given that there is very little variation in the low levels of domestic work performed by Japanese husbands (Raymo and Lim 2007; Tsuya, Bumpass, Choe, and Rindfuss 2003).² Combined with the fact that it is common for unmarried people to live with their parents (Rindfuss 2004) and thus to do less housework (Raymo and Ono 2007), marriage itself is a good proxy for a gender inequalitarian division of household labor. If these stressors offset the advantages conferred by the protective nature of marriage emphasized in the causality argument, we expect that marriage will have a negative impact on women's health.

² In an earlier study of labor force transitions among married women in Japan based on the same data used in this analysis, we found that husband's participation in household was very low on average (around 20%) and did not differ by education (of either husbands or wives) or wives' employment status. As a result, the gender division of housework had no effect on women's labor force transitions.

Previous research provides little basis on which to assess the implications of divorce for women's health in Japan and we are also unable to satisfactorily address this question.³ Based on findings from the U.S. and considering characteristics of Japanese society discussed above (e.g., traditional norms surrounding family, economic hardship and higher likelihood of employment of divorced women), we expect that divorce may be negatively associated with both psychological and physical health.

We also hypothesize that the association between marriage and health may be moderated by employment. The disadvantages that women face in the labor market (Brinton 2001) suggest that employment may be detrimental to women's health. Combined with the burdens imposed on married women including heavy responsibilities for housework and childrearing, we expect the health of working wives to be worse than that of their non-working counterparts.

Health outcomes may also vary depending on marital quality. Even if marriage is beneficial for health on average, it is unlikely that all marriages are equally beneficial. We therefore, expect that women in unsatisfactory marriages will have worse health outcomes compared to those in more satisfactory marriages. Further, women reporting lower marital satisfaction may be more likely than the unmarried to report poor health since the perception of bad marriage itself may be a source of stress (Ono and Raymo 2006) that is manifested in negative health outcomes.

In addition, we include several controls such as age, baseline health, education, employment, per-capita household income, coresidence with parents(in-law), and characteristics of children (having children and presence of preschooler) based on the evidence from the previous research. In specific, age should be negatively associated with physical health but

³ Due to the small number of divorces in our data, we combined those divorced between waves and those divorced for longer periods into one category. Therefore, we are not able to effectively distinguish between and causation in this analysis. For further detail, refer to the data section.

positively associated with psychological health (e.g., House, Kessler, & Herzog 1990; Mirowsky 1996). Education and income is positively associated with various health outcomes including longevity, self-reported health, and depression through economic resources, healthy behaviors, and access to health care services (e.g., Ross and Wu 1995; Schnittker 2004). Parenthood, especially raising young children is strong stressor to physical and psychological health (e.g., Evenson and Simon 2005). Living arrangements are also important in the Japanese context. In Japan, it is quite common for both unmarried and married (especially eldest sons and their wives) to coreside with their parents (Rindfuss 2004). Coresiding with parents (in-laws) should be beneficial to physical health to the extent that parents provide help in housework (and childcare). However, living together with parents (in-laws) may not be necessarily good for psychological health. It may be source of conflict and emotional stress, particularly for married women coresiding with in-laws. Yome-shutome (i.e., mother-in-law and daughter-in-law) conflict is widely discussed in the popular media.

Data and methods

Data

We use data from the Japanese Panel of Survey of Consumers (JPSC), an annual survey of a nationally representative sample of young women. The original sample was stratified by marital status, with 1,002 married women and 498 unmarried women between the ages of 24 and 34 interviewed at the first wave in 1993. In wave 5 (1997), a second cohort consisting of 201 married and 299 unmarried women was added. We use data from the second to tenth waves

(1994-2002) when information on health symptoms was collected. The total sample size used in this analysis is 5,266 person-years of observation.⁴

Measures

Our dependent variables are two health indices constructed from a battery of 58 questions related to individual well-being that was asked every other year, beginning in the second wave.

Specifically, respondents were asked if they experienced any of the 58 conditions during the past six months, with response options of yes or no. These items cover several dimensions of psychological and physical well-being, including anxiety, depression, alcohol use, motivation, optimism, and physical stress. Using factor analysis, we generated two separate health indices.⁵ Each index ranges from 0 to 1, with higher values implying greater stressors and worse health. The first index, consisting of 12 items, reflects dimensions of psychological distress such as depression and anxiety ($\alpha = 0.75$). The second index reflects physical health and is comprised of 13 items (e.g., joint pains, headache, tired when getting up in the morning) that are widely used in research on health in the U.S. ($\alpha = 0.75$).

Our primary focus is on the relationships between these two measures of health and marital status. Using information on marital status in the first and subsequent waves, we construct a three category measure of marital status: never-married (reference category), married, and divorced⁶. In preliminary analyses, we used a more detailed measure of marital status that differentiated those divorced between waves from those divorced for longer periods, and newly

⁴ The sample size used in models for physical health is 3,909 person-years of observation since questions asking physical health symptoms were not available in the tenth wave (2002).

⁵ We conducted explanatory factor analysis since it is not clear on what basis these items are included and thus there are no comparable scales that we can refer to. We calculated each index as the mean value of all items identified through the factor analysis rather than the total sum of the items because responses are missing for some items.

⁶ The JPSC data does not separate divorced and widowed women and there are presumably a few widows included in the category for divorced. We assume, however, that the number of widows is very small given the young age of women in our sample.

married women from those married longer to examine how changes in marital status affect health. In these analyses (results not shown), the sign and size of the coefficients for newlyweds were very similar to those for the continuously married in models for both psychological and physical health. We therefore combined these two groups of married women into one category. As for divorced women, separating the recently divorced from those divorced for longer periods resulted in too few cases and we did not see any statistically significant results for these categories (or differences between them). Consequently, we decided to use one category for divorced women.⁷

Recognizing that differences in health status across these marital categories may reflect selection of more or less healthy women into different statuses, we control for baseline health – i.e., the first observed value for each of the health indices (assessed at the second survey in 1994 for the first cohort and at the sixth survey in 1998 for the second cohort). We then examine the extent to which relationships between marital status and health may differ by employment status and marital quality. Women who are in the labor force are coded as 1 and those who are not working are coded as 0 (reference). The relatively low rates of labor force participation among married women in Japan are well documented (Brinton 2001) and almost half of married women in our sample were not-working. A measure for marital quality is constructed from a question that asked respondents to evaluate the relationship with their husbands among the five categories: very satisfactory, satisfactory, so-so, unsatisfactory, and very unsatisfactory.⁸ We collapsed this measure into three categories including (very) satisfactory, so-so, and (very)

⁷ We excluded remarried women from our analysis. First, there are very few higher order marriages (less than 0.01 percent of the sample). Second, we are hesitant to include them in the married category given that the health effects of remarriage may be different from those of first marriage.

⁸ We also note that marital quality may consist of dimensions other than the measure of marital satisfaction that we use. In the subsequent analysis, we will incorporate more detailed information for the measure for marital quality, for example, questions that ask “How much time do you converse with your husband on daily basis?” and “To what extent do you trust your husband?”

unsatisfactory based on the distributions of respondents (e.g., less than 3 percent of women answered that their marriages were very unsatisfactory).⁹

Finally, we assess the extent to which theoretically relevant individual and family characteristics can explain significant differences in health by marital status as well as differences in these relationships by work status and marital quality. Based on the results of previous research in the U.S. (e.g., Ross and Wu 1995; Evenson and Simon 2005; Rindfuss 2004) we control for age, education, per-capita household income, parenthood, the presence of preschool age children, and living arrangements. Educational attainment, constructed as a categorical variable, includes three groups based on substantive and empirical similarity: high school or less, junior college/vocational school, and university or higher. We use a measure of per-capita household income (i.e., total family income divided by number of household members) given that a large proportion of married women are not employed and many of them have zero income and that living with parents(in-laws) are quite common in our sample. Living arrangements is a dichotomous indicator of coresidence with parents(-in-law). Based on household rosters collected at each wave, women coresiding with at least one parent (or parent-in-law for married women) are coded as 1 and others are coded as 0. Having children and presence of preschool age child (i.e., below three years old) are also dichotomous variables coding women with children or preschooler as 1 and otherwise as 0.

Analytically, we estimate six models for each health index using random effects regression analysis. The first model estimates the bivariate relationships between marital status and health, net of age. The second examines how the bivariate association observed in the first

⁹ In waves 4 and 6 there is no information on marital quality available so we use responses from the previous survey year. We thus use interwave marital quality (e.g., from wave 5) to examine the changes in health outcomes between the two surrounding waves (e.g., waves 4 and 6). The distributions of the answers are similar across waves and most of the few changes we do observe occurred within our broad categories (e.g., between very satisfactory and satisfactory).

model changes when baseline health is controlled for. The third includes employment and then, in the fourth model, we evaluate whether marital differences in health vary by employment status. The fifth model examines the moderating effects of marital quality on health. The sixth model adds controls including education, per-capita household income, living arrangements, parenthood and the presence of a preschooler.

Results

Table 1 presents descriptive statistics (means and standard deviations) for all variables in our analyses both for the entire sample and separately by marital status. Married women fare best in terms of both psychological and physical health. Never married and divorced women have similar values on both indices. According to the test results for differences in the mean values, the differences between married and singles are statistically significant for both psychosocial well-being and physical health. Also, married women have the lowest level of psychological distress and best physical health at baseline. No big differences are seen between non-married and divorced in baseline health but divorced women score slightly lower than single women in physical health. Tests comparing the mean values for baseline health indicate statistically significant differences between married and single women for both psychological well-being and physical health. There are no significant differences between the non-married and divorced women but married have significantly better physical health than divorced women at baseline.

In addition, Table 1 shows that there are some differences in sample characteristics depending on marital status. For example, employment status varies greatly by marital status, with most (90 percent) of the non-married women working while half of married women are not in the labor force. In addition, the majority of divorced women (almost 80 percent) are

employed. To the extent that work is an important source of stress, the lower labor force participation rates among married women suggest that marriage may be associated with better psychological and physical health. Non-married women tend to have higher education than married and divorced but this likely reflects age differences among the different marital categories. Per-capita household income is also higher among single women, presumably reflecting the earnings of coresident parents. As noted above, most of the never married women live with parents and coresidence with parents(in-law) is also quite common among those who are married and divorced.

Tables 2 (psychological well-being) and Table 3 (physical health) present results from the random effects regression models described above (i.e., six models for each health index). Results for the baseline models indicate that marriage is positively associated with health. Relative to never-married women, those who are married fare significantly better in terms of psychological distress (- 0.036) and physical health (- 0.122). Divorced women report better physical health than the never-married, but are not better off in terms of psychological health. In addition, age is negatively related to physical health while there is no association between age and psychological health. Introducing baseline health in model 2 does little to change the associations between marital status and health indices observed in the baseline models. Compared to non-married, those who are married still have significantly lower levels of psychological distress and better physical health, net of baseline health. Also, divorced women fare better than non-married singles in terms of physical health as in model 1. Model 3 adds employment. The relative benefits that married women have (compared to never married singles) for psychological well-being and physical health remain significant. Again, the divorced have

better physical health than non-married. Work has negative effects on both psychological well-being and physical health as hypothesized.¹⁰

Model 4 evaluates whether the differences in health across marital status differ by employment status. Married women still have better psychological well-being than non-married but their relative advantage in physical health loses statistical significance. Results of this model do not provide statistically significant support for the posited interactions between marriage and employment. However, the signs and magnitudes of coefficients for work and marital status are consistent with our hypothesis in the model for psychological well-being. In particular, the negative effect of work among married women approaches conventional levels of statistical significance. It is likely that sample size may not be big enough or we need to control for other important factors such as supportiveness of colleagues or supervisors in the work places (Repetti, Matthews, and Waldron 1989).

In Model 5, we examine how marital quality may moderate the association between marriage and health.¹¹ As expected, women in good marriages tend to have better health. Compared with never married women, those in satisfactory marital relationships fare better in terms of psychological health while women in unsatisfactory marriages have worse health. The relative benefits of a satisfactory marriage appear to be larger for physical health: married women have significantly better physical health than those who remain unmarried unless they are in an unsatisfactory marriage.

¹⁰ In supplementary analyses, we examined the effects of work with more detailed measures including the standard (regular) employment versus part-time (irregular) work. The negatives effects of work on health are same regardless of the employment status with slight differences in its magnitude. Since other job characteristics like occupation might also be important factors to examine the association between employment and women's health (Repetti, Matthews, and Waldron 1989), we also examined whether occupation and firm size impacted health but did not find any significant relationships.

¹¹ Since we did not find any moderating effects of work on health by marital status in model 4 and subsequent models (results not shown), we only include measure for employment in model 5 and model 6 without the interaction between employment and marital status.

Finally, other potential mediators and controls (education, per-capita household income, living arrangements, parenthood, and the presence of preschool age child) are added in model 6. Those with higher education report better psychological health than high school graduates but they do not differ in terms of physical health. Per-capita household income is not significantly related to either health index. Parenthood and having preschool age children are also not significantly related to health. As expected, coresidence with parents(in-law) is negatively associated with psychological health while it has positive effects on physical health.¹² The overall relationships between marriage and health seen in model 5 have changed little: satisfactory marriages are beneficial for both psychological and physical health. On the contrary, unsatisfactory marriages are associated with lower levels of psychological well-being. Women who report their marital quality to be fair have relative physical health benefits but do not differ in terms of psychological health, compared to the never-married.

Conclusions and discussion

Our results are consistent with theoretical emphases on the protective effects of marriage: married women in Japan fare better, on average, in terms of both psychological and physical health. The relative health benefits for married women (at least those in satisfactory marriages) remain significant, net of baseline health and other controls including employment, education, per-capita income, and parenthood. It is an important finding that marriage is associated with better health in a setting where there are reasons to expect that it should be detrimental to women's health. It may be that distinctive characteristics of Japanese society (e.g., relative

¹² We also examined whether the effects of coresidence with parents(in-law) differ by marital status in the supplementary analysis but did not find any significant differences. To fully evaluate the moderating effects of living arrangements, it may need more sophisticated categorization, for example, differentiating coresiding with own parents or parents-in-law.

homogeneity in family behaviors) and the centrality of marriage as a social institution may provide more protection to married women through societal approval and various forms of support. But as this is the first study to evaluate this hypothesis with relatively rich data, it is important to provide more supportive evidence of this relationship. Our findings also provide evidence supporting the generality of findings based on data from the U.S. while raising important questions about the extent to which the positive relationship between marriage and health is due to distinctive features of Japanese society and/or due to the same factors that are relevant for the similar relationship observed in the US.

There are several other important implications of our results. First, it is noteworthy that the health benefits of marriage depend upon marital quality. We found that women in satisfactory marriages not only have better psychological health, but also fare better in terms of physical health. Unsatisfactory marriages contribute to psychological distress while marriage appears to be beneficial for physical health unless women are in unsatisfactory relationships. Our study is the first to document the important moderating effects of marital quality on women's health in the Japanese context and it indicates that future studies on marriage and health in Japan should take this into account.

Second, employment is found to be detrimental to both psychological and physical health for Japanese women. As noted, we evaluated the effects of job characteristics such as occupation and firm size in the supplementary analyses, but found no significant effects. It is possible that other job characteristics, not captured by these conventional measures, are more directly related with psychological and physical health among Japanese women. For example, the attitudes of supervisors and colleagues may be important mediators between employment and health, as appears to be the case in the U.S. (Repetti, Matthews, and Waldron 1989). In addition,

it is possible that the negative effects of work may differ by marital status although we did not find statistically significant interaction between work and marriage in this analysis. We hope that other studies further pursue this question.

Third, our results on relationships between living arrangements and health have important implications in the Japanese context. As seen in our sample, in Japan it is common for adult children to live with parents before marriage. Also it is quite common for (eldest) sons to live with parents following marriage (Rindfus, Choe, Bumpass, and Byun 2004). The effects of living arrangements should differ by marital status, especially in cases where women coreside with their husbands' parent(s). As portrayed in the popular media, conflicts between daughter-in-laws and mother-in-laws suggest that the negative effects of living arrangements on psychological health should be larger for married women. However, we should also note that help from parents(in-law) is important for working mothers given the limited childcare facilities (Wada 2007) and strong normative beliefs emphasizing the mother's role in childrearing (Hirao 2007). This suggests that the mediating effects of living arrangements on women's health in Japan are complex and provides a framework for interpreting our findings of ambiguous relationships between coresidence and health (i.e., beneficial for physical health but detrimental to psychological well-being). Although not a main focus of our study, this is an important research topic in the Japanese context which merits further investigation.

Our study also has some limitations and room for improvement. First, factors not examined in detail in this study (e.g., age differentials, alternative job characteristics, previous marital quality for the divorced) may be helpful in explaining the remaining health benefits for married and divorced women. In addition, in order to more fully understand associations between marriage and health, it would be very useful to examine the effects of marital transitions

(e.g., first marriage, remarriage, divorce) in addition to the effects of marital status (e.g., Simon 2002; Marks and Lambert 1998). Results from preliminary analyses which separated first married from those already married showed that these two groups were similar in terms of both health outcomes. However, due to data limitations (i.e., too few cases of divorces), we treated divorce as a status and could not evaluate how marital dissolution affects women's health. Also, we were not able to distinguish between selection and causation in attempting to understand the positive association between divorce and physical health. Given the steady increase in the divorce rate in Japan and the adverse economic consequences of divorce for women (Smock 1994), it is important to understand the relationships between divorce and women's health. We hope that different data containing enough information on divorce and other marital transitions can be used to answer these questions. Gender differentials in the association between marriage and health is another important issue that we were not able to evaluate with our data. Pervasive gender inequality in the family and society makes Japan an ideal setting to evaluate whether marriage advantages in health differ by gender.

Finally, although our study overcomes some major limitations of past studies, we have not yet taken full advantage of the available longitudinal information in the data. In subsequent extensions, we will use different analytical techniques (i.e., growth-curve models) that will allow us to describe the shape of health trajectories with respect to age and to evaluate the extent to which the levels and shapes of health trajectories differ by marital status. We will also assess the extent to which changes in marital status shift the level and/or slopes of women's health trajectories and whether such shifts are permanent or transitory. Also, the JPSC data have rich information on health that we have yet to exploit. We only used two indices for this analysis but there are many health-related items representing multiple dimensions of health. For example,

some items measure the positive aspects of psychological well-being including optimism and self-confidence, which are useful to evaluate the complex nature of psychological well-being (e.g., Marks and Lambert 1998).

Our study is the first attempt to examine the relationships between marriage and health in Japan taking into account the importance of baseline health. Therefore, the finding that marriage is associated with better health has important implications, particularly for the generality of marriage advantages documented in the U.S. (Waite and Gallagher 2000) and other countries (e.g., Weissman et al. 1996). The limitations and possibilities for improvement discussed above also highlight the need for further studies that build upon our initial findings.

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Table 1: Descriptive Statistics for Analysis Variables

<i>Variables</i>	Total sample N=5,266	Non-married N=1,018	Married N=4,075	Divorced N=173
Health index				
Psychological well-being	0.27 (0.21)	0.31 (0.22)	0.26 (0.20)	0.30 (0.20)
Physical health (N=3,909)	0.40 (0.30)	0.44 (0.30)	0.38 (0.30)	0.44 (0.29)
Marital status				
Non-married single	0.19	1.00	—	—
Married (including newly weds)	0.77	—	1.00	—
Divorced	0.03	—	—	1.00
Age	34.01 (4.14)	31.81 (3.67)	34.51 (4.05)	35.29 (4.40)
Baseline health				
Psychological well-being	0.29 (0.20)	0.31 (0.20)	0.28 (0.20)	0.31 (0.21)
Physical health (N=3,909)	0.29 (0.21)	0.32 (0.21)	0.28 (0.21)	0.35 (0.21)
Marital satisfaction				
Satisfactory	0.29	—	0.29	—
So-so	0.57	—	0.57	—
Unsatisfactory	0.12	—	0.12	—
Marital satisfaction miss	0.02	—	0.02	—
Education				
High school or less	0.48	0.38	0.50	0.64
Junior college/Vocational school	0.39	0.41	0.39	0.31
University or more	0.12	0.21	0.10	0.05
Employed ^a	0.61	0.90	0.52	0.82
Per-capita household income (logged)	4.84 (1.25)	5.24 (1.09)	4.77 (1.25)	4.29 (1.49)
Coresidence with parents(in-laws) ^a	0.44	0.75	0.36	0.43
Parenthood ^a	0.73	0.07	0.89	0.84
Has preschool-age child ^a	0.73	0.01	0.34	0.10

* Standard deviations in parentheses

* Some totals do not sum up to 1 due to the rounding error.

a: Dichotomous variables coded 1= yes, 0 = no (reference category).

Table 2: Results from the Random Effects Regression Models

	Model1	Model2	Model3	Model4	Model5	Model6
<i>Variables</i>	Psychological Well-being					
Age	-0.001 (1.52)	-0.001 (0.87)	-0.001 (1.26)	-0.001 (1.40)	-0.001 (2.10)*	-0.001 (1.99)*
Marital status (ref: Non-married single)						
Married	-0.036 (4.18)**	-0.024 (3.26)**	-0.017 (2.24)*	-0.040 (2.30)*		
Marital satisfaction						
Satisfactory					-0.034 (4.39)**	-0.035 (3.44)**
Fair					-0.003 (0.29)	-0.004 (0.35)
Unsatisfactory					0.030 (2.93)**	0.028 (2.31)*
Marital satisfaction miss					-0.000 (0.01)	0.003 (0.17)
Divorced	-0.004 (0.22)	-0.003 (0.20)	-0.001 (0.05)	0.026 (0.79)	0.004 (0.26)	0.000 (0.00)
Baseline health		0.612 (37.62)**	0.611 (37.51)**	0.609 (37.41)**	0.599 (37.17)**	0.593 (36.91)**
Employed ^a			0.016 (3.12)**	-0.007 (0.43)	0.014 (2.63)**	0.013 (2.47)*
Education (ref: High school or less)						
Junior college/Vocational school						-0.021 (2.95)**
Univresity or more						-0.025 (2.37)*
Per-capita household income (logged)						-0.003 (1.76)
Coresidence with parents(in-laws) ^a						0.012 (2.04)*
Parenthood ^a						0.003 (0.28)
Has preschool-age child ^a						0.000 (0.01)
Employed * Married				0.028 (1.52)		
Employed * Divorced				-0.034 (0.97)		
Constant	0.341 (14.44)**	0.136 (6.33)**	0.130 (6.00)**	0.154 (5.77)**	0.152 (7.02)**	0.177 (6.86)**
df	3	4	5	7	8	14
Wald chi-square	24.82	1452.18	1460.51	1469.21	1582.25	1620.63
Number of person-years	5266	5266	5266	5266	5266	5266
Number of groups (id)	1665	1665	1665	1665	1665	1665

Absolute value of z statistics in parentheses

* significant at 5%; ** significant at 1%

a:Dichotomous variables coded 1= yes, 0 = no (reference category).

Table 3: Results from the Random Effects Regression Models

	Model1	Model2	Model3	Model4	Model5	Model6
<i>Variables</i>	Physical Health					
Age	0.026 (17.47)**	0.019 (14.30)**	0.018 (13.55)**	0.018 (13.52)**	0.018 (13.24)**	0.019 (12.34)**
Marital status (ref: Non-married single)						
Married	-0.122 (7.85)**	-0.081 (6.03)**	-0.061 (4.34)**	-0.055 (1.64)		
Marital satisfaction						
Satisfactory					-0.067 (4.57)**	-0.064 (3.24)**
Fair					-0.057 (3.44)**	-0.053 (2.50)*
Unsatisfactory					-0.036 (1.77)	-0.032 (1.30)
Marital quality miss					-0.058 (2.23)*	-0.065 (2.39)*
Divorced	-0.089 (2.88)**	-0.085 (3.03)**	-0.080 (2.85)**	-0.051 (0.74)	-0.078 (2.79)**	-0.076 (2.55)**
Baseline health		0.731 (27.05)**	0.728 (27.12)**	0.727 (27.09)**	0.724 (26.91)**	0.719 (26.66)**
Employed ^a			0.044 (4.31)**	0.050 (1.48)	0.043 (4.24)**	0.043 (4.09)**
Education (ref: High school or less)						
Junior college/Vocational school						-0.012 (0.97)
Univresity or more						-0.028 (1.55)
Per-capita household income (logged)						-0.001 (0.26)
Coresidence with parents(in-laws) ^a						-0.028 (2.53)*
Parenthood ^a						-0.026 (1.36)
Has preschool-age child ^a						0.000 (0.02)
Employed * Married				-0.006 (0.18)		
Employed * Divorced				-0.033 (0.45)		
Constant	-0.359 (7.42)**	-0.366 (8.41)**	-0.376 (8.65)**	-0.381 (7.19)**	-0.368 (8.39)**	-0.349 (6.69)**
df	3	4	5	7	8	14
Wald chi-square	318.70	949.49	974.95	975.01	979.69	991.21
Number of person-years	3909	3909	3909	3909	3909	3909
Number of groups (id)	1662	1662	1662	1662	1662	1662

Absolute value of z statistics in parentheses

* significant at 5%; ** significant at 1%

a:Dichotomous variables coded 1= yes, 0 = no (reference category).

Appendix 1. Question wording and items used for health indices

Question: Did you have each of the experiences as listed below for the past half a year?

1 Yes 2 No

Index 1: Psychological Well-being

1. You felt it sometimes onerous to make a decision about a personal thing of little importance.
2. You were sometimes afflicted with no ability to feel happy or sad.
3. You felt sometimes irritated and anxious.
4. You felt sometimes that you would have died rather than lived and suffered so much.
5. You awoke early every morning and felt bad.
6. You rather worried about the future needlessly.
7. You sometimes minded if people around you might dislike you.
8. You felt as if people watched you attentively.
9. You felt sick or oppressed in the chest if you faced some disagreeable thing.
10. You felt as if people around you read your mind.
11. You supposed that people around you talked about you or spoke ill of you.
12. You felt mentally much stressed.

Index 2: Physical health

1. You often felt dizzy.
2. You were liable to have eyestrain.
3. You had a stomach ache sometimes when you were hungry.
4. You felt a pain at your joints sometimes.
5. You had a pain sometimes at your back or in your lumbar region.
6. Your heart palpitated sometimes.
7. You felt often tired when you got up in the morning.
8. You had a swollen face sometimes.
9. You were sometimes difficult to pass urine.
10. You had a headache sometimes.
11. You were liable to have a cold.
12. You had often a slight fever.
13. You had swollen feet sometimes.