How Does Childlessness Affect Older Americans' Health Status and Behavior?

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February 2011

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Acknowledgements: I thank Allison Lind for extraordinary research assistance, Anita Rocha for her skillful programming, and the Department of Policy Analysis and Management at Cornell University for hosting me as a visitor when part of this paper was written. Special thanks to Mark Long for many helpful conversations and comments about this study. Joseph Cook, Jennifer Tennant and participants in seminars at Columbia University and the University at Albany (SUNY) also provided helpful comments and suggestions. The research reported here was supported in part by the Center for Studies in Demography and Ecology at the University of Washington and the National Institute on Aging at the National Institutes of Health (grant 1R0SAG029594-01A2).

Abstract

Objectives The study examines the relationships between childlessness and ten indicators of older Americans' health status and behavior: self-reported health, depression, limitations in performing ADL and instrumental ADL, limitations on fine and gross motor activities, obesity, being underweight, obtaining vigorous exercise, and alcohol use.

Methods Using data from the Health and Retirement Survey, the study estimates these relationships and compares findings from OLS, logit and propensity score models.

Results Childless older persons exhibit worse health and health behaviors than parents on most indicators. After controlling for confounding characteristics, for men, the evidence is strongest that childlessness is positively related to being underweight, having limitations on fine motor activities, and not getting vigorous exercise. For women, the evidence is strongest for positive relationships with being underweight and drinking heavily.

Discussion Results on being underweight, exercise and heavy drinking are consistent with the premise that parents take better care of themselves than childless elders and are more likely to avoid risky health behaviors because of social pressures and personal motivations. The result on being underweight is also consistent with the possibility that childless elders eat inadequately because they lack adult children who may help with shopping and cooking, and monitor their nutritional status.

Introduction

In 2006, 20.4% of American women age 40-44 were childless by choice or because of infertility problems, compared to 17.5% in 1995 and 10.2% in 1976 (U.S. Census Bureau 2008). As childlessness become more common, understanding its impacts on individuals takes on increasing importance.

In the domain of health status, for example, if childless adults enjoy higher consumption, including better health care, when younger because they did not need to devote a significant portion of their income to supporting children, they may have better health at older ages. Conversely, to the extent that children monitor their parents' health, and identify problems while they are minor and can be treated more easily and at less cost, older parents may have better health.

The policy implications of such individual effects may be significant. If childless adults, on average, have poorer health than parents, then they are likely to require greater health care and social services. If childlessness continues to increase, financial pressures on public programs that provide health and nursing home care, and social services for older Americans will be larger than the rising ratio of elders to working age adults alone would imply.

Alternatively, if childless persons tend to have better health than parents, they may place fewer demands on public programs. It is also possible that older persons' demands for health care and social services are independent of parenthood status. If so, changes in the prevalence of childlessness would not affect programs' costs.

This study uses data from the Health and Retirement Survey (HRS) to examine the relationship between childlessness and the health of older Americans. Because of gender differences in social influences on health and the prevalence of specific health conditions, the study presents separate estimates for men and women. The study contributes to the existing

literature in two important ways. First, while nearly all studies of this relationship examine one or two indicators of health, it examines ten. Second, unlike prior research it compares findings from both regression (OLS or logit depending on the outcome) and propensity score models. The findings may offer useful information for understanding the health consequences of childlessness, and their policy importance.

Background and possible linkages between childlessness and health status and behavior

Sociological and economic reasoning suggests several mechanisms through which childlessness may affect health status and behavior. Consider possible positive effects. Suppose childless elders enjoyed higher personal consumption, including health care, when younger because they did not devote a significant portion of their income to supporting children. Better health care and higher consumption in general when younger may help childless adults enter their older years in better health. If childless elders have more assets and current income than their counterparts with children, they can afford better health care and health insurance and can more easily pay for household help and other services that parents may receive from children. If childless adults feel less pressure to earn income, they may choose less stressful (but less lucrative) jobs that leave more time for exercise and relaxation, and are less likely to lead to health problems induced by stress. Childless adults avoid the stressors associated with parenting and any health problems that they create. They also avoid stress created by adult children, who may have their own mental and physical health problems as well as emotional, financial and legal crises, who in rare cases precede their parents' in death, or who may treat their older parents badly (Milkie et al. 2008, Umberson, Pudrovkska & Reczek 2010). Evidence consistent with positive effects would be finding that childless elders

have better overall physical health, are less likely to have chronic disabilities that limit life activities, have better mental health, and are more likely to exercise.

Now consider possible negative effects. Adult children typically are central in aging parents' social networks (Kendig et al. 2007). If children provide social support and services to elderly parents that positively affect health outcomes, childless elders will tend to have relatively poorer health, net of other characteristics. For example, a child's assistance with household tasks may prevent falls that lead to hospitalization, may delay the time until a nursing home is necessary, or may prevent the need for a nursing home entirely (Larsson & Silverstein 2004, Charles & Sevak 2005, Noel-Miller 2010, Sasso & Johnson 2002). Children may help parents comply with medication schedules, drive them to clinics, monitor their health conditions, and identify problems while they are still minor and treated more easily. If a parent requires hospitalization or other institutional care, a child may monitor the quality of care and advocate on the parent's behalf to hospital staff, nursing home staff, other health care providers, and health insurance providers. Evidence consistent with negative effects due to lack of support from children would be findings that childless elders have worse overall physical health, are more likely to have chronic disabilities that limit life activities, and have poorer mental health.

Parents may be more likely to avoid risky health behaviors (e.g. smoking, drunk driving, lack of exercise) because of social pressures to be responsible parents, because they wish to set a good example for their children and because they look forward to the rewards of watching their children mature and of being grandparents (Kendig et al. 2007). Such differences in behavior may cause childless elders' health to be worse than parents'. Evidence consistent

with this mechanism would be finding that childless persons are more likely to drink heavily and be clinically obese or underweight, and less likely to get regular exercise.

By overseeing their children's health care, parents may more regularly interact with health care providers. The information they receive may improve both their health behaviors and their ability to navigate the health care system in middle age and later years. If this mechanism is important, we would expect older parents to score better on all indicators of health and health behavior. Last, childbirth and nursing can have both positive and negative long run effects on women's health (Kendig et al. 2007, Hurt et al. 2006, Ptok et al. 2002).

Based on these considerations, the paper tests two general hypotheses:

H1. Childless older persons and parents differ in health status and behavior.

H2. Such differences remain after controlling for socio-economic status and other influences on health.

The discussion above implies that predictions about the relationship between childlessness and health status are ambiguous. For any given health indicator, the positive or negative effects may dominate, or they may offset each other. Indeed, the direction of relationships need not be the same across different health outcomes. Only empirical analysis can identify the direction and statistical significance of any relationships. Hence, neither hypothesis specifies the direction of the difference.

The role of gender Older fathers are significantly less likely than older mothers to receive help from their adult children (Hogan & Eggebeen 1995, Lin 2008, Sasso & Johnson 2002). This implies that, on average, the difference between mothers and childless women in care received would be larger than that between fathers and childless men. If such care improves health outcomes, a third hypothesis is:

H3. Childlessness is associated with more adverse health outcomes for women.

The role of marital status A substantial literature demonstrates that marriage is associated with (or, some argue, causes) greater income and better health, and has other protective effects (Hu & Goldman, 1990, Mincy et al., 2009, Waite & Gallagher, 2000). Some of the hypothesized causal links from marriage to health are similar to the links from childlessness to health. For instance, compared to older never-married persons, older married and formerly married persons are likely to have more extensive social networks (including children but extending beyond them) that can provide social support and services. Married and formerly married persons, like parents, may have been more likely to avoid risky health behaviors. For currently married persons, a healthy spouse may provide support and services similar to what adult children might provide. Also, whether an unmarried respondent is widowed or currently partnered may moderate how childlessness affects health.

Prior studies of health and childlessness While the literature on the relationships between fertility and health is immense, relatively few studies explicitly focus on childlessness and elders' health. Research on American elders mainly examines psychological well-being or the availability and provision of instrumental support and care, which are thought to be related to psychological well-being (Allen et al. 2000, Bachrach 1980, Bures, Koropeckyj-Cox & Loree 2009, Chang, Wilber & Silverstein 2010, Hogan & Eggebeen 1995, Koropeckyj-Cox 1998, Koropeckyj-Cox, Pienta, & Brown 2007, Zhang & Hayward 2001). Despite reasons to think childless elders fare worse in both domains, they generally fare about the same as parents (Allen et al. 2000, Umberson, Pudrovska & Reczek 2010), other things equal (including marital status). Research on European and Chinese elders, though, finds childlessness to be negatively related to mental health (Buber & Engelhardt 2008, Chou & Chi 2004, Hansen, Slagsvold &

Moum 2009, Keizer et al. 2010). Keizer et al. (2010) reports that this relationship vanishes after controlling for partnership history.

Turning to physical health, childlessness is associated with poorer self-reported health among Dutch men (Keizer et al. 2010), but here too, the relationship is not robust to the inclusion of partnership history. Recent studies find childless elders to be at greater risk of mortality (Eisenberg et al. 2011, Grundy & Kravdal 2010, Hank 2010, Spence & Ebenstein 2009, Tamakoshi et al. 2011, Weitoft, Burstrom & Rosen . 2004) and of specific health problems such as multiple sclerosis (Nielsen et al. 2011) and impaired physical functioning (Guralnik et al. 2009). However, childless older men appear to have lower risk of prostate cancer (Eisenberg et al. 2011).

Cwikel et al. (2006) and Kendig et al. (2007), the only articles that examine broad sets of health outcomes and behaviors for older parents and childless persons, are most closely related to this study. Cwikel et al. (2006) find no evidence that older never-married childless Australian women fare worse on a range of physical and emotional health indicators, or that they are high users of medical services. Using data from Australia, Finland and the Netherlands on persons age 65 and older, Kendig et al. (2007) examine self-reported health, functional capacity, pain, use of prescription drugs, depression, difficulty of falling asleep, fruit consumption, alcohol consumption, smoking and physical exercise. Their ANOVA analyses find that controlling for marital status, childless persons have worse outcomes for smoking, alcohol use and exercise. Effects for men were larger.

The current study complements these two contributions by examining another society – the U.S. – and applying more extensive multivariate methods with more control variables. It uses propensity score methods to address the possibility that non-random selection into childlessness

may result in biased estimates. No prior study of childlessness and elders' health dealt with this important issue.

Methods

Data: The Health and Retirement Survey (HRS) provides the data. The HRS is a publicly funded panel study started in 1992. It re-interviews subjects biannually, with proxy interviews after death. Initially the HRS included American residents born during 1931-1941 (and their spouses, regardless of age). In 1993 the AHEAD (Assets and Health Dynamics among the Oldest Old) survey started collecting data on persons born in 1923 or earlier. The HRS and AHEAD merged in 1998 and added the War Baby sample of persons born between 1942 and 1947 and the Children of the Depression sample of persons born between 1924 and 1930. The Early Boomer cohort of persons born in 1948-1953 was added in 2004. The expanded HRS is representative of all persons over 50 years old in the United States.

Because propensity score models require one observation per respondent, this study uses outcome information on each person for the first wave in which he or she appears in the HRS and is age 50 or older. The regression models use the same sample so that any differences with findings from propensity score models are clearly attributable to the estimation method. After dropping respondents with missing data, the sample contains 8,039 men and 11,515 women. The mean ages of the male and female samples are both 64.9. Regressions that use all available waves of data for each respondent are similar to the one-wave regressions.

Since health problems increase with age, any differences in health due to childlessness might also increase with age. To assess this possibility and to check the sensitivity of the findings to the age range of the sample, the analysis is replicated for respondents who are age 65 or older.

Dependent variables. The mechanisms discussed earlier suggest that both health status and health behavior may differ between childless elders and older parents. To explore whether such differences exist, the study examines six general indicators of health status and four of health behaviors. The broadest indicator of health status is **self-reported general health**, which is coded using the standard one to five scale for excellent – very good, good, fair, and poor – where larger values indicate worse health. The indicator of mental health is a dummy variable based on eight items from the Center for Epidemiologic Studies Depression scale collected by the HRS. Following Zhang & Hayward and (2001) and Bures, Koropeckyj-Cox & Loree (2009), I classify persons with responses indicative of depression on three or more items as **depressed**.

Four measures indicate limitations on life activities. The HRS codes **limitations in performing activities of daily living** (ADL) on a 0 to 5 scale. The scale equals the sum of reports of difficulty in bathing, dressing, eating, walking across a room, and getting in and out of bed. The HRS also codes **limitations in performing instrumental activities of daily living** (IADL) on a 0 to 5 scale. The scale equals the sum of reports of difficulty in using a telephone, managing money, taking medications, shopping for groceries, and preparing hot meals. The indices of **limitations on fine and gross motor activities** respectively equal the sum of reports of difficulty in picking up a dime, eating, and dressing, and the sum of reports of difficulty in walking one block, walking across a room, climbing one flight of stairs, getting in and out of bed, and bathing. Because multiple limitations are uncommon, I converted the ADL, IADL and motor activities scales to dummy variables for the presence of one or more limitations.

Four dependent variables reflect health behaviors related to eating habits, exercise, and alcohol use. Following convention, a dummy variable for **obesity** equals 1 if a respondent's

body mass index (BMI) exceeds 30 and zero otherwise. A dummy variable for being **underweight** equals 1 if BMI is less than 20 and zero otherwise. The more stringent clinical definition – BMI less than 18.5 – gave similar results. Findings that use BMI itself are consistent with those obtained with the two dummy variables.

The dummy variable for **vigorous exercise** equals one if the respondent reports such activity at least three times per week. Alcohol use is coded as none, moderate (women having an average of no more than one drink per day, men having an average of no more than two per day), and heavy (averages more than one or two drinks per day). The tables show the relationship between childlessness and the likelihood of **heavy drinking**.

The first two columns of table 1 show that, on average, women are less likely to drink heavily than men. Men exhibit better outcomes for the other nine indicators. All gender differences are statistically significant at the one percent level. For reasons discussed earlier as well as the significant gender differences in the indicators and statistical tests that decisively reject for all outcomes the hypothesis that the regression coefficients for men and women are equal, I estimate all models separately for men and women.

[Table 1 about here]

Measuring childlessness. A straightforward definition of a "childless" person is someone who was never a biological parent. I use the HRS question about the number of biological children to create a dummy variable equal to one if the person reports "never a biological parent," and zero otherwise. Information about living biological children allows construction of an alternative dummy variable for having "no living children." Since less than 150 biological parents report no living children, the two measures yield similar results. Because the "never a

parent" measure has fewer missing responses, I use it to maximize sample size. In the male sample 11.8 percent are childless; in the female sample, 10.8 percent.

Columns 3-6 of table 1 compares mean outcomes of older parents and childless persons. Childless men report worse self-rated health. Childless men and women exhibit the same rates of depression as fathers and mothers. For limitations on ADL, IADL, and gross and fine motor activities, being underweight and getting vigorous exercise, childless men and women show significantly worse outcomes. Childless women are less obese and more likely to drink heavily.

Other explanatory variables. The regressions include available information on family background and personal characteristics that may be associated with health status. There are race and ethnicity dummies for black, white Hispanic, and other race/ethnicity, with white non-Hispanic as the omitted category. The dummies for religious affiliation are Protestant, Catholic, and other, with no religion as the omitted category. There are dummy variables for being born outside the U.S., English not being the first language, and veteran status.

Because poor child health is likely to lead to worse adult health and may also and may impair a person's ability to have children, the models include a retrospective self-assessment of health as a child using the standard one to five scale. Other control variables are age and age squared, years of completed schooling, number of living siblings, and dummies indicating whether the respondent ever smoked or had never married. Because I estimate separate models for men and women, there is no gender dummy.

Since health care has improved over time, we would expect persons born later to have better health, other things equal. Also, persons born after 1938 would not have endured possible health consequences of the Great Depression. To control for any such cohort differences, the models include eight dummy variables for the birth cohorts 1910-14, 1915-19,

…, 1945-49, and 1950-53. (The last birth year in the sample is 1953.) The omitted category is born before 1910.

Table 2 reveals several significant differences between parents and childless persons in family background and personal characteristics. Childless men and women are older, less likely to be Hispanic and to not have English as their first language, have fewer siblings, report worse health as a child, and are more likely to have never married. Childless women also are more likely to be black and a veteran, and have 0.7 years more education.

[Table 2 about here]

Estimation methods The study first estimates OLS models for self-reported health and logit models for the nine dummy variable outcomes. The models take the form:

$$y_i = \alpha + \beta X_i + \gamma C_i + \varepsilon_i$$

where y is the outcome, X is a vector of personal, family background and cohort variables, C is the indicator for childlessness, and ε_i is the error term. In the initial regression models, X excludes the dummy variable for having never married.

Though the regression models include many controls, the estimates may be biased because of selection. For example, suppose adults with health problems during their childbearing years could not conceive or decided to forego parenthood. Then it would be incorrect to attribute a correlation between childlessness and poorer health only to childlessness. Rather, because persons with health problems when young are likely to be in poorer health when old, an observed correlation would overstate any negative relationship of childlessness to elders' health status (or understate a positive relationship). The data about child health status may partly mitigate this concern, but because the HRS lacks data on health during respondents' childbearing years, some selection bias is a possibility.

If most childlessness were involuntary because of genetic factors or exogenous health conditions that prevented successful pregnancy, endogenous selection would be minor and likely to have little effect on the estimates. The HRS, though, lacks information to identify persons who were unable to be biological parents.

It is obviously impossible to conduct an experiment to generate an estimate of γ – the effect of the "treatment" of being childless – that is unbiased by self-selection. Lacking experimental data, a common approach to address selection is to include person or family fixed effects. This is infeasible here because childlessness is time invariant for each person and the HRS lacks sibling data on health and most other characteristics.

As an alternative, I use propensity score models (Rosenbaum & Rubin 1985). In this study's context the propensity score is the probability of being childless, conditional on a set of observed characteristics. I use a logit regression to predict each respondent's propensity score. Once all respondents' propensity scores are calculated, a childless person is matched to one or more parents who have similar propensity scores using one of several established procedures for determining matches. The mean of the difference in outcome between each treated case and its match (or matches) provides the estimate of the relationship between childlessness and that outcome.

One advantage of propensity score models is that, unlike regression models, they do not impose strong restrictions on the functional form of the relationship between childlessness and the outcomes. As a result, they allow examination of the results' sensitivity to the linearity assumption of regression.

I estimate the score using a logit regression that includes the explanatory variables described above, except for the dummy for having never married. Nearly all these variables are

constant over a respondent's adult life (e.g. race, religion, whether foreign born, child health). Variables reflecting circumstances during respondents' early and middle adult years that may have influenced the likelihood of being childless are not included (with the exception of education and veteran status) because they are unavailable in the HRS. For men, the characteristics most strongly related to the probability of being childless were religious affiliation and child health status. For women the results are quite different. Child health is less strongly related to childlessness while religion shows on relationship. The characteristics most strongly related to childlessness are race, birth cohort, and education. (The complete propensity score regressions are available upon request.)

The logit specification passes the balancing test (Dehejia & Wahba 2002) for both men and women. (When I included the never married dummy, I was unable to find a specification that passed the balancing test for either men or women. This failure resulted from the high correlation between marital and parental status in the sample.) The distribution of propensity scores for childless persons and those who are parents closely overlap within the region of common support. This indicates that there are ample numbers of parents well matched with each childless person.

The average treatment impact is estimated with three alternative procedures. "Radius matching" matches a childless case to all cases with children that have propensity scores within .005 of the childless case's score. When multiple control cases fall within the radius, their average outcome is compared to the childless case's outcome. The Epanechnikov kernel approach matches a childless case to all cases with children that have scores within the specified bandwidth. When multiple control cases fall within the bandwidth, their kernel-weighted average outcome is compared to the childless case's outcome. Standard errors are

bootstrapped. Henry and Yi (2009) offer evidence that radius and Epanechnikov kernel matching are among the matching designs that produce the least bias compared to an experimental estimate.

The third procedure transforms the propensity scores to create weights for OLS and logit regressions (Imbens 2004). These "doubly robust" models include both *X* and *C*. Since the results are nearly identical to simple OLS and logit models, the tables do not report them.

Propensity score methods rely on the "conditional independence assumption": all factors related to receiving a treatment are observed and measured (Black & Smith 2004). Such methods address "selection on observables" but do not fully deal with the selection problem because unobserved characteristics are likely to influence both being childless and health. If parents and childless persons differ in unobserved ways, between-group comparisons may reflect those differences rather than the impact of childlessness.

Taking account of marital and economic status To address whether the relationships of parental status to health may be confounded with those of marital status, a second set of models adds to *X* the never married dummy and, in some specifications, dummies for being divorced, widowed, or partnered. Older persons who never married are likely to differ from those did in characteristics that are unobservable in the HRS (e.g. willingness to make long term commitments, health as a young adult). The same is likely for divorced persons. Since these characteristics may also be related to fertility choices and later health status, including marital status dummies may also mitigate selection bias.

Differences in the economic status of older parents and childless persons may also confound the relationships between parental status and health. To assess this possibility, I re-

estimated the regressions including the logarithm of either income or wealth (both measured in 2006 dollars).

Results

Columns 1, 3, 4 and 6 of table 3 present the coefficients on the childless dummy from OLS and logit regressions for the ten indicators. Columns 2 and 5 show the estimated difference in each indicator between older parents and childless persons derived from the radius matching propensity score estimator. I show the radius matching results because they differ from the regressions more than those based on the Epanechnikov kernel and, so, better indicate the sensitivity of the findings to choice of estimator. (Epanechnikov kernel estimates are available upon request.) For all outcomes except vigorous exercise, a positive regression coefficient or a positive difference in columns 2 and 5 implies that childlessness is negatively associated with health status or good health behavior.

Because logit coefficients show the association of childlessness with the log odds of each outcome, for ease of interpretation the table also presents in brackets the predicted change in probability associated with childlessness implied by each logit coefficient, holding all other explanatory variables at their means. For the nine dummy variables, the matching estimator directly shows the difference between childless persons' and parents' mean probability of each outcome

Consider the estimates for men in columns 1 and 2, from models that do not include marital status. Childlessness is broadly associated with worse male health. Of the 20 estimates, 16 have signs consistent with a negative association between childlessness and health. Of these, 11 are significant at the one or five percent level. None of the four estimates suggesting a positive relationship is significant at even the 20 percent level. Both estimators indicate that

childlessness is strongly associated ($p < .05$ or .01) with higher likelihoods of being underweight, having limitations on fine motor activities, and exercising less. The propensity score estimator also shows childlessness is significantly associated with poorer self-rated health and a higher likelihood of depression and of having limitations on ADL, IADL and gross motor activities. There is no evidence of any relationship between childlessness and men's likelihood of obesity and heavy drinking.

[Table 3 about here]

Of the 20 estimates for women in columns 4and 5, 18 have signs consistent with a negative association between childlessness and health. Of the 18, ten are significant at the one or five percent level. Both estimators indicate that childlessness is strongly associated ($p < .01$) with higher likelihoods of a woman being underweight and drinking heavily. The propensity score estimator also shows childlessness is significantly associated with higher likelihoods of having limitations on life activities and exercising less, but with a lower probability of obesity. Self-rated health and depression show no association with childlessness.

For both men and women, bivariate regressions (not shown) yield significant coefficients ($p < .05$) on the childless dummy for seven of the ten outcomes. In the multivariate regressions all significant coefficients fall in absolute magnitude and four (five) of the seven become insignificant for men (women). For men and women the control variables most strongly associated with the outcomes are child health status, education, and the dummy for whether the person ever smoked. For women, many of the dummies for race and ethnicity are also consistently significant. (Full results for the control variables are available from the author.)

Addressing the relationship of marital status to childlessness and health The models in columns 3 and 6 of table 3 expand the specification by including a dummy variable for having

never married. Doing so tests whether the negative relationships between childlessness and health persist once the protective effects of marriage are taken into account. Models that further add dummies for being divorced, widowed or partnered (with currently married as the reference group) yield similar results, as do models which restrict the samples to currently married persons. For this reason, I do not report results from those variants.

Controlling for marital status weakens the finding that childlessness is adversely related to several indicators of health status, a result consistent with Keizer et al. (2010). For men, comparing columns 1 and 3 shows that the three statistically significant regression coefficients fall in size and significance level. Being childless remains strongly associated with a higher probability of being underweight. The associations with limitations on fine motor activities and vigorous exercise are only significant at the ten and six percent level, respectively.

For women the results are more robust to the inclusion of marital status. The two significant coefficients in column 4 remain essentially unchanged in size and significance.

I also attempted to take marital status into account in the propensity score models. But as noted earlier, when I included the dummy for having never married in the logit model used to construct the propensity score, I was unable to find a specification that passed the balancing test for either men or women. Consequently, there are no results to compare to columns 2 and 5 of table 3.

Controlling for income and wealth Regressions that include the log of either income or wealth find that these financial variables are positively associated with better health at high levels of significance. But, interestingly, including them had essentially no effect on the significant coefficients in columns 1, 3, 4 and 6.

Results for persons age 65 or older Models estimated on samples of men and women who were at least 65 years old produce results that are highly consistent with those in table 3. For men, there are only two notable differences. The relationship between childlessness and the probability of having limitations on gross motor activities is stronger in all three models and becomes significant when marital status is included, while childlessness' relationship with the probability of getting vigorous exercise is weaker. For women over 65, there is one notable difference: childlessness shows a significant negative association with the likelihood of obesity in all three models, rather than in just one for the full sample. Being childless is associated with a reduction of about .03 in the probability that a woman over 65 is obese.

Discussion

The conceptual framework suggested three hypotheses about the relationships between childlessness and health status and behavior:

H1. Childless older persons and parents differ in health status and behavior.

H2. Such differences remain after controlling for socio-economic status and other influences on health.

H3. Childlessness is associated with more adverse health outcomes for women.

Because the framework is ambiguous whether childless older individuals would tend to have better or worse outcomes than parents, neither H1 nor H2 specifies the direction of the differences. This study's empirical analysis provides tests of these three hypotheses.

For the most part the findings confirm H1. The bivariate differences in table 1 indicate that childless men and women both exhibit worse outcomes than fathers and mothers on seven of ten indicators and show statistically insignificant differences on three.

For men, the evidence in table 3 is most convincing for a positive relationship between childlessness and being underweight. All three estimates are strongly significant. There is strong but less compelling evidence of a positive relationship with having limitations on fine motor activities and with not getting vigorous exercise. For both outcomes two estimates are significant but the one that accounts for marital status is not. For six outcomes the propensity score estimator shows childlessness is related to worse outcomes, but the regression models do not. There is no evidence of a relationship between childlessness and obesity or heavy drinking.

For women, the evidence is most convincing for positive relationships between childlessness and being underweight and heavy drinking. These relationships remain unchanged to the inclusion of marital status. There is marginal evidence of positive relationships with the four indices of limitations on life activities and a negative relationship with obesity since the propensity score estimates are significant, but none of the regression estimates are. For self-rated health and depression, no estimate is significant.

From these mixed results one may conclude that H2 receives partial support for both men and women. The results offer no support for H3. Table 3 shows similar patterns of signs and significance levels for men and women. If anything, childless men fare slightly worse.

Most prior studies of childlessness and health examined mental health and predominantly found no relationship with childlessness. This study also finds no relationship between childlessness and depression. Replicating previous findings suggests that the empirical models presented here are plausible and that one may place more confidence in the findings for the other indicators.

The results on being underweight, on exercise for men, and on heavy drinking for women are consistent with the premise that parents take better care of themselves than childless elders

and are more likely to avoid risky health behaviors because of social pressures and personal motivations. While there may be a variety of reasons why the childless are more likely to be underweight, this finding is also consistent with the possibility that childless elders do not eat adequately because they lack adult children who may help with grocery shopping and cooking, and monitor their nutritional status.

A possible mechanism linking childlessness with a greater likelihood of limitations on men's fine motor activities is the social support provided by children. It may be that children's assistance with household tasks, monitoring of their parents' health, and help with obtaining health care and complying with treatment protocols lowers parents' likelihood of debilitating injuries or chronic conditions that reduce their capacity to perform routine activities.

The sizes of the significant predicted differences in outcomes between parents and childless persons are substantively important, even when one uses the most conservative estimates from columns 3 and 6. For men, column 3 shows an increase in the probability of being underweight of .011. Though small in absolute magnitude, this represents a 55 percent increase relative to the fathers' mean of .020. The corresponding predicted increase of .025 for women equals 37 percent of the mothers' mean. A change of .019 in a man's probability of having limitations on fine motor activities represents an 18 percent increase over the fathers' mean. A rise of .018 in a woman's likelihood of drinking heavily represents a 42 percent change. A decrease of .039 in a man's probability of getting vigorous exercise is a large absolute difference but only a seven percent decline. The predicted differences in these outcomes between parents and childless persons are larger for the propensity matching models.

The findings have several limitations. The broad agreement across the regression, propensity score, and propensity weighted regression models suggests a degree of reliability to

the findings and that selection into childlessness may be minor. But it certainly is not conclusive since the sensitivity of the estimates to possible selection on unobservable characteristics could not be assessed. A related concern is that health data collected for older adults will suffer from mortality selection effects because people in poor health are less likely to survive to the age when they would be eligible to participate in the survey or, if they do survive, to participate in a lengthy interview. To the extent that childlessness itself lead to higher mortality, such selection would lead to underestimates of childlessness' impact on health. Therefore, one should regard the findings as demonstrating associations rather than as strong evidence of causality.

The models do not shed light on the mechanisms that underlay differences in outcomes. For instance, to what extent is the better health of older parents attributable to their children's provision of social support and caregiving? Exploring those mechanisms would be a fruitful line of future research.

This study determined childlessness based on respondents' biological children. In view of today's complex family structures, it would be useful to know whether step and adopted children affect elders' health. Do stepchildren provide support services to step parents but stop doing so when their biological parent dies? Such questions warrant exploration in future research.

Compared to women in the sample, who were born no later than 1953, women born more recently have had greater economic opportunities, benefited from better health care technologies, and are more likely to be childless. Thus, the health consequences of childlessness for younger cohorts of women (and their partners) may differ from those of the

persons in the HRS. If so, extrapolating this study's findings to younger cohorts could be misleading.

The policy issue that partly motivated this research is whether childless elders tend to require greater health care and social services than elderly parents. Finding that childless adults are worse off on several health indicators suggests the answer is "yes." If childlessness continues to increase and this finding holds up for future childless elders, financial pressures on public programs that provide health and nursing home care and social services for older Americans will be larger than that implied by the projected increase in the population of elders. On the other hand, if childless elders' poorer health raises their mortality rate, they will use health and social services for fewer years than parents, which would exert downward pressure on program costs. Future research on the relationship of childlessness to other health related outcomes, including preventive behaviors such as getting a flu shot, mammogram or prostate exam, and the use of other health care services (e.g. hospital stays, in-home care) would provide further evidence with important implications for health care policy.

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Table 1: Means and standard deviations of outcomes, by gender

	All Men	All Women[a]	Men		Women	
Health status			Parents	Childless	Parents	Childless
Self-reported health (5=poor)	2.68 (1.14)	2.74 (1.16)	2.56 (1.15)	2.77* (1.17)	2.74 (1.15)	2.74 (1.20)
Depressed	.101 (.302)	.158 (.365)	.099 (.299)	.116 (.320)	.158 (.364)	.164 (.370)
Limitations on ADL	.118 (.323)	.151 (.358)	.115 (.319)	.139* (.345)	.147 (.354)	.185** (.388)
Limitations on IADL	.089 (.285)	.121 (.327)	.087 (.282)	.109* (.312)	.118 (.323)	.144** (.352)
Limitations on gross motor activities	.150 (.357)	.237 (.425)	.147 (.354)	.181** (.385)	.234 (.424)	.258 (.438)
Limitations on fine motor activities	.112 (.315)	.127 (.333)	.108 (.347)	.140** (.311)	.125 (.331)	.145* (.353)
Health behavior						
Obese	.217 (.412)	.247 (.431)	.218 (.413)	.205 (.404)	.251 (.433)	.216** (.412)
Underweight	.005 (.074)	.025 (.156)	.020 (.205)	.044** (.139)	.068 (.313)	.110** (.252)
Vigorous exercise	.519 (.500)	.419 (.493)	.526 (.499)	.467** (.499)	.423 (.494)	.388* (.487)
Heavy drinking	.063 (.243)	.046 (.209)	.064 (.250)	.056 (.230)	.043 (.204)	.066** (.248)
			N = 8,039		N = 11,515	

a. All differences with men are significant at 1%

* difference with parents significant at 5% ** difference with parents significant at 1%

Table 2: Means and standard deviations for explanatory variables for parents and childless persons, by gender

	Men		Women	
	Parents	Childless	Parents	Childless
Percent childless	11.8		10.8	
Age	64.8 (9.32)	65.6* (10.49)	64.6 (10.29)	67.4** (11.75)
Black	.121 (.326)	.126 (.332)	.148 (.355)	.165 (.372)
White Hispanic	.058 (.234)	.034** (.180)	.059 (.235)	.041* (.198)
White non-Hispanic	.788 (.005)	.807 (.013)	.760 (.004)	.760 (.012)
Other race	.032 (.177)	.034 (.180)	.033 (.179)	.034 (.181)
Foreign born	.089 (.284)	.067* (.251)	.092 (.289)	.089 (.285)
English not first language	.059 (.236)	.034** (.180)	.058 (.234)	.045 (.207)
Protestant	.623 (.485)	.598 (.491)	.670 (.470)	.651 (.477)
Catholic	.267 (.442)	.257 (.437)	.263 (.441)	.267 (.443)
Other religion	.038 (.191)	.038 (.192)	.032 (.177)	.038 (.191)
No religion	.072 (.003)	.107** (.010)	.034 (.002)	.044 (.006)
Number of living siblings	2.66 (2.35)	2.50 (2.27)	2.72 (2.42)	2.33** (2.08)
Child health (5=poor)	1.80 (.971)	1.93** (1.05)	1.86 (1.00)	1.91 (1.05)
Education (years)	12.2 (3.50)	12.2 (3.67)	11.8 (3.09)	12.5** (3.40)
Veteran	.584 (.493)	.597 (.491)	.009 (.093)	.017** (.129)
Ever smoked	.736 (.441)	.713 (.453)	.483 (.500)	.483 (.500)
Never married	.004 (.064)	.220** (.414)	.010 (.101)	.191** (.393)
Number of cases	7,148	891	10,269	1,246

* difference significant at 5% ** difference significant at 1%

Table 3: Estimated relationship between childlessness and health status and health behavior based on regression and propensity score matching models

	Men (N = 8,039)			**Women** (N = 11,515)		
Health status	OLS or logit regression	Radius matching	OLS or logit with never married dummy	OLS or logit regression	Radius matching	OLS or logit with never married dummy
Self-reported health	.071 (.038)	.152** (.039)	.019 (.042)	.014 (.032)	.056 (.037)	-.013 (.034)
Depressed	.112 (.116) [.009]	.024* (.012)	.005 (.130) [.000]	.079 (.085) [.010]	.015 (.012)	.028 (.090) [.004]
Limitations on ADL	.135 (.107) [.013]	.038** (.012)	.084 (.118) [.008]	.153 (.084) [.018]	.051** (.012)	.108 (.089) [.013]
Limitations on IADL	.144 (.121) [.010]	.032** (.012)	.046 (.135) [.003]	.072 (.094) [.007]	.038** (.010)	.063 (.098) [.006]
Limitations on gross motor activities	.163 (.098) [.020]	.048** (.011)	.144 (.107) [.017]	.026 (.074) [.005]	.042** (.013)	-.010 (.079) [-.002]
Limitations on fine motor activities	.235* (.107) [.023]	.043** (.011)	.194 (.117) [.019]	.081 (.090) [.008]	.029** (.010)	.070 (.095) [.007]
Health behavior						
Obese	-.042 (.090) [-.007]	-.016 (.013)	.064 (.098) [.011]	-.033 (.076) [-.006]	-.038** (.012)	-.081 (.080) [-.014]
Underweight	.768** (.189) [.015]	.025** (.007)	.560** (.216) [.011]	.362** (.102) [.024]	.047** (.010)	.371** (.109) [.025]
Vigorous exercise	-.204** (.073) [-.051]	-.078** (.020)	-.156 (.080) [-.039]	-.046 (.064) [-.011]	-.050** (.014)	-.022 9.068) [-.005]
Heavy drinking	-.133 (.159) [-.006]	-.010 (.009)	-.108 (.174) [-.005]	.502** (.132) [.016]	.021** (.007)	.544** (.140) [.018]

a. The regressions in columns 1, 3, 4 and 6 include a constant term and controls for cohort, age, race/ethnicity, religion, foreign birth, English as a second language, number of living siblings, self-rated child health, years of education, veteran status, and ever-smoked. Columns 3 and 6 also include a dummy for having never married. The estimates for heavy drinking are from multinomial logit models with three outcomes (no, moderate and heavy drinking.) The figures in brackets show the change in the linear probability of each outcome implied by the logit coefficient.