Childlessness and Health among Older Adults in 20 Countries

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Abstract

Background and Objectives: No previous study to our knowledge has examined the association between childlessness and health using a wide range of countries and health outcomes. Therefore, the relationship between childlessness and health remains unclear, especially cross-nationally. This study improves previous literature by exploring and documenting associations between childlessness and health across 20 countries and five health outcomes.

Research Design and Methods: Drawing on cross-sectional harmonized data from the family of Health and Retirement Surveys across the United States (HRS, wave 11), Europe (SHARE, waves 4 and 5), Mexico (MHAS, wave 3), and China (CHARLS, wave 2), we use logistic repression models to estimate the association between childlessness and poor health (poor self-rated health, 1 or more ADL limitations, 1 or more IADL limitations, 1 or more chronic conditions, and depression) in a sample of adults aged 50 and older across 20 countries (N=109,648).

Results: Our results point to a prevalent absence of association between childlessness and health and suggest that childlessness may be associated with better (e.g., Mexico, Hungary) or worse health (e.g., Austria, Estonia, Netherlands, Poland) in certain contexts and for certain measures.

Discussion and Implications: We discuss these findings in light of the meaning of childlessness, resources available by country, as well as cross-national economic, social, and cultural contexts to provide suggestions for aging policy and future research.

Keywords: cross-national, family, well-being, global aging, harmonized data

INTRODUCTION

Older adults are increasingly living longer lives without children, a trend that is projected to increase globally due to rapid fertility declines since the latter half of the 20th century (OECD, 2014; Díaz-Venegas, Sáenz, & Wong, 2017; Zimmer & Kwong, 2003). Adult children are an important source of support for older adults, and such support is generally associated with positive consequences for parents' well-being (Merz, Schulze, & Schuengel, 2010). While this pattern may suggest health risks among childless aging populations, considering socio-cultural and economic variation across countries, it is unknown if and how the association between childlessness and health differs cross-nationally.

Existing cross-national research on the relationship between childlessness and health in later life contains important limitations, including: 1) reliance on data from a single region, or within-region comparisons, primarily in Europe (Hank & Wagner, 2013; Gibney, Delaney, Codd, & Fahey, 2017); 2) comparisons of a small number of countries from different global regions (Kendig, Dykstra, van Gaalen, & Melkas, 2007); 3) use of a single or few measures of health (Grundy, van den Broek, & Keenan, 2017; Neuberger & Preisner, 2018; Verdery et al., 2018); and 4) different operationalizations of childlessness (e.g., total number of children, Hank and Wagner, 2013; childless compared to parents, Neuberger & Priesner, 2018; kinlessness, which combines absence of child and spouse, Margolis & Verdery, 2017; Verdery et al., 2018). Therefore, it is unclear whether associations between childlessness and health are consistent across countries.

This study addresses these gaps by drawing on cross-sectional harmonized data for adults aged 50 years and older in 20 countries from four global regions (Europe, North America, Latin America, and Asia) to explore associations between childlessness and five health outcomes (self-rated health, ADL, IADL, chronic conditions, depression). To our knowledge, this study is the first attempt to document cross-national variation in the

association between childlessness and health using a large and diverse sample of countries, multiple health indicators, and a consistent measurement of childlessness across countries.

Childlessness and Health

Availability, quantity, and quality of family relationships contribute to health via several mechanisms (Thoits, 2011). Childlessness, for example, is often hypothesized to be associated with increased risk of poor health in later life due to lower social support, weakened sense of meaning, and greater isolation (Hansen, 2012). Children can also be a form of social control that promotes healthy behaviors (lower alcohol consumption, physical activity) as parents develop familial responsibilities and are motivated to protect their health (Umberson, Crosnoe, & Reczek, 2010). Positive health habits can persist into later life (Kendig et al. 2007), which may lower risk of poor health outcomes. Yet, parenting also incurs psychological and financial stressors earlier in the life course (Nomaguchi & Milkie, 2003), which can accumulate to poor health in later life. Furthermore, poorer quality parent-child relations are associated with health disadvantages (Koropeckyj-Cox, 2002). Thus, childlessness has the potential to be health debilitating and health enhancing.

Cross-National Findings

Most empirical research on childlessness and health has examined mental health, such as depression, loneliness, and life satisfaction (Zhang & Liu, 2007; Zoutewelle-Terovan & Liefbroer, & Castle, 2017). We focus on depression given its increasing global prevalence, higher occurrence in later life, and association with disability and overall health declines (World Health Organization, 2017). Existing studies of childlessness and depression on older European, American, Chinese, Mexican, and Latin American samples yield mixed results.

Using the Survey of Health, Ageing and Retirement in Europe (SHARE), Hank and Wagner (2013) found that older adults with no living children had higher depression only when compared to parents with two children. Using the Generations and Gender Programme (GGS), Grundy et al. (2017) found that older adults with no living children or only one child were at greater risk for depression compared to those with two children, particularly in Eastern Europe (compared to Western Europe). Among Norwegian older adults, however, childlessness was not associated with depression (Hansen et al., 2009). In the United States, studies generally demonstrate that childless older adults do not differ from parents in likelihood of experiencing depression net of socio-demographic, economic and health factors (Zhang & Hayward, 2001; Bures, Koropeckyj-Cox, & Loree, 2009). Yet, some US studies find that childlessness is associated with worse psychological health among women (Koropeckyj-Cox, 1998) as well as widowed or divorced men (Zhang & Hayward, 2001). Likewise, Kendig et al. (2007) observe marital status and gender differences in later life depression among formerly married childless (men in Finland and women in Australia), relative to parents. In China, Guo (2014) found that older childless are not more vulnerable to depression, yet other studies find that childless Chinese experience higher depression even after controlling for individual-level factors (Chou & Chi, 2004; Djundeva, Emery, & Dykstra, 2017), particularly in rural areas (Djundeva et al., 2017). Finally, Feng (2017) finds that older Chinese who lost all children to death have similar levels of depression as parents, but older adults who are childless for any other reason (voluntary or involuntary) report less depression. Quashie and Andrade (2018) find that childless older adults in Mexico City do not differ from parents in depression likelihood. Finally, to our knowledge, only one study has examined childlessness using the Mexican Health and Aging Study (MHAS) and finds that those aged 50-74 with zero to two children report fewer depressive symptoms than those with five or more children (Díaz-Venegas et al. 2017).

Beyond mental health, studies of childlessness and physical health or self-rated health are rare. Kendig et al. (2007) found that childlessness was associated with more limited physical activity among a specific sub-group of formerly married men in Australia, Finland, and the Netherlands. Mexican older adults with fewer children (i.e., zero to two) report fewer chronic conditions compared to those with five or more children (Díaz-Venegas et al., 2017), and older Chinese childless (voluntary or involuntary) were less likely to report difficulty with instrumental activities of daily living (IADLs) compared to parents (Feng, 2017). Overall, such inconclusive results may be due to inconsistent measurement of childlessness, and/or limited health outcomes examined.

Contextual Variation

In addition, conflicting results may reflect cross-national variation in contextual factors such as formal support options, cultural values, and demographic profiles (Albertini and Mencarini 2013; Deindl and Brandt 2017, Schnettler and Wöhler 2016). For example, income inequality within European countries and the US shapes older adults' access to quality health care (Jürges, 2015; Dickman, Himmelstein, & Woolhandler, 2017), which leads to poorer health in countries with greater income inequality (Ploubidis, Dale, & Grundy, 2012). Yet, children may also facilitate health care utilization (Aguila, Díaz, Fu, Kapteyn, & Pierson, 2011; Li & Chi, 2011), while global regions with a stronger reliance on children as a source of support (e.g., Southern and Eastern Europe, Mexico, China) are less likely to have public support available compared to Western and Northern Europe and the United States (Litwin, 2010; Grundy et al., 2017; Aguila et al., 2011; Guo, 2014).

Although the present study does not directly measure these contextual traits, these nuances likely contribute to cross-country variation in associations between childlessness and health. Despite such variation, we were unable to locate any study that simultaneously

examines childlessness and health among a wide range of countries, using mental and physical health indicators, and consistent measures of childlessness.

Research Questions

Therefore, this study explores the following research questions:

1) What is the association between childlessness and health in a cross-national sample of 20 countries, using multiple health indicators (self-rated health, ADL, IADL, chronic conditions and depression)?
2) Do associations between childlessness and health vary by country and health outcome?
3) If so, what patterns, if any, emerge regarding childlessness and health cross-nationally?

Although this paper is exploratory, we expect to find variation in the direction and magnitude of the association between childlessness and health cross-nationally, as well as variation across countries regarding the type of health outcome examined. We seek to document, rather than explain, this variation to begin to identify cross-national patterns in the association between childlessness across multiple health outcomes and countries.

METHODS

Data

We use data from several surveys belonging to the Health and Retirement Study (HRS) family of surveys. The HRS is a nationally representative longitudinal survey of individuals age 50+ in the US, administered every two years since 1992. It includes detailed information on health, socio-demographic, and economic characteristics and has spawned other international aging surveys that share objectives with a mutual desire to harmonize content (Sonnega et al. 2014) for cross-national comparisons (Brønnum-Hansen, 2014).

To analyze these harmonized data sources, we use the Gateway to Global Aging Data (http://gateway.usc.edu), a platform designed to facilitate use of these data through metadata (e.g., questionnaires), item comparability and availability, and software syntax (see Lee, 2015). We combine cross-sectional data for comparable years from the HRS (Wave 11, 2012-2013), Mexican Health & Aging Study (MHAS, Wave 3, 2012), China Health & Retirement Study (CHARLS, Wave 2, 2013), and Survey of Health, Ageing & Retirement in Europe (SHARE, Wave 5, 2013; data for Hungary and Poland are from Wave 4, 2011-2012).

Given that HRS surveys vary in their minimum age (e.g., 45 years, 50 years), we restrict analysis to age 50 and older, yielding an initial sample of 118,700 older adults. Omitting missing cases on health outcome variables and number of living children resulted in the loss of 9,052 cases (7.6%), yielding an analytic sample of 109,648 older adults from 20 countries (Austria, Belgium, China, Czechia, Denmark, Estonia, France, Germany, Hungary, Italy, Luxembourg, Mexico, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, US). Table 1 presents an overview of all variables included in our analysis.

Measures

We analyze five health indicators: poor self-rated health, ADL difficulties, IADL difficulties, chronic conditions, and feelings of depression. All outcome variables are dichotomous with 1 indicating worse health conditions. Our independent variable of interest is a dummy variable indicating childlessness compared to at least one living child of any type including biological, step-children, and adopted children alive at the time of interview (1=childless, 0=parent). We also include covariates known to be associated with health and childlessness, including: age, gender, marital status, living arrangements, number of living siblings, location of residence, education, employment status, household income (Table 1).

Analysis

Descriptive statistics of key variables by country are displayed in Figure 1. We also conduct multivariate logistic regression analysis by country to compare associations between childlessness and poor health across five health outcomes (Table 2). Model 1 (M1) controls for only gender and age, Model 2 (M2) introduces family support variables (marital status, living arrangement, having living siblings), and Model 3 (M3) adds controls for socio-economic status (place of living, employment status, education, income quartiles).

Due to unobserved heterogeneity, coefficients and odds-ratios estimated from different samples (i.e., countries) cannot be directly compared (Mood, 2010). Therefore, our comparison of patterns (e.g., presence, direction, consistency of effects across health outcomes and countries) is descriptive. To address this limitation, we also report average marginal effects (AMEs) which are less subject to the influence of unobserved heterogeneity. AMEs of childlessness can be interpreted as the difference in percentage points between childless and parents in the probability of reporting each health problem (e.g., an AME of 0.1 for depression means that childless are 10 percentage points more likely than parents to be depressed). Because we examine three models, across five health outcomes and 20 countries, we have a total of 300 AMEs (i.e., 3x5x20) to report from our analysis. To organize our results, Table 2 displays AMEs of interest (i.e., for the childless dummy) and Figure 2 provides a visual summary of the results across countries with a focus on the mostly unadjusted model (M1) and fully adjusted (M3). In the text, we describe results from M1 and summarize changes in results as adjustments are added to the models (M2, M3).

Finally, because associations between childlessness and health may be impacted by the number of children among parents, and because average number of children differs by country, we perform a robustness check that replicates all analyses by weighting each observation by distribution of children in each country (see Supplementary Materials).

Weighted results are similar to the unweighted results in both magnitude and statistical significance, therefore unweighted results are presented and we conclude that results presented are unlikely to be driven simply by distribution of number of children by country.

RESULTS

Descriptive

Figure 1 illustrates distributions of childlessness and health outcomes across the 20 countries. In the pooled sample, 7.7% are childless, but percentages vary considerably cross-nationally and range from low percentages in China (2.0%), Mexico (4.1%), Czechia (4.2%), and Poland (4.8%) to higher percentages in Switzerland (16.3%) and parts of Europe (12% in Luxembourg, Italy, Belgium, Germany, Austria). Overall, 44.4% of older adults reported poor self-rated health and this measure has the greatest cross-national variation, ranging from 17% in Switzerland to 75.2% in China. Average prevalence of ADL limitations is 10.5%, which ranges from 5.4% in Switzerland to 15% in Poland and Portugal. Prevalence of IADL limitations is 10.8% in the pooled sample, ranging from 3.8% in Switzerland to 17.9% in China. Chronic conditions are the most prevalent form of poor health examined with the least variation cross-nationally. About 72.4% of the sample of older adults reports presence of chronic conditions, ranging from about 63% in Switzerland and the Netherlands to about 80% in Czechia, Poland, and the US. Finally, about 39.2% report feelings of depression, from a low in the US (13.8%) to a high in Poland (51.3%) and Portugal (50.1%).

Multivariate

Unadjusted Associations between Childlessness and Health (Table 2, M1 Models)

We begin by examining the association between childlessness and health from models that only adjust for age and gender (M1, Table 2) for each health outcome separately.

Self-Rated Health. The association between childlessness and self-rated health is statistically significant in only five of the 20 countries. For France, Netherlands, and Switzerland the association is positive, indicating that childlessness is associated with a higher probability of reporting poor self-rated health. However, AMEs tend to be small. The highest value is found for the Netherlands where childless are six percentage points (pp) more likely than parents to self-report poor health status. In two countries (Mexico and Hungary) the association is negative, and the magnitude of the AMEs tends to be higher. For example, Hungarian childless older adults are 13 pp less likely than parents to report poor health.

ADL Limitations. Childlessness is associated with ADL limitations in eight countries. For five of these cases (Belgium, Czechia, Denmark, the Netherlands, and US), childless are more likely to report ADLs. Yet in three countries (Hungary, Mexico, and Poland), childless are less likely to report ADLs. AMEs tend to be negligible (ranging from 3 to 6 pp).

IADL Limitations. The highest frequency of statistically significant AMEs is found in the association between childlessness and IADL limitations (11 countries). Childless are more likely to report IADLs in 10 countries (Austria, Belgium, Czechia, Denmark, Estonia, Germany, Luxembourg, Netherlands, Spain and Sweden) and marginally less likely to report IADL limitations in Mexico only. The highest magnitude is found for the Netherlands (5 pp).

Chronic Conditions. Chronic conditions are the only health outcome among the five that showed consistently significant negative associations with childlessness, but this pattern was found in only five countries (Germany, Hungary, Mexico, Italy, and US). The strongest marginal (negative) effects were found for Mexico (7 pp), Italy (8 pp) and Hungary (14 pp).

Depression. Childlessness was statistically significantly associated with depression in six countries, predicting a higher likelihood of depression in four countries (Czechia, the Netherlands, Spain, and Sweden) and a lower likelihood in two countries (Hungary and Mexico). The strongest AMEs were found in Hungary (-8 pp) and Czechia (+11 pp).

To summarize, first, among the total of 100 associations analyzed (M1; 20 countries x 5 outcomes), a minority (N=35) were statistically significant and even fewer (N=15) were larger than 5 pp. Second, when associations are statistically and substantially significant, they are inconsistent in terms of direction, health outcomes, and countries. For example, Mexico is the only country with a consistent association between childlessness and all five health outcomes, wherein childless individuals report better health across all outcomes examined. Hungary follows a similar pattern, except there is no association with IADL limitations. Of all the health outcomes examined, higher prevalence of chronic conditions is the only outcome that is consistently associated with childlessness, yet a majority of the associations are null.

Changes in Associations after Adjustment for Covariates (Table 2, Models M2 and M3)

Next, we compare results from M1 with those from M2 and M3 that add controls for family support and socio-economic conditions, respectively.

First, adding covariates to the models does not alter the direction (i.e., positive, negative) of any previously statistically significant effects. Second, 17 of the previously statistically significant associations between childlessness and worse health are no longer significant after adjustments and most losses of significance occurred for IADL and ADL limitations except for one case (e.g., ADL in Portugal) that remained significant in M3. In four cases, statistically significant associations between childlessness and health emerge where they did not previously exist in M1 (e.g., childlessness and higher risk of poor self-rated health in Italy and Poland, and lower risk of depression in Belgium and Denmark). Finally, we find associations between childlessness and lower risk poor self-rated health and IADL limitations in the US in M2, but these associations are weak and do not persist in M3.

Overall, the most prevalent changes observed after adding controls are from childlessness being associated with poorer health to no association, potentially signaling

selection of childless people into conditions that are associated with poorer health. In other words, the initial health disadvantages observed among childless may be due to other confounding factors, especially in the Netherlands and Sweden.

Summary of Key Findings

Out of 300 regressions (3 models x 5 health outcomes x 20 countries; Table 2), childlessness had an association with health in only 26% (N=79) of cases and only 12.7% of cases (N=38) produced AMEs larger than 5 pp. These findings suggest that childlessness is not consistently associated with health disadvantage or advantage in our sample of 20 countries, yet exceptions exist.

Figure 2 offers a visual summary of findings from M1 and M3. After adjusting for all covariates (M3), childlessness is associated with worse health for one or more health outcomes in five countries (Austria, Czechia, Estonia, the Netherlands, and Poland) and better health in six countries (Belgium, Denmark, Germany, Hungary, Mexico, and US). In one country (Italy), we find both positive and negative associations between childlessness and health. For the remaining eight countries, we find no association between childlessness and health. Mexico and Hungary emerge as countries with a clear health advantage for childless across all measures (with the exception of IADL for Hungary). When childlessness is associated with poorer health, it is typically limited to one health outcome.

Across outcomes, childlessness has the most consistent association with higher risk of IADL limitation, except for Mexico (lower risk of IADL), and self-rated health displays the most conflicting results. Childlessness is associated with lower risk of chronic conditions and ADL limitations in all cases where the association is significant, yet lower risk of depression in multiple countries and higher risk of depression in one country.

DISCUSSION

To our knowledge, this is the first study to explore associations between childlessness and health across a range of health outcomes and countries. Specifically, our analysis extends existing research by examining patterns within and across 20 countries, spanning four global regions, and a range of physical and mental health measures (i.e., self-rated health, ADL, IADL, chronic conditions, and depression) using harmonized, cross-national data. Although exploratory, we expected to find cross-national differences in the direction and magnitude of the association between childlessness and health due to unobserved factors such as country composition, sample selection, and socio-cultural-economic contextual differences.

No Consistent Association between Childlessness and Health across Countries

Our first finding is that there is a prevalence of non-significant associations between childlessness and health, net of demographic, family support, and socio-economic covariates. When significant associations with health are observed, they exist in a minority of countries and vary in terms of direction, magnitude, and by type of health outcome examined. In other words, childless older adults are not overall less healthy in this sample of 20 countries and in some cases, childless are healthier.

Among the countries considered, Hungary and Mexico emerge as interesting cases—with childlessness being associated with better health on nearly every health indicator for Hungary, and all health indicators for Mexico. These patterns are unexpected given the lower levels of socio-economic development and the normative emphasis of children for support or to fulfil socially expected life course pathways (Aguila et al. 2011; Szalma & Takacs, 2015). It is possible that in countries with fewer economic resources, parenthood may contribute to economic and social strains (Díaz-Venegas et al., 2017). By this logic, not having children may enhance health by reducing stressors. On the other hand, we do not observe health boosts

among the childless in countries that are flush with economic and institutional support for families, such as Northern and Western Europe (Hansen et al. 2009).

Diversity of Findings within Regions

Second, our cross-national findings underscore marked regional variation. Although Eastern and Southern European regions are characterized by stronger emphasis on family support (Daatland, Herlofson, & Lima, 2011), our results reveal distinct differences within these regions. Italy emerged as the only Southern European country where childless older adults were more likely to report a poor rating of their overall health but less likely to report chronic conditions, net of controls. In Eastern Europe, Hungary is the only country where childlessness was associated with better health while childlessness was associated with poorer outcomes in Poland and Czechia. These patterns may reflect the strength of norms regarding family ties in Italy and Poland where the mere absence of children presents an overall health disadvantage, while in Czechia childlessness may be especially salient for mental *and* functional health. More research is needed to investigate the specific national characteristics, within these regions, that may contextualize the association between childlessness and health to untangle the many layers related to family decision-making, economic security, and health among aging populations.

Risk and Lack of Risk across Health Outcomes

Third, across outcomes, self-rated health and depression have mixed patterns of association whereas childlessness is associated with a lower risk of ADLs, and higher risk of IADLs, in a few countries. Functional decline is one dimension of health for which the absence of children is acutely experienced in later life as such limitations often involve frequent familial support (National Alliance for Caregiving and AARP, 2015). Children may

be particularly crucial for instrumental help, as it can be difficult to obtain sustained instrumental assistance from non-kin informal support and paying for formal support is extremely costly (Ivanova & Dykstra, 2015).

Lower risk of chronic conditions is observed among childless in Germany, Hungary, Italy, Mexico, and the US. It is possible that because our measure reflects diagnosed chronic conditions, parents are more likely to be aware of or diagnosed with chronic conditions due to support or intervention from their children as caregivers. On the other hand, perhaps childless older adults in these countries lacked parenthood stressors, had enhanced leisure or exercise opportunities, or perhaps more financial resources (unaccounted for in this analysis), and therefore better health.

Our findings underscore the importance of examining the complexity of the childlessness-health relationship from a comparative perspective that accounts for mental and physical health. Consistent with previous research that shows childless are not generally worse than older parents across different dimensions of well-being (Hank and Wagner, 2013), we find that childlessness is not universally harmful for different dimensions of health, and find this pattern in a wider set of countries than previously examined. The observed gaps in the health of childless versus parents in prior studies may be attributable to other (often unobserved) factors, including disparities in family support and economic resources, which select certain individuals into childlessness. These selection biases may also reflect psychosocial, economic, and social characteristics of childless individuals, which enhance their capacity to age in good health (Ivanova & Dykstra, 2015). As such, childlessness does not seem to clearly shape health in our cross-sectional, cross-national study.

Policy Implications

This study has several implications both for practice and research. First, the overall lack of association between childlessness and health suggests that the childless may at less risk than previously thought and may not represent a generalizable "at risk" population cross-nationally. In fact, it is possible that social policies may need to be directed to older parents more so than the childless in certain contexts (e.g., Hungary and Mexico). Further, vast variation observed across health outcomes suggests that existing and future policies aimed at supporting childless older adults should take into account the multidimensionality of health and contextual variation in health risks. It is possible that interventions should focus on mental and instrumental health in some countries (Czechia), and overall health in other countries (Italy and Poland). Overall, wide variation across countries and regions suggests that adopting a policy from one country or region and applying it to another may be an incorrect approach. More research is needed to understand the underlying causes of the variation observed to identify best practices for health interventions by family structure.

Limitations and Future Directions

This study includes several limitations to be addressed by future research. First, it is cross-sectional and can only speculate on causal mechanisms. Second, we do not include empirical data on macro- or country-level indicators in our analysis and can only speculate about contextual explanations. Third, although we include more countries than previous studies, our sample is still limited to only 20 countries and the indicators available in these datasets. Fourth, we cannot examine children's circumstances, such as their proximity to parents nor the quality of family relations, which can contribute to poorer health outcomes (Antman, 2014; Rook, 2015). Finally, we are unable to account for the pathways into childlessness (e.g., child death, voluntary or involuntary), which may impact health outcomes (Dykstra, 2009;

Feng, 2017). Despite these limitations, the results of our study suggest that childlessness is not consistently associated with poorer physical and mental health cross-nationally, and raises new questions about contextualizing policies aimed to support increasing numbers of older adults who may be aging without children.

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Table 1. Measurement Details for All Variables

Variable	Description (survey question)	Measurement	Categories (Reference category in bold)
Self-Rated Health	Respondents' self-reported health, scale excellent to poor	Dichotomous	**Good**, Poor (Missing (1.9%), omitted)[a]
Activities of Daily Living (ADL)	Wallace Scale, 0-3	Dichotomous	**No ADL limitations**, At least 1 (Missing (1.4%), omitted)
Instrumental Activities of Daily Living (IADL)	Constructed using difficulty with managing money, taking medications, shopping, preparing meals	Dichotomous	**No IADL limitations,** At least 1 (Missing (9%), omitted)
Chronic Conditions	Constructed using ever diagnosed with high blood pressure, diabetes, cancer, stroke, lung disease, and heart disease	Dichotomous	**No conditions,** At least 1 condition (Missing (1.3%), omitted)
Depression	Single item measure: Felt depressed in the week prior to the interview	Dichotomous	**Not depressed,** Depressed (Missing (4.6%), omitted)
Childlessness	Number of living children	Dichotomous	**At least 1 living child,** Childless (Missing (0.2%), omitted)
Age	Respondents' age	Continuous	Years
Gender	Respondents' sex	Dichotomous	**Men**, Women
Marital Status	Current marital status	Categorical	**Partnered**, Widowed, Separated/Divorced/Never Married, Missing (0.8%)
Living Arrangements	Number of people in household	Dichotomous	**With others**, Alone
Living Siblings	Number of living siblings	Dichotomous	**At least 1**, No siblings, Missing (1.04%)
Location of Residence[b]	Respondent's living region	Categorical	**Urban**, Rural, Missing (2.6%)
Education	Harmonized education levels	Categorical	**Less than lower secondary,** Upper Secondary & Vocational, Tertiary, Missing (0.4%)
Employment Status	Currently working	Categorical	**Not working**, Working, Missing (0.7%)
Household Income Quartile	Total household income	Categorical	**Q1,** Q2, Q3, Q4, Missing Income (3.5%)

[a]These percentages represent the total missing for the respective variable but there are country differences in the percentage of missing cases. Missing categories were included for the control variables to avoid losing cases and variability in the sample size for each outcome variable. Our initial sample included 118,700 older adults. We omitted missing cases on the outcome variables and the number of living children. This accounted for a total of 9,052 cases representing 7.6% of the sample, producing our analytic sample of 109,648 older adults. [b]In the case of Mexico, respondents' urban-rural residence was determined by merging the MHAS wave 3 data with the 2015 Master file to determine the household's location of residence. Following the methods of Salinas et al. (2010) urban areas combines locations with population size15,000 to 99,999 (semi-urban) and 100,000 and more (urban). Rural households combine locations with population size of 2,500 to 14,999 (semi-rural) and those < 2,500(rural).

Table 2. Multivariate Logistic Regression Results of Marginal Effects of Childlessness on Health

Self-Rated Health	Austria	Belgium	China	Czechia	Denmark	Estonia	France	Germany	Hungary	Italy	Luxem-bourg	Mexico	Netherlands	Poland	Portugal	Slovenia	Spain	Sweden	Switzer-land	USA
M1	0.01	0.01	0.01	0.05	0.02	0.02	**0.05****	0.01	**-0.13*****	0.03	0.03	**-0.08*****	**0.06*****	0.08	0.01	0.00	0.01	0.04	0.04**	-0.00
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	**(0.02)**	(0.02)	**(0.03)**	(0.02)	(0.04)	**(0.02)**	**(0.02)**	(0.05)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.01)
M2	-0.00	-0.01	-0.00	0.05	-0.02	0.03	0.04	-0.02	**-0.11*****	0.04	0.02	**-0.06*****	0.03	0.10	0.04	0.00	0.01	0.01	0.02	-0.04***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	**(0.03)**	(0.03)	(0.04)	**(0.02)**	(0.02)	(0.06)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.01)
M3	0.01	-0.01	-0.01	0.05	-0.02	0.02	0.03	-0.01	**-0.09*****	**0.05***	0.02	**-0.05****	0.03	**0.11***	0.03	0.00	0.02	0.00	0.02	-0.01
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	**(0.03)**	**(0.02)**	(0.04)	**(0.02)**	(0.02)	**(0.06)**	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.01)

ADL's	Austria	Belgium	China	Czechia	Denmark	Estonia	France	Germany	Hungary	Italy	Luxem-bourg	Mexico	Netherlands	Poland	Portugal	Slovenia	Spain	Sweden	Switzer-land	USA
M1	0.01	0.03**	0.02	0.03*	0.03**	0.00	0.01	0.01	**-0.05****	-0.01	0.02	-0.03*	0.03**	0.01	**-0.06***	-0.01	0.01	0.02	0.00	0.02**
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	**(0.02)**	(0.01)	(0.02)	(0.02)	(0.01)	(0.04)	**(0.03)**	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
M2	0.00	0.01	0.02	0.03*	0.01	0.01	-0.00	-0.00	**-0.06****	-0.01	0.02	-0.03*	0.01	0.04	-0.04	-0.01	0.01	0.00	0.00	-0.00
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	**(0.02)**	(0.02)	(0.02)	(0.02)	(0.01)	(0.04)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
M3	0.01	0.01	0.01	0.03	0.01	0.01	-0.01	-0.01	**-0.06****	-0.01	0.02	-0.03*	0.01	0.04	-0.04	-0.01	-0.00	-0.00	0.00	0.01
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	**(0.02)**	(0.02)	(0.02)	(0.02)	(0.01)	(0.04)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)

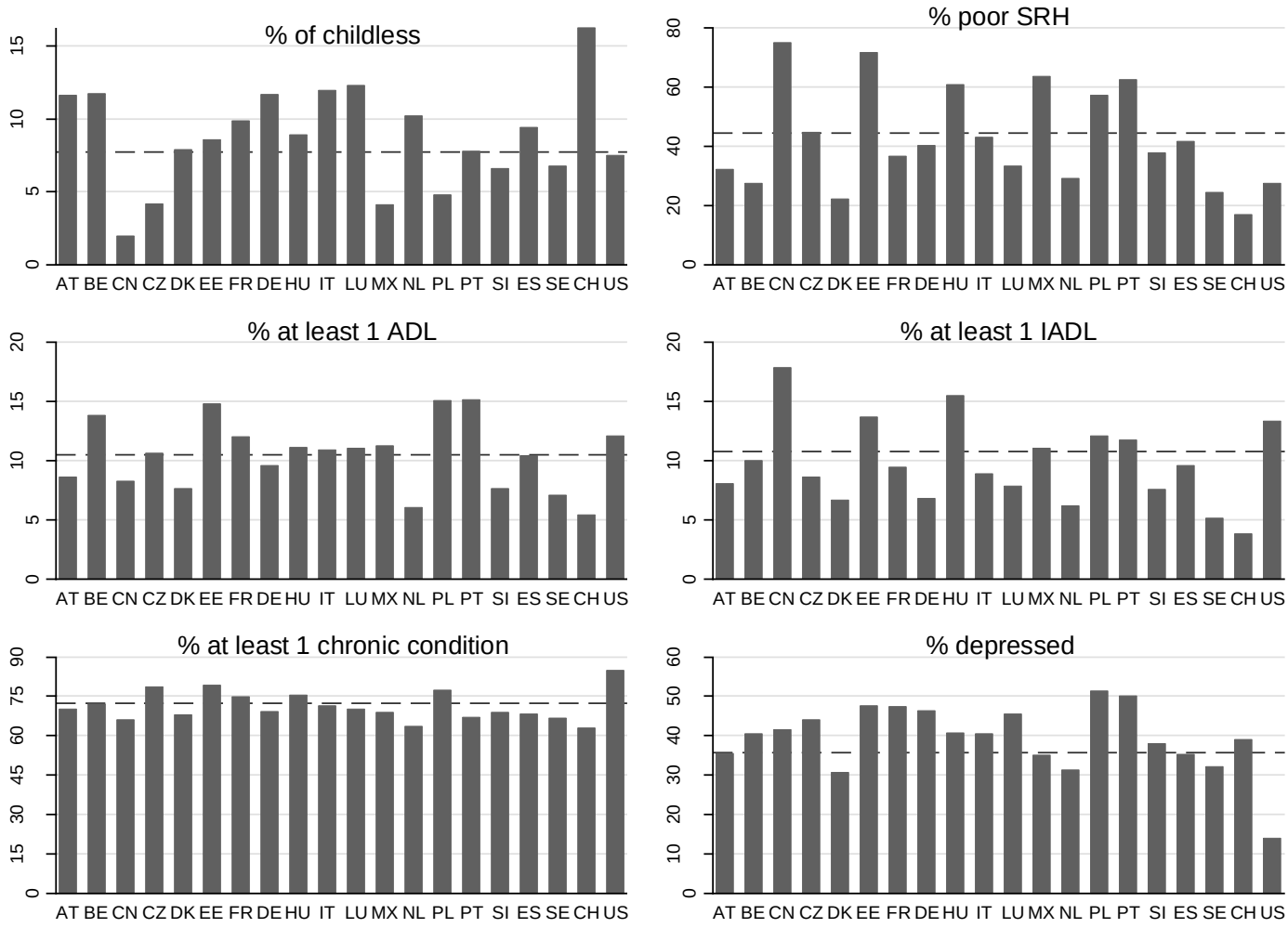
IADL's	Austria	Belgium	China	Czechia	Denmark	Estonia	France	Germany	Hungary	Italy	Luxem-bourg	Mexico	Netherlands	Poland	Portugal	Slovenia	Spain	Sweden	Switzer-land	USA
M1	0.04***	0.03***	0.03	0.04***	0.03**	0.02*	0.02	0.02**	-0.02	0.02	0.03*	-0.03*	**0.05*****	0.03	-0.02	-0.00	0.03**	0.02*	0.01	0.00
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	**(0.01)**	(0.03)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
M2	0.04***	0.01	0.04	0.04**	0.01	0.03**	0.01	0.01	-0.02	-0.00	0.03	-0.03*	0.04***	0.03	-0.02	-0.01	0.02*	0.01	0.01	-0.02**
	(0.01)	(0.01)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.04)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
M3	0.04***	0.02	0.03	0.04**	0.01	0.03*	0.01	0.00	-0.01	-0.00	0.03	-0.03*	0.03***	0.03	-0.02	-0.01	0.02	0.01	0.01	-0.01
	(0.01)	(0.01)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.04)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)

Chronic Conditions	Austria	Belgium	China	Czechia	Denmark	Estonia	France	Germany	Hungary	Italy	Luxem-bourg	Mexico	Netherlands	Poland	Portugal	Slovenia	Spain	Sweden	Switzer-land	USA
M1	0.01	0.03	0.02	0.03	0.02	-0.00	-0.03	-0.03*	**-0.14*****	**-0.08*****	-0.04	**-0.07*****	0.01	0.06	-0.06	-0.03	0.02	-0.01	-0.02	-0.02**
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	**(0.02)**	**(0.02)**	(0.03)	**(0.02)**	(0.02)	(0.05)	(0.04)	(0.03)	(0.02)	(0.03)	(0.02)	(0.01)
M2	0.00	0.01	0.04	0.03	-0.01	0.01	-0.02	-0.05**	**-0.14*****	**-0.07*****	-0.05	**-0.05****	0.02	0.07	-0.04	-0.01	0.02	-0.01	-0.02	-0.03***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	**(0.03)**	**(0.02)**	(0.03)	**(0.02)**	(0.02)	(0.05)	(0.04)	(0.04)	(0.02)	(0.03)	(0.02)	(0.01)
M3	0.00	0.01	0.03	0.03	-0.01	-0.00	-0.03	-0.04**	**-0.14*****	**-0.06*****	-0.05	**-0.05****	0.02	0.06	-0.04	-0.01	0.03	-0.01	-0.02	-0.02**
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	**(0.03)**	**(0.02)**	(0.03)	**(0.02)**	(0.02)	(0.05)	(0.04)	(0.04)	(0.02)	(0.03)	(0.02)	(0.01)

Depression	Austria	Belgium	China	Czechia	Denmark	Estonia	France	Germany	Hungary	Italy	Luxem-bourg	Mexico	Netherlands	Poland	Portugal	Slovenia	Spain	Sweden	Switzer-land	USA
M1	-0.00	-0.01	-0.02	**0.11*****	-0.03	0.03	-0.02	0.01	**-0.08****	-0.00	0.02	**-0.06*****	**0.06*****	-0.02	-0.04	0.02	0.04*	**0.06****	-0.03	0.01
	(0.02)	(0.02)	(0.03)	**(0.03)**	(0.03)	(0.02)	(0.02)	(0.02)	**(0.03)**	(0.02)	(0.04)	**(0.02)**	**(0.02)**	(0.06)	(0.04)	(0.04)	(0.02)	**(0.03)**	(0.02)	(0.01)
M2	-0.04	**-0.05****	-0.05	**0.09*****	**-0.05***	0.01	-0.02	-0.01	**-0.08****	-0.03	0.00	**-0.07*****	0.02	-0.07	-0.06	0.00	0.00	0.03	-0.04	-0.01
	(0.02)	**(0.02)**	(0.04)	**(0.03)**	**(0.03)**	(0.02)	(0.03)	(0.02)	**(0.03)**	(0.03)	(0.04)	**(0.02)**	(0.02)	(0.06)	(0.04)	(0.04)	(0.02)	(0.03)	(0.03)	(0.01)
M3	-0.04	-0.04**	-0.05	**0.09****	**-0.05***	0.01	-0.03	-0.01	**-0.07****	-0.03	-0.00	**-0.07*****	0.02	-0.07	-0.06	-0.00	0.01	0.02	-0.04	0.00
	(0.02)	(0.02)	(0.04)	**(0.03)**	**(0.03)**	(0.02)	(0.03)	(0.02)	**(0.03)**	(0.03)	(0.04)	**(0.02)**	(0.02)	(0.06)	(0.04)	(0.04)	(0.02)	(0.03)	(0.03)	(0.01)
N	4047	5475	12291	5435	4010	5488	4379	5535	2946	4571	1565	12398	4086	1685	1910	2873	6310	4481	2942	17174

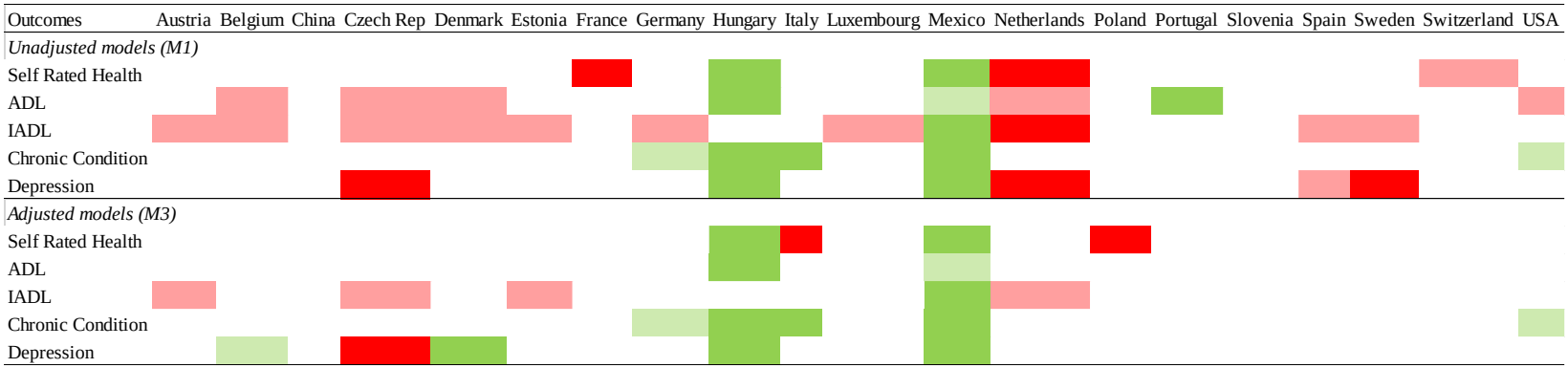
Note: ***p<.01; **p<.05; * p<.1. M1 controls for age and gender. M2 adds controls for marital status, living arrangement, availability of siblings. M3 adds controls for rural/urban location, education, and income quartile. All outcomes are dichotomous with 1 indicating poor health and 0 good health. Because childlessness is also a dichotomous variable, marginal effects have to be interpreted as differences in terms of percentage points in the probability to report bad health conditions. Highlighted in **red are positive** statistically significant marginal effects (childless have worse health than parents). Highlighted in **green are negative** statistically significant marginal effects (childless have better health than parents). In bold we highlight MEs not smaller than 5 percentage points.

Figure 1: Percentage Distributions of Childlessness and Health Outcomes by country



Note: Dashed lines represent the average % on the pooled sample of all countries of each variable. Country code correspond to ISO 3166-2 country codes: AT (Austria), BE (Belgium), CN (China), CZ (Czechia), DK (Denmark), EE (Estonia), FR (France), DE (Germany), HU (Hungary), IT (Italy), LU (Luxembourg), MX (Mexico), NL (Netherlands), PL (Poland), PT (Portugal), SI (Slovenia), ES (Spain), SE (Sweden), CH (Switzerland) and US (United States of America).

Figure 2. Visual Comparison of Unadjusted (M1) and Adjusted (M3) Associations between Childlessness and Health



Note: M1 controls for age and gender. M3 adds controls for marital status, living arrangement, availability of siblings, rural/urban location, education, and income quartile. All outcomes are dichotomous with 1 indicating poor health and 0 good health. Highlighted in red are positive statistically significant marginal effects (childless have worse health than parents). Highlighted in green are negative statistically significant marginal effects (childless have better health than parents). Lighter colors indicate MEs smaller than 5 percentage points.

Supplementary materials: Robustness check

The effect of parenthood may be driven by the number of children rather than from the fact *per se* of being a parent versus being childless. More importantly, the different effects found by countries may be due to the different distributions of the number of children, i.e. in some countries the proportion of parents with 5 children is higher than the average across all countries. In order to rule out this possibility we have implemented a robustness check by re-running all the analysis weighting each observation in such a way that the distribution of children in each country resembled the average distribution across all countries. First, we excluded from each country individuals with more than 8 children. The proportion of individuals with more than 8 children was low in all countries. In total we excluded 1,951 observations (1.8% of the working sample). Then we calculated a weight for each individual using the formula:

$$\text{weight} = 1/ (f_{cj} / f_{tj}) = f_{tj} / f_{cj} \qquad (1)$$

where f_{cj} represents the relative frequency for each category j of number of children (j = 0, 2, …, 5) within each country (c = 1, 2, …, 20) and f_{tj} is the same but calculated on the pooled sample of all countries. Finally, we re-estimated model 3 for each country and health measure weighting each observation by the weights in formula (1). Note that we dropped individuals with more than 8 children because in some counties we did not have observations for some of the parities higher than the eight.

The estimated marginal effects were very similar both in magnitude and statistical significance. All MEs were consistent in terms of statistical significance but 3 (out of 100). Even in these 3 cases the estimated MEs were very similar as those presented in the paper. Therefore, we can be confident that our results and especially differences between countries are not driven by differences in the distribution of number of children among parents.

Table S.1 Robustness check results: Multivariate Logistic Regression Results of Marginal Effects of Childlessness on Health

Outcomes	Austria	Belgium	China	Czech Rep	Denmark	Estonia	France	Germany	Hungary	Italy	Luxem-bourg	Mexico	Nether-lands	Poland	Portugal	Slovenia	Spain	Sweden	Switzer-land	USA
Self-Rated Health	0.01	-0.01	-0.02	0.03	-0.03	0.02	0.03	-0.02	-0.09***	0.04	0.02	-0.04*	0.03	0.11**	0.02	0.02	0.01	-0.00	0.02	-0.01
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.02)	(0.02)	(0.06)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.01)
ADL	0.01	0.01	0.01	0.03	0.01	0.01	-0.01	-0.00	-0.06**	-0.01	0.00	-0.02	0.01	0.03	-0.06	-0.02	-0.01	-0.00	0.00	0.01
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.03)	(0.02)	(0.03)	(0.01)	(0.01)	(0.04)	(0.03)	(0.03)	(0.02)	(0.02)	(0.01)	(0.01)
IADL	0.04***	0.01	0.04	0.04**	0.01	0.03*	0.00	0.01	-0.02	-0.00	0.01	-0.02*	0.03***	0.03	-0.02	-0.01	0.01	0.01	0.01	-0.01
	(0.01)	(0.01)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)	(0.04)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Chronic Conditions	-0.00	0.01	0.06	0.03	-0.02	-0.00	-0.03	-0.04**	-0.14***	-0.06***	-0.05	-0.04*	0.01	0.06	-0.05	0.00	0.02	-0.01	-0.03	-0.02**
	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.04)	(0.02)	(0.02)	(0.05)	(0.04)	(0.04)	(0.02)	(0.03)	(0.02)	(0.01)
Depression	-0.04	-0.04**	-0.04	0.08**	-0.04	0.01	-0.03	-0.02	-0.08**	-0.05*	-0.01	-0.05**	0.00	-0.08	-0.07	-0.01	-0.00	0.02	-0.04	-0.00
	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.04)	(0.02)	(0.03)	(0.06)	(0.04)	(0.04)	(0.02)	(0.03)	(0.03)	(0.01)
N (weighted)	4037	5465	12265	5430	4009	5485	4365	5529	2939	4562	1565	10973	4077	1680	1902	2873	6295	4478	2977	16787

Note: ***p<.01; **p<.05; * p<.1. Marginal effects reported in the table are to be compared to model M3 in Table 2, i.e. they include all controls. All outcomes are dichotomous with 1 indicating poor health and 0 good health. Because childlessness is also a dichotomous variable, marginal effects have to be interpreted as differences in terms of percentage points in the probability to report bad health conditions. MEs highlighted in light blue were statistically significant in Table 2. MEs highlighted in brown were not statistically significant in Table 2. Unweighted sample sizes are the same as in Table 2.