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Convergence and persistent contrasts in the determinants of working-age women in Sweden and Japan living alone since the 1990s

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Abstract

The increase in one-person households (OPHs) in the developed world is often seen as the result of a trend in which individualistic values and behaviors are replacing family solidarity. Nordic countries have been identified as frontrunners in this development. In Asia, equally developed countries like Japan retain elements of a strong-family system and an asymmetrical gender regime, simultaneously as they are experiencing rapid increases in OPHs. This article aims to uncover how the demographic and socioeconomic composition of OPHs have developed since the 1990s among working-age women in Sweden and Japan. Our results show that, in particular, civil status and income play different roles for OPH-living in Sweden and Japan. In contrast to Japan, the level of OPHs remained stable over time in Sweden, and even declined among women with high incomes. This suggests that the negative association between family formation and women's economic activity is temporary and only prevails as long as society has not adapted to the convergence of men's and women's socioeconomic roles. The findings are discussed in light of the "second demographic transition" and "dual equilibrium theory".

Keywords: One-person households, Single living, Gender, Family systems, Sweden, Japan

Introduction

One of the most distinct demographic trends in Western societies during the last 50 years is the increase in the proportion of one-person households (OPHs) (Klinenberg, 2012; Esteve et al., 2020; Sandström & Karlsson, 2019). We know that living alone is a risk factor for the health and well-being of individuals (see e.g., Brändström & Sandström, 2022; Lamidi & Nash, 2022; Raymo, 2015; Hughes & Waite, 2002), but the extent to which families work to provide risk pooling and social and economic security for adults varies across developed societies. Previous research on OPHs has shown that there is geographical variation in both the incidence and characteristics of OPHs that is related to social and cultural features that have typically been explained by longstanding

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historical path dependencies in different societies. These historical traits are clear in Europe, where some countries are characterized by individualistic and weak-family systems and others by stronger family interdependence (Reher, 1998). Previous studies have shown that population characteristics explain only a small part of the differences in the prevalence of OPHs, while behaviors account for the larger proportion of the variation (Padyab et al., 2019).

Sweden has been characterized as a frontrunner in the so-called Second Demographic Transition (SDT), in which secular individualistic values have increased in significance and family ties and conjugal reciprocities have become less critical (Esping-Andersen, 1999; Lesthaeghe, 2010; Ohlsson-Wijk et al., 2020). The fact that living alone is the arrangement that makes the greatest demands on individual self-sufficiency arguably makes OPHs a central indicator for the value changes associated with the SDT, and therefore it would be wrong to regard the increase in OPHs as a mere reflection of changing trends in marriage, divorce and cohabitation. Since the 1990s, Sweden has also exhibited one of the highest proportions of OPHs in the developed world (OECD, 2016). But the share of OPHs is also increasing rapidly in societies where the role of the family is still very important, such as in Southern Europe (Reher & Requena, 2017), and particularly in Asia's most developed nations (Yeung & Cheung, 2015).

Japan has the highest proportion of OPHs in Asia, and this proportion across the total population increased from approximately every fifth household in 1990 to every third household in 2010 (Raymo, 2015). Given the different roles played by family support in different developed societies, a comparative viewpoint is essential for understanding the causes and consequences of a growing proportion of individuals living alone. Most systematic work has focused on Europe and North America. To the best of our knowledge, no comparative studies have been conducted on potential differences in the temporal development in the characteristics of OPHs between weak-family countries in Europe, with a long history of high rates of OPHs, and strong-family Asian countries.

The reshaping of Western societies into modern market economies has meant that women's economic roles have changed to a greater extent than men's (Blossfeld & Kiernan, 1995). However, the degree of change is not uniform and varies across different societies (World Economic Forum, 2018). The extent to which women's roles have become more symmetrical with men's is important because theoretical models in economics, sociology, and demography identify changes in women's socioeconomic status and integration into market processes outside of the family as one of the main determinants of changes in family behavior (see e.g., Becker, 1991; Beck & Beck-Gernsheim, 1995; Giddens, 1992; Lesthaeghe, 2010).

However, the majority of prior research has focused on changes in OPH-living in young adulthood and old age, and knowledge is limited about the significant increase of OPH-living among women of working age (30–64 years), which is the age-span when gainful employment peaks during the life-course (Demey et al., 2013). In addition, changes in the incidence of OPHs in mid-life and their socioeconomic status is of great importance for policymakers in welfare states that take on extensive responsibility for the care needs of the elderly. The main reason for this is that being an OPH in later midlife is a powerful determinant of living arrangements in old age (Demey et al., 2013). Of all the men and women in Sweden who entered retirement age (age 65+) during the

period 2011–2018 and lived alone in 2011, 86% were still living by themselves in 2018 (calculations based on Swedish register data). This is important because we know that being an OPH or having low socioeconomic status are both positive determinants of care consumption among those aged 65+ (Brändström & Sandström, 2022; Hughes & Waite, 2002). Consequently, higher rates of OPHs translate into increased needs for care, especially if OPH-living increases among low-SES individuals. This motivates a focus on OPHs and their socioeconomic status.

By using register data covering the entire working-age female population of Sweden, and a comparable nationally representative sample for Japan, this study is the first longitudinal analysis of the impact of women's demographic and socioeconomic characteristics on the probability of being an OPH in Sweden and Japan since the 1990s. Both countries are highly developed and economically comparable, but display significant disparities in culture, family systems, and gender regimes. Japan is an Asian society with a strong-family system, but with rapidly increasing levels of OPHs in recent decades (Raymo, 2015), while Sweden is an individualistic and weak-family society typical of Northern Europe, with high but stable levels of OPHs in recent decades.

Conceptual framework—second demographic transition and dual equilibrium theory

The role of the family in developed countries has undergone radical changes since the 1960s, with reductions in fertility to levels well below replacement, postponement of family formation, decreased marriage rates, a higher proportion of couples living outside of wedlock, increased union instability, and an increased share of OPHs. This shift in family dynamics has been labeled the Second Demographic Transition (Lesthaeghe, 2020; Lesthaeghe & Van de Kaa, 1986). The central tenet of SDT theory is that, when economic development reaches a sufficient threshold, individuals can prioritize the fulfillment of higher-order needs, such as self-actualization, because their access to basic material necessities is guaranteed. This results in a shift in values towards secular individualism and support for gender equality. Consequently, the economic functions of conjugal relationships become less important, and unions are primarily formed and sustained to the extent that the relationship can provide emotional returns. Women with high levels of education who are active in the labor market are regarded as the frontrunners in this process (Lesthaeghe, 2010). The end result is thought to be a reduction in the returns from marriage and family formation due to the reduced potential for specialization and trading of market and non-market skills within unions (Becker, 1991; Becker et al., 1977). This increase in individual autonomy results in a permanent reduction in conjugal solidarity, intergenerational support, and interdependence between family members, which explains the trend towards "less family" in Western societies since the 1960s (Beck & Beck-Gernsheim, 1995; Giddens, 1992; Lesthaeghe, 2010). These theoretical presuppositions are supported by research on how female human capital was related to family outcomes up until the 1980s in the West. This research showed that high levels of female income and education tended to be negatively associated with nuptiality, fertility, and union stability during conditions when female labor-force participation was moderate to low, but increasing (see e.g., Brewster & Rindfuss, 2000; Espenshade, 1985; Ruggles, 1997; Sandström, 2012).

However, in order to explain the fact that the association between women's socioeconomic status and family outcomes has tended to become less negative over time, and has even shifted from negative to positive in countries exhibiting high levels of institutional and cultural gender equality, such as Sweden (for a review see Esping-Andersen, 2016), a number of different scholars in the field of demography and sociology have argued that women's integration into market processes outside the family does not necessarily represent a new demographic equilibrium characterized by a persistent state of low fertility and unstable relationships (Arpino et al., 2015; Esping-Andersen, 2009; Esping-Andersen & Billari, 2015; Goldscheider et al., 2015; McDonald, 2000). Rather, it has been suggested that the tendency for highly educated women in particular to retreat from parenting and partnering is a transitional stage experienced by societies in which a majority of women have become economically self-sufficient, but where norms in the labor market and political sphere regarding gender equity have not yet adapted in a way that facilitates the economic activity of women who choose to form families, and men in the private sphere have not yet accepted a more symmetrical division of domestic work. Similar arguments have been put forward by economists such as Doepke et al. (2022), who argue that the reversal in the income gradient of fertility among women in some highly developed countries in Northern Europe must be understood as the result of more generous family policies, cooperative fathers, and flexible labor markets that work to reduce the opportunity cost of family formation for employed and career-oriented women. To summarize, these scholars argue that, when gender-egalitarian values reach a 'dominant normative status', the conditions that result in low fertility and high rates of singlehood among economically active women disappear. The most important indicators for this change are that the individual-level associations between family formation and women's education and income shift from a negative to a positive gradient. We will refer to this set of perspectives as dual equilibrium theory. This perspective predicts a U-shaped development over time between increased economic independence among women and family outcomes such as partnering, parenting, and union stability that change in tandem with the level of gender equality at a societal level.

SDT theory and dual equilibrium theory have different implications for the long-term development of levels of OPHs and how OPH-living among women is related to their socioeconomic status. Therefore, we will first give a brief background to the development of family dynamics and women's integration into market processes outside the family in Sweden and Japan.

Background—demographic regimes in contemporary Sweden and Japan

The changes associated with the SDT have moved at a different pace in the typical frontrunner societies in Northern Europe and the USA than in the laggards in Southern Europe and highly developed nations in East Asia. The frontrunners, most typically exemplified by the Nordic countries (Ohlsson-Wijk et al., 2020), are described as having a weak-family system (Reher, 1998), being more "de-familialized" and gender-egalitarian (Esping-Andersen, 1999), and having a more individualistic and post-materialist value system compared to the strong-family societies of Asia and Southern Europe (Inglehart, 1990; Lesthaeghe, 2020). In these latter contexts, the family typically still plays a much more profound role in the economic and social welfare of the individual, and the gender

regime is more asymmetrical, with higher proportions of non-employed women (Padyab et al., 2019; Raymo et al., 2015) than in the more individualistic cultures of the Nordic countries (Goldscheider et al., 2015; Stanfors & Goldscheider, 2017).

For many decades, Sweden, together with the other Nordic countries, has stood out as the society providing the strongest support for gender-egalitarianism in the world (Esping-Andersen, 2016; World Economic Forum, 2018). Sweden has consistently ranked highest in surveys measuring support for post-materialist values such as individual independence (World Economic Forum, 2018; World Value Survey, 2020). But studies have also shown that support for symmetrical gender roles has increased in Japan since the 1990s (Fukuda, 2016; UNDP, 2020), and that these value changes affect women more than men (Choe et al., 2014). However, after accounting for these changes, Japanese values regarding gender roles still stand out as some of the most traditional among countries with high levels of economic development and stable democracies (Welzel et al., 2002; World Economic Forum, 2018).

In both Sweden and Japan, economic restructuring since the Second World War has meant that women's socioeconomic status has become much more similar to men's. In Japan, the gender gap in education was closed in the late 1980s (Fukuda, 2016, p. 49), while in Sweden this change took place about 20 years earlier, during the 1960s (Stanfors, 2003, p. 77). Since the 1990s, Swedish women have surpassed men in their levels of education, and today 55% of women have university degrees compared to 41% of men (Statistics Sweden, 2020). In Sweden, the big increase in employment rates among married women and mothers started in the early 1960s, and since the 1980s women's employment rates have been more or less on a par with men's (Statistics Sweden, 2020). In Japan, female labor-force participation rates increased rapidly during the 1970s and 1980s, but then stalled at about 65% in the 1990s and has only started to increase from these levels during the last decade (Fukuda, 2016). Therefore, the labor-force participation rate of Swedish women aged 20–64 was still considerably higher (84%) than that of Japanese women (72%) in 2016 (OECD, 2022).

Despite its more pronounced emphasis on the role of the family, Japan has not evaded the typical features of the SDT, i.e., decreased family formation and less union stability (Fukuda, 2016; Lesthaeghe, 2020, pp. 25–27). Like the strong-family countries in southern Europe, Japan has experienced dramatic falls in fertility, and since the 1990s fertility rates have remained well below 1.5 children per woman (Atoh, 2008; Kohler et al., 2001; United Nations, 2019). Japan was the first non-Western country to complete the first demographic transition in the 1950s, with fertility reducing to replacement level of around 2.1 children per woman. After two decades of stable fertility. After the mid-1970s, total fertility declined consistently, reaching 1.29 children per woman in 2005, and has only recovered slightly to levels of around 1.4 since then (Cheng, 2020). In comparison, although total fertility has varied with the economic cycle since the baby-boom period, cohort fertility in the Nordic countries has remained close to replacement level fertility of two children per woman for all women born up until the mid-1970s (Jalovaara et al., 2018).

Apart from the very low levels of fertility, the sharp rise in the proportion of OPHs is perhaps the most dramatic expression of the demographic shift associated with the SDT. In typical weak-family societies like Sweden, Norway, Finland, and Denmark, more than

40% of households contained only one person in 2019 (Eurostat, 2021). However, the increase in OPHs that took off during the 1960s in these countries has been attenuated since the 1990s, and the level has remained practically unchanged, or even decreased slightly (Sandström et al., 2021).

Another change associated with the SDT in Japan is the sharp rise in divorce across marriage cohorts since the mid-1970s. The divorce rate has doubled among couples married in the mid-1990s compared to those married in the early 1980s (Raymo et al., 2004). Since the turn of the millennium, the divorce rates in Sweden and Japan have been on a par, hovering at 2–2.5 per 1000 inhabitants (Fukuda, 2016, p. 45).

But, even if Japan has been impacted by the value-changes associated with the SDT (Fukuda, 2016) it is also clear that Japan has not followed the typical Northern/Western development towards family nuclearization, and that Japanese society retains many stem-family behaviors and values (Kato, 2021; Kumagai, 2010). Intergenerational co-residence, where elderly parents share a household with their eldest child, remains popular. Studies in Japan show that, although the proportion of adult children co-residing with parents at marriage has declined, about 30% of married women who were born during the 1960s still shared their household with a parent 15 years after marriage (Kato, 2021). In this sense, there is insufficient evidence for an individualistic shift in Asian countries like Japan (Atoh, 2001; Atoh et al., 2004; Raymo et al., 2015). The trend towards "less family" can rather be understood as the result of rapid economic modernization, which has changed women's economic roles without a fundamental shift in the gender regime that allows women to reconcile conflicts between family formation and labor-market participation.

Even though Japan's demographic regime has been undergoing substantial changes and shares many traits with the weak-family societies in Northern Europe, the picture is multifaceted, revealing both continuity and change. Family dynamics and attitudes in Japan still exhibit sharp contrasts in some areas when compared to Sweden, which is a staunchly individualistic society. Even when parents and children live apart, family ties appear closer than in Western societies and support from children to parents is extensive (Nishioka, 2000). In comparison, Sweden has historically had one of the lowest levels of intergenerational co-residence in the world (Iacovou & Skew, 2011), and only 2.8% of those aged 80 + lived with their children in 2004 (Hank, 2007). However, this does not mean that support from children to parents is not extensive in Sweden. Several studies show that both daughters and sons in Sweden provide support to elderly parents and that 45% of those aged 65 + received care/help from their children in 2010 (Ulmanen & Szebehely, 2015).

Another important contrast between family dynamics in Sweden and Japan is that premarital cohabitation and non-marital childbearing is a majority behavior in Sweden, where more than half of all births have been out of wedlock among women born since the mid-1960s (Statistics Sweden, 2014, pp. 70–72). In comparison, the incidence of extramarital births is still exceedingly low in Japan, amounting to only 2% of all births in 2010 (Fukuda, 2016, p. 92). The main reason for the very low rates of out-of-wedlock childbearing in Japan is that cohabitation has not yet developed into an acceptable long-term alternative to marriage (Matsuda, 2020). Even though the proportion of 25- to 29-year-olds who have ever cohabited has tripled in Japan, from 3 to 12% since the

1980s, cohabitation typically remains a brief, transitional stage in the life-course before formal marriage (Fukuda, 2016, p. 46). Only about 2% of unmarried Japanese women aged 25–29 were cohabiting with a partner in 2010 (Raymo et al., 2015). In Sweden, 36% of women in the same age group lived in a cohabitational relationship in 2011 (Statistics Sweden, 2022b). The low cohabitation ratios of young unmarried individuals in Japan have been stressed as a contributing factor to the very low fertility rates (Atoh, 2008).

These persistent contrasts make a comparison of the demographic and socioeconomic status (SES) compositions of the OPH populations and their evolution over time between the two countries intriguing. In terms of the prevalence of OPHs, Japan has experienced marked increases, whereas Sweden has remained virtually stable during the last three decades. Have these changes meant that Japan is becoming more like Sweden in terms of the characteristics of those who live alone? Or is Japan following a different path that results in persistent contrasts between Sweden and Japan?

Given these differences in gender regime, welfare state, and family system between the two countries, and the fact that Sweden entered the Second Demographic Transition much earlier than Japan and has had a longer time to adapt to the increased economic independence of women, we expect that, in particular, the development of how women's SES is related to the probability of being an OPH will differ between the two countries. If the predictions stated in the dual equilibrium framework are correct, we expect a distinctly positive association between SES and OPH status in Japan. This would be the expected pattern, given that changes in women's economic roles is of a much more recent date in Japan than in Sweden, and that the gender regime is still highly asymmetrical. In comparison, we expect the positive gradient to have weakened since the 1990s in Sweden, or even reversed, given that rates of OPHs have been high for a long time and that the gender regime is much more symmetrical than in Japan.

Data and method

Given the theoretical presuppositions, our main focus was directed toward inter-country disparities in the association between income and education, which function as key indicators of an individual's socioeconomic status, and the probability of being an OPH. This investigation also took into account the differences in a set of sociodemographic control variables, including age, civil status, parental status, rural–urban context, and sector of employment.

Data

The study focus on women aged 30–64 years, based on the assumption that the majority of these have completed their education and established themselves in the labor market at this stage of the life-course. The dataset used for the analysis included microdata from both countries consisting of register data covering the entire population of Sweden for the years 1990, 2011, and 2016 and the Comprehensive Survey of Living Conditions (CSLC) in Japan for the years 1989, 2001, 2011, and 2016. All the datasets for Sweden were based on the administrative population registers from Statistics Sweden, which contain annual information on household composition based on the Swedish dwelling register (Statistics Sweden, 2013), the Population and Housing Census of 1990 (Statistics Sweden, 1992), and complete fertility histories based on the multi-generation registers

(Statistics Sweden, 2011). We do not provide any estimates for the year 2000 for Sweden because there is no register-based dwelling information for the period between the last traditional census taken in Sweden in 1990 and 2011, which is when the new dwelling register came online. Information about income, occupational status, and education was drawn from the integrated database for labor-market research (Statistics Sweden, 2019). From an initial total of 6,107,312 observations, 47,484 were excluded due to missing values for some variables or not living in a private dwelling. We eventually constructed a dataset consisting of 6,024,013 observations, representing 3,558,960 unique individuals in Sweden.

The Japanese dataset CSLC is a nationally representative, repeated cross-sectional survey of the non-institutionalized population in Japan. CLSC has been conducted once every three years since 1986 by the Ministry of Health, Labor, and Welfare (MHLW, 2021). It contains four questionnaires regarding health information, household structure, income statistics, and long-term care utilization. The health and household questionnaires cover a random sample of the entire population, with 600,000–800,000 respondents in each survey year. The income questionnaire randomly selects 10% of the full sample to collect income information. We extracted data for the years 1989, 2010, and 2016 in accordance with the Swedish data points. We further added data for the year 2001 to trace the evolution of OPHs in Japan more precisely, at 10-year intervals. Of an initial total of 154,056 women, we eliminated 27,718 cases with missing information for one or more variables of interest, and thus ended up with a sample of 126,338 women in Japan. Previous studies have shown that the Japanese dataset is nationally representative regarding the relevant demographic and socioeconomic characteristics (Shibuya et al., 2002).

Variables

We harmonized the variables to ensure comparability. The dependent variable was based on the living arrangements of individuals as a straightforward binary variable: living alone or living with others.

Age was recoded into a five-year interval categorical variable, and the sample was categorized by civil status (never married, married, divorced, or widowed), parental status (childless women versus mothers), income tertiles (low, middle, and high), and level of education (compulsory or less, secondary, university or above) based on the International Standard Classification of Education. The place of residence (rural versus urban) was recorded, where urban is defined in Japan as regions with more than 50,000 inhabitants. For Sweden, the classification of urban and rural areas is based on the division of municipalities in the Swedish Association of Local Authorities and Regions, divided into a total of nine groups based on structural parameters, such as population, economic structure, and commuting patterns (Ålhvik & Gillingsjö, 2016). These classifications are: (1) metropolitan (Stockholm, Göteborg, Malmö), (2) larger cities, (3) suburban, metropolitan, (4) suburban, larger cities, (5) commuter municipalities, (6) small towns, (7) commuter municipalities near small towns, (8) municipalities in sparsely populated regions, and (9) municipalities in sparsely populated regions with tourism and amenity industries. The first four categories are considered urban areas, while categories 5–9 are designated rural.

Occupational status with seven categories was defined based on Swedish Standard Classification of Occupations codes and Japanese Standard Classification of Occupations codes. Both are based on the international ISCO classification system for occupations. This variable was used as a control variable and incudes a separate category for women who are not employed.

Statistical analysis

Because the dependent variable was binary, we used logistic regression to estimate the odds ratio of living alone dependent upon individual-level characteristics. In addition to odds ratios, we also estimated predicted probabilities in the form of average marginal effects (Long & Mustillo, 2021) for the relevant theoretical variables.

Parental status and level of education were unavailable in Japan until 2010. Therefore, we estimated logistic models for each year that were restricted to the variables available in both countries for the entire period of 1989–2016, in order to generate strictly comparable results between the two countries regarding temporal development. The second set of adjustments were made by adding parental status and level of education, which applied only to the year 2016. All estimates were performed using Stata version 17 (StataCorp, College Station TX).

Results

Table 1 shows the descriptive statistics for all variables included in the analysis. The proportion of women living alone has remained steady at about 13% in Sweden, whereas it increased by 1.5% over the period in question in Japan, from 3.6 to 5.2%. Despite the fact that few women of working age live in OPHs in Japan, we find considerable changes over time in the individual-level determinants of OPHs, especially in Japan. The age structure did not change very much in Sweden during the study period, but the Japanese population aged to a greater extent. In both countries, the proportions of never-married or divorced women increased substantially over time, while the proportion of married women decreased. The proportion of women living in urban areas increased in both countries, and the distribution of income became more even after 1989/90. But income differences remained much more salient in Japan than in Sweden, as in 2016 more than half of Japanese women were in the lowest income group while this figure was only 23% among Swedish women. The majority of women in both countries had children. Women's education reflects the different gender regimes in the two countries, with the proportion of university-educated women being higher in Sweden, although the proportion increased by 6% in Japan between 2010 and 2016.

Table 2 shows the unadjusted proportions of OPHs by demographic and socioeconomic status of women. In both countries, the proportion of OPHs increase as women age. In Japan increases since the 1990s have primarily occurred among women in the age-span 30–54. In Sweden the proportion of OPHs have declined, primarily among women in the age span 45–64.

In terms of the likelihood of living in an OPH by civil status, in the 1990s the two countries displayed distinct patterns of OPHs among widows. More than 60% of widows in Sweden lived alone, while only 23% of widows in Japan did so. Since then, the countries have moved in opposite directions, with an increase in the proportion of

Table 1 Distribution () of demographic and socioeconomic characteristics of women in Sweden and Japan

	Japan				Sweden		
	1989 (%)	**2001 (%)**	**2010 (%)**	**2016 (%)**	**1990 (%)**	**2011 (%)**	**2016 (%)**
Living arrangement							
Living with others	96.4	95.0	94.6	94.8	86.2	86.8	86.6
Alone	3.6	5.0	5.4	5.2	13.8	13.2	13.4
Age group							
30–34	12.9	12.7	11.4	10.6	15.1	13.3	14.1
35–39	16.3	12.5	13.7	12.4	15.5	14.5	13.9
40–44	16.5	13.0	13.7	15.3	17.4	15.1	14.8
45–49	15.3	14.3	12.9	14.8	16.2	15.5	15.2
50–54	13.9	18.4	13.3	14.3	12.5	13.7	15.3
55–59	12.9	14.3	16.4	14.8	11.4	13.6	13.5
60–64	12.1	14.7	18.7	17.7	11.9	14.3	13.1
Civil status							
Never married	4.7	8.3	12.0	14.2	15.7	30.1	31.6
Married	86.2	81.4	78.0	75.6	66.6	52.2	51.2
Divorced	3.5	5.6	6.7	7.5	13.8	15.9	15.7
Widowed	5.6	4.7	3.3	2.7	4.0	1.8	1.6
Place of residence							
Rural	35.0	39.5	23.0	22.9	36.7	32.3	30.9
Urban	65.0	60.5	77.0	77.1	63.3	67.7	69.1
Income							
Low (p1–32)	59.0	54.2	51.5	50.2	31.1	24.3	23.1
Middle (p33–65)	33.3	35.6	35.9	36.7	44.4	44.7	43.2
High (p66–100)	7.7	10.2	12.6	13.1	24.5	31.0	33.7
Parental status							
Childless			21.7	23.7	13.7	16.2	17.1
Parent			78.3	76.3	86.3	83.8	82.9
Education							
Compulsory or less			8.5	4.6	35.0	12.2	10.5
Secondary			61.9	60.0	43.1	49.4	47.1
University and above			29.6	35.4	21.9	38.4	42.4
Occupational status							
Not working	49.8	39.2	36.9	31.0	16.8	9.7	21.2
Senior managers	1.5	1.7	1.2	1.4	2.1	4.2	4.8
Professionals	4.9	10.1	14.8	17.0	23.9	38.1	35.2
Clerks	9.0	12.7	15.2	18.0	15.6	10.5	8.1
Service workers	15.4	20.9	21.3	22.4	22.3	26.6	23.1
Skilled agricultural	5.2	3.6	2.4	2.0	1.2	0.6	0.6
Craft workers	14.1	11.8	8.1	8.3	18.1	10.3	7.1
N	30,029	19,185	16,087	13,718	1,832,938	2,079,162	2,111,913

Source: Comprehensive Survey of Living Conditions (CSLC) for Japan wave 1989, 2001, 2011, and 2016. Statistics Sweden (SCB), Population registers 1990, 2011, and 2016

OPHs among widows in Japan and a decrease in Sweden, bringing the two countries closer together. On the other hand, both countries declined in OPHs among never-married women. Both countries had a higher proportion of OPHs among women in urban areas in 1990. Since then, the proportion of OPHs has increased in rural areas

Table 2 Proportion of women living alone by demographic and socioeconomic characteristics in Sweden and Japan

Variables	Japan				Sweden		
	1989 (%)	2001 (%)	2010 (%)	2016 (%)	1990 (%)	2011 (%)	2016 (%)
Age group							
30–34	1.9	3.6	3.9	3.6	11.8	11.3	11.6
35–39	1.4	2.4	3.4	2.6	8.0	8.1	8.4
40–44	1.8	2.7	2.9	3.7	8.2	7.7	7.9
45–49	2.8	3.9	4.4	5.1	11.4	9.9	9.8
50–54	3.8	4.2	5.2	5.5	16.0	14.0	14.0
55–59	6.3	6.9	6.6	6.8	20.6	19.2	19.3
60–64	8.8	10.6	9.4	8.0	26.5	23.5	24.0
Civil status							
Never married	27.0	21.8	18.6	18.0	35.0	23.6	24.0
Married	0.1	0.3	0.6	0.4	1.1	1.0	1.1
Divorced	24.4	27.1	25.2	19.8	37.0	30.0	29.0
Widowed	23.8	30.0	31.3	31.9	60.4	47.2	41.8
Place of residence							
Rural	2.8	3.2	4.6	3.8	10.5	11.6	12.2
Urban	4.0	6.1	5.6	5.7	15.6	14.0	13.9
Income							
Low (p1–32)	0.7	1.3	1.5	1.5	9.4	15.5	16.1
Middle (p33–65)	7.4	8.9	8.9	8.6	12.9	12.1	12.7
High (p66–100)	9.1	10.9	11.3	10.1	21.0	13.0	12.3
Parental status							
Childless			14.3	14.1	43.3	37.3	36.7
Parent			2.8	2.4	9.0	8.5	8.4
Education							
Compulsory or less			8.8	8.1	14.7	16.3	15.8
Secondary			5.2	5.1	13.1	13.4	14.2
University and above			4.5	4.8	13.9	12.1	11.9
Occupational status							
Not working	2.3	3.2	3.5	3.4	18.6	17.8	17.0
Senior managers	7.5	6.1	9.1	9.1	13.4	10.1	9.7
Professionals	5.6	7.5	7.5	6.6	14.0	12.3	12.0
Clerks	5.9	5.9	6.0	5.2	14.2	14.2	13.9
Service workers	5.9	6.8	6.7	6.3	11.4	12.5	12.4
Skilled agricultural	2.0	2.3	2.6	1.1	4.8	13.3	14.1
Craft workers	3.3	5.1	5.1	6.4	12.1	14.2	13.4

Source: Comprehensive Survey of Living Conditions (CSLC) for Japan wave 1989, 2001, 2011, and 2016. Statistics Sweden (SCB), Population registers 1990, 2011, and 2016

in Japan, and even more so in urban areas, while in Sweden it has decreased in urban areas and increased in rural areas.

Both countries showed a positive income gradient in OPH-living in 1990. What stands out is the exceptionally low rate of OPHs in the lowest income group in Japan, which was less than 1% in 1989, compared to approximately one-ninth of low-income Swedish women in 1990. The positive gradient in Japan has remained stable over time, whereas in Sweden there has been a steep decline in the positive association between income and OPH-living. In fact, since 2011 we find the highest proportions of OPHs

among women in the lowest income group. The proportion of OPHs among high-income Japanese women remained stable at approximately 10%, whereas in Sweden it dropped precipitously, from 21 in 1990 to 12% in 2016.

In both countries, women who had children were less likely to live alone than childless women, and women with higher levels of education were less likely to live alone than those with only a Compulsory education.

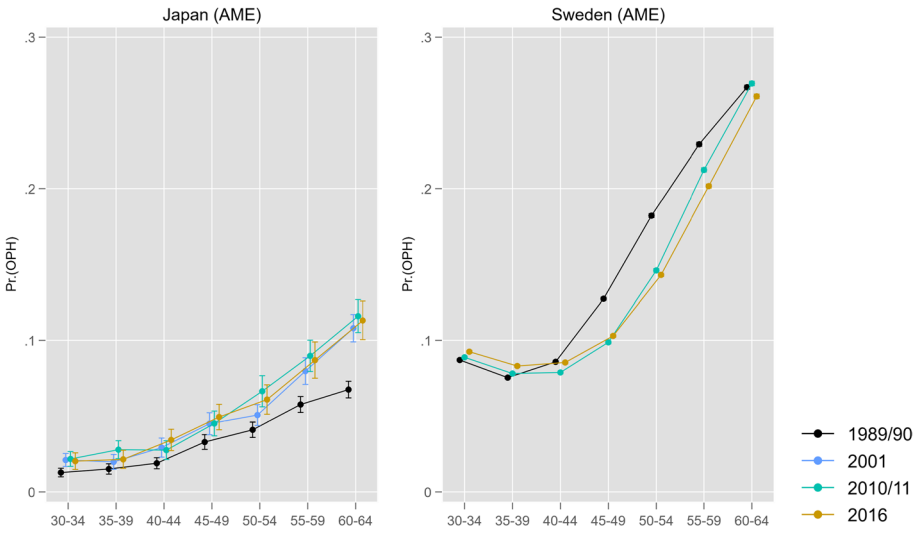
Figures 1, 2, 3, 4 and 5 show the net probability of OPH-living in the form of average marginal effects (AMEs) after adjusting for compositional differences in the individual characteristics of women in each country.

Age

Figure 1 presents the probability of OPH-living across different age-groups. When we account for compositional differences across different age-groups, the positive age gradient in Japan has grown over time. This growth was especially evident among women of upper middle age. For instance, in 1989, the probability of living alone among Japanese women aged 60–64 was approximately 0.07, but by 2016 this has increased to approximately 0.12.

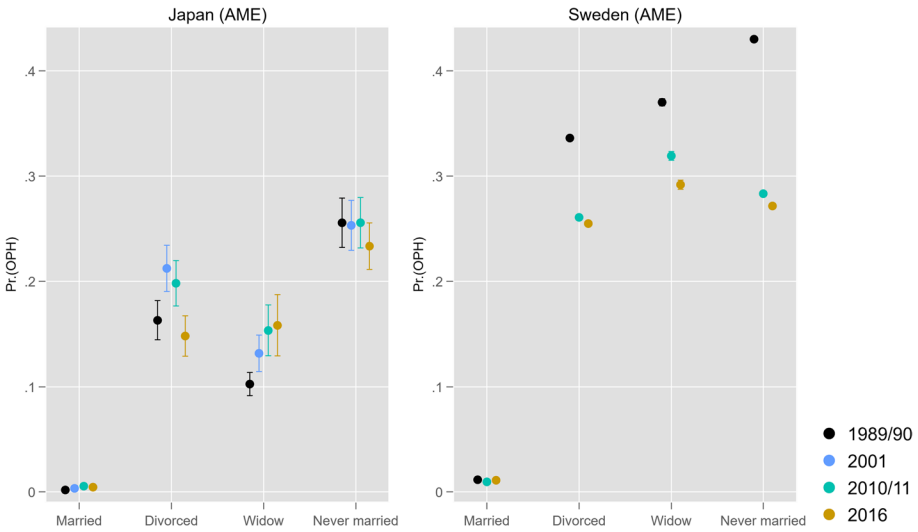
In contrast, the positive age gradient in Sweden has weakened since the 1990s. Adjusted results indicate that the reduced probability of OPH-living was concentrated among women aged 40–54. For instance, the probability of OPHs among Swedish women aged 50–54 was 0.18 in 1990, which decreased to 0.14 in 2016.

Japanese women were less likely to live alone than their Swedish counterparts, regardless of year or age. In particular, the highest probability of OPHs in Japan was only slightly over 0.1 (that of those aged 60–64), while the probability in Sweden was more than twice as high (0.26) in the same age-group.



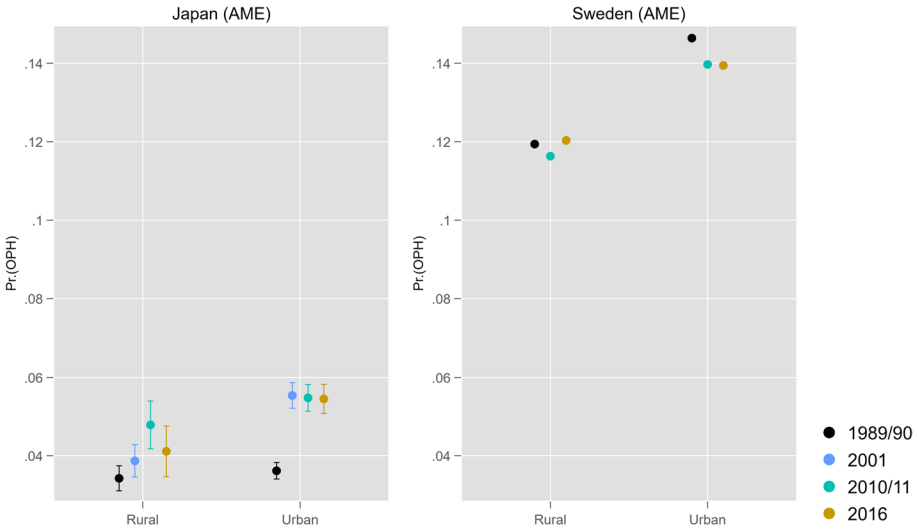
Note: Full models for each survey year and country are found in Table A1 of the appendix and includes controls for: *age, urban-rural context, civil status, income and occupational status*.

Fig. 1 Probability (AMEs) of living alone among women in Sweden and Japan 1989–2016 by age group



Note: Full models for each survey year and country are found in Table A1 of the appendix and includes controls for: *age, urban-rural context, civil status, income and occupational status.*

Fig. 2 Probability (AMEs) of living alone among women in Sweden and Japan 1989–2016 by civil status



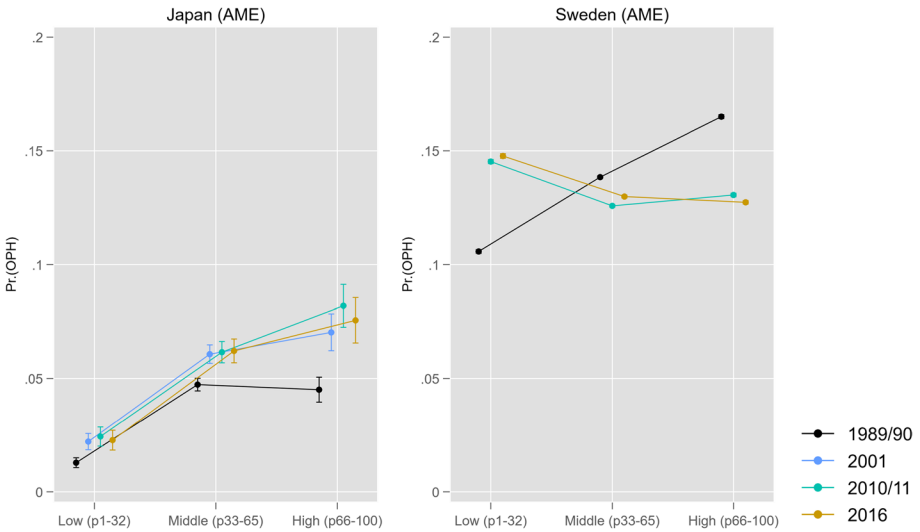
Note: Full models for each survey year and country are found in Table A1 of the appendix and includes controls for: *age, urban-rural context, civil status, income and occupational status.*

Fig. 3 Probability (AMEs) of living alone among women in Sweden and Japan 1989–2016 by urban and rural context

Civil status

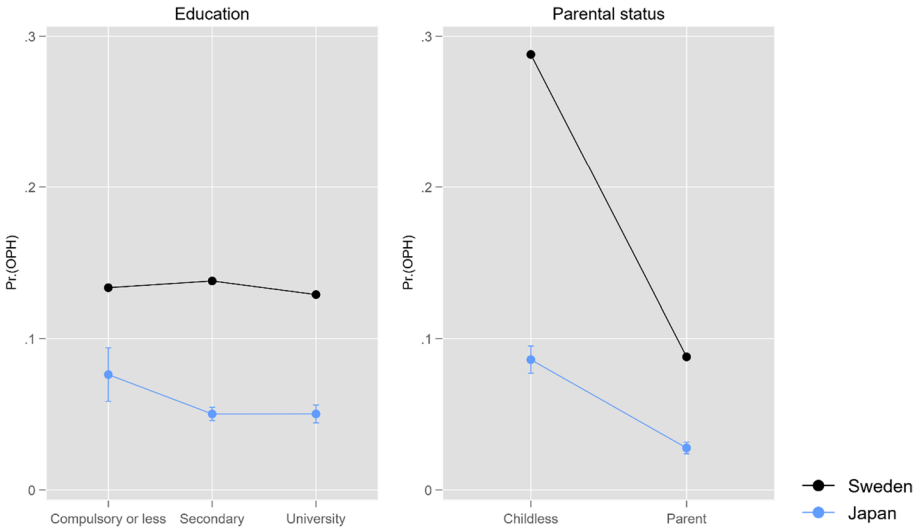
In both countries, the probability of OPHs among married women was in practice zero, and exhibited only minor variation over time. Regarding the other civil statuses, however, there were significant disparities between the two countries.

In Sweden, the prevalence of OPHs decreased among divorced, widowed, and never-married women after 1990. Particularly notable was the decrease between 1990 and 2011. In Japan, however, the time pattern of OPHs varied by civil status. After 1989, the



Note: Full models for each survey year and country are found in Table A1 of the appendix and includes controls for: *age, urban-rural context, civil status, income and occupational status.*

Fig. 4 Probability (AMEs) of living alone among women in Sweden and Japan 1989–2016 by income level



Note: Full models for 2016 is found in Table A1 of the appendix and includes controls for: *age, urban-rural context, civil status, income, occupational status and education/parental status.*

Fig. 5 Probability (AMEs) of living alone among women in Sweden and Japan in 2016 by education and parental status

prevalence of OPHs among divorced Japanese women had increased by 2001, but then declined again and by 2016 it had returned to approximately the same level as in 1989. For widows, the probability of being an OPH increased steadily after 1989. Those who had never married revealed only a moderate decline in the likelihood of living alone, which is markedly less than the magnitude suggested by the unadjusted rates in Table 2, which do not account for compositional differences. The major difference between the countries is that in Sweden all non-married women showed a decline in the probability

of being an OPH, while the only major change in Japan was the increased probability of living as an OPH among windows.

Place of residence

Changes in the average marginal probability of being an OPH across urban and rural areas show that, when we adjust for compositional differences, Japan had practically no urban–rural gradient in 1989, but that geographical differences increased over time, driven by more substantial increases in probabilities in urban areas compared to rural ones.

In contrast, urban–rural differences have declined slightly in Sweden, but geographical disparities in the probability of being an OPH was and continued to be small in both societies compared to the other determinants included in the analysis.

Income

The change in the adjusted probability of being an OPH across income groups, as shown in Fig. 4, is by far the most striking difference between the two countries. When we adjust for compositional differences across income groups, we find a clearly positive association in both Sweden and Japan in 1989/1990. In Japan, the positive gradient increased in strength, especially between 1989 and 2001, with by far the largest increases in probability occurring among high-income women, while increases among mid- and low-income women was marginal. After 2001, the positive gradient remained virtually unchanged. In contrast, the income gradient in Sweden completely transformed, from clearly positive in 1990 to clearly negative in 2016. Thus, we find a change over time whereby Sweden and Japan have diverged from one another. As in 1989, high-income women were still the most likely to live alone in Japan in 2016, while Sweden in 2016 shows the opposite pattern, with the lowest probabilities among women with the highest incomes.

Parental status and education

Since parental status and education information only became available in the Japanese survey after 2010, we estimated separate models for 2016, where we can assess the association between OPH status and these additional indicators (see model 2016 B in Additional file 1 for the full regression table). This depicts how the probability of being an OPH in contemporary Sweden and Japan varies across these two additional indicators.

Not surprisingly, parental status is a strong predictor of living with others in both countries (Fig. 5). Having children decreased the probability of living in an OPH in Sweden more than in Japan. Swedish mothers were approximately one-third as likely to live alone as those without children, whereas Japanese mothers were approximately half as likely to do so.

Lastly, when we control for the additional variables we have for 2016, including income, and estimate the probability of living in an OPH for women with different levels of education, we find no practically relevant association in Sweden, and a weakly negative gradient in Japan. Interestingly, education plays the opposite role to income in Japan. This shows that the socioeconomic gradient in Japan today is not uniformly positive, but rather that it depends on which dimension of socioeconomic status we consider. When

we include education in our models, the positive gradient of income remains essentially unchanged. In both countries, however, it is clear that income differences are a much more important determinant for OPH status than education, as differences across income levels were more substantial in both countries.

Concluding discussion

The aim of this study was to explore how women's demographic and socioeconomic characteristics have impacted the probability of living in an OPH among working-age women (30–64) in Sweden and Japan since 1989/1990. The growth in OPHs in Japan and the stability in Sweden has worked to reduce the differences in the rates of women who live alone in the two countries. In terms of the kind of women who live alone, we find a tendency towards greater similarity in terms of age-patterns and regional differences, while persistent contrasts remain in the effects of civil status and, especially, income.

The proportion of OPHs in the age span 15 + more than doubled in Sweden between 1960 (9.1%) and 1990 (21.8%) (Sandstedt, 1991; Statistics Sweden, 1992). Since then, the rate has stabilized and even declined marginally, but the proportion of the population living alone is still one of the highest in the world. In Japan, the proportion of OPHs started to increase substantially after 1989, and by 2011 Japan had joined Sweden in the group of countries with a higher proportion of OPHs than the OECD average (OECD, 2016). However, even with the recent increases in Japan, OPHs are still much more common in Sweden, where 21.5% of all individuals lived as an OPH in 2015, compared to 15.8% in Japan (NIPSSR, 2023; Statistics Sweden, 2022a).

In both countries, urban women show higher rates of OPHs. In Japan, the proportion of OPHs has increased in all age groups, whereas in Sweden it declined substantially among 45- to 59-year-olds and remained stable among 30- to 44-year-olds, showing a weakening age gradient in Sweden. So even if probabilities are still lower in Japan, the increase among older women in Japan and the corresponding declines in Sweden have resulted in a tendency for a more similar association between age and being an OPH in the two countries.

For other characteristics, such as civil status and, in particular, income levels, these factors continue to play quite different roles for OPH-living among economically active women in Japan compared to the situation in Sweden. The general increase in OPHs among working-age women in Japan is related to the rise in never-married women and childlessness since 1989. Since then, Japan has experienced a sharp decline in partnering and an increase in the postponement of family formation (Raymo et al. 2021). We find that the proportion of never-married women aged 30–64 has approximately tripled since 1989 (Table 1). According to the literature, total fertility has also fallen from an already low level of 1.6 children per woman in the 1990s to 1.43 in 2016 (Human Fertility Database, 2022). Childlessness has more than doubled, rising from 12% of Japanese women born in 1955 to 27% of those born in 1975 (Sobotka, 2021). In comparison, lifelong childlessness among Swedish women has remained stable at approximately 14% across the cohorts born during the period 1955–1974 (Jalovaara et al., 2018). Although we find slightly higher levels of childlessness in Sweden in 2016 (17%) than in 1990 (13%), it is still markedly lower than the rate of 24% among all women aged 30–64 in Japan. In sum, the declines in partnering among women in Japan help to explain why

increases in OPHs have been large in Japan and why there is a lack of such tendencies in the same age groups in Sweden.

In comparison, continued declines in marriage rates in Sweden have not translated into an increased proportion of OPHs. Rather, the results show how the deinstitutionalization of marriage (Cherlin, 2004) has continued to evolve since 1990. Probabilities of OPH-living have declined sharply among never-married women, but also among the divorced and widows, showing that cohabitation is becoming a preferred living arrangement for an increasing proportion of non-married Swedish women. This is still not the case in Japan. Despite the fact that cohabitation has become more common since the 1990s, it is still far from the situation in Sweden. We find only insignificant declines in the probability of living in an OPH among never-married and divorced women in Japan, and the only significant change across civil status is an increased probability of living alone among widows. In Sweden, cohabitation prior to marriage was already a practically universal behavior in the 1990s (Duvander, 1999), and since then has increased further in significance as the proportion of never-married women has continued to increase (Table 1). The importance of cohabitation in contemporary Sweden is illustrated by the fact that 42% of non-married, working-age women lived in a cohabitational relationship in 2016 (Statistics Sweden, 2022a). Remarriage rates among divorced women have also declined by approximately 40% since the 1990s (Andersson & Kolk, 2015). At the same time, 69% of women born during the period 1950–1965 had formed a new union within 10 years of a divorce. This rate of re-partnering after divorce was the highest found across 10 different European countries (Gałęzewska et al., 2017). This illustrates that most of the higher-order unions in Sweden today are in the form of cohabitation, and few of them transform into marriages.

Among widows, the probabilities of OPH-living in Sweden and Japan are becoming more similar over time, due to the probabilities decreasing in Sweden and increasing in Japan. Although we are unaware of any exact calculations of changes in the re-partnering behavior of widows in Sweden during the last few decades, the causes of the declining proportion of OPHs among widows in Sweden since the 1990s are likely to be the same as those for divorced women, in terms of high rates of re-partnering in the form of cohabitation rather than marriage. In Japan, the increased proportion of OPHs among widows is likely to have been caused by several processes. It is known that the incidence of intergenerational co-residence in Japan has declined precipitously, from 14.2% of all households in 1990 to 5.8% in 2016 (MHLW, 2021). Studies show that values favoring independence among the elderly have increased in significance during our study period, and that attitudes towards filial care have become markedly more negative (Atoh, 2001; Fukuda, 2016). The proportion of Japanese women who agreed with the statement that caring for elderly parents is a "natural duty" decreased from 57% in the late 1980s to 31% around the turn of the new millennium. Meanwhile, only 11% considered intergenerational support to be a "good custom" (Fukuda, 2016, p. 52).

Although we find a tendency towards convergence in the ways in which age and widowhood matter for the probability of living as an OPH since 1989/90, persistent contrasts remain when we look at the impact of income and education in the two countries. When focusing on income, Japan still exhibits the typical SDT trait that women with high levels of economic resources are leading the shift towards "less" family, in terms of

either being constrained, or choosing, to live alone to a greater extent than low-income women. This relationship persists even when we control for other demographic and socioeconomic factors that might act as confounders to the relationship.

In Sweden, we find a positive income gradient in OPH-living in 1990, which had completely reversed by 2016. Taken in isolation, this change would be very surprising, but in the light of a number of recent studies on changes in the association between female education and income and, for example, divorce and childlessness in recent decades, these results are reasonable. In Sweden, the income and education gradient of several family outcomes for women born in the 1970s and 1980s has shifted from negative to positive. Specifically, high education/income has been shown to be negatively related to childlessness (Jalovaara et al., 2018) and divorce (Esping-Andersen, 2016), which is the opposite of the positive association found for these outcomes during the 1990s and earlier (Dribe & Smith, 2021; Sandström et al., 2014). Unlike Sweden, the positive income gradient in contemporary Japan remains strong, with the highest probabilities of living alone found among women in the highest income tertile in 2016. Among the socioeconomic indicators we included in the analysis, income was the most influential factor for differences in OPH-living in both Sweden and Japan. The idea that income is the strongest determinant is intuitive because income is a more immediate indicator of women's economic independence and career orientation than education or sector of employment.

These persistent contrasts in how female human capital and economic resources influence the probability of living alone among women in Sweden and Japan can probably be explained by the distinct differences in the gender regimes of the two countries. In the economic sphere, Japanese women of peak childbearing age (25–34 years) have made a giant leap in labor-force participation, from less than 50% in the early 1980s to over 80% in 2018 (Statistics Bureau of Japan, 2021). Their human capital accumulation is now on a par with that of men as the gender gap in education had already closed by the early 1990s (Fukuda, 2016, p. 49). These changes represent a sharp shift towards economic self-sufficiency and stronger career orientation among Japanese women. However, even though attitudes towards gender roles and the level of conjugal specialization in Japan are changing, they remain highly traditional in comparison to developed Western countries in general, and the Nordic countries in particular. While Sweden ranked as the third country in the world in the Global Gender Gap Report in 2018, Japan ranked 110th out of a total of 149 ranked countries (World Economic Forum, 2018). Although the exactness of such comparisons can be debated, the vast difference between the two countries illustrates that value changes, both in the labor market and among men, still have a long way to go in Japan in terms of reducing the constraints on family formation for economically active women. In addition to the general assessments of gender equality at the societal level, such as the Global Gender Gap index, studies on assortative mating show that expectations of female hypergamy remain strong in Japan (Fukuda et al., 2020), and that the gender regime surrounding the household division of labor is still one of the most asymmetrical in the developed world (Fuwa, 2004). Given the trade-offs imposed by the persistence of a rather traditional gender regime in Japan, it is not surprising that OPH-living still has a strong positive relationship with women's income levels in Japan.

The observation that cultural values have not yet adapted to the changed economic roles of women in Japan is potentially explained by the fact that increases in female

economic activity in Japan are of a much more recent date than in Sweden. In 1990, the beginning of our study period, Swedish women with children under the age of 16 had a labor-force participation rate of 89.9% (Stanfors, 2003), which at that time was in practice on a par with that of men aged 25–44 (Statistics Sweden, 2021a). During our study period, Sweden has consistently remained at the very top of evaluations of gender equality in the labor market, political institutions, and values expressed by men (Esping-Andersen, 2016). Time-use surveys also find that conjugal specialization between market and domestic work has declined sharply in Sweden since the 1970s. Although women still allocate more time to unpaid work than men, men contribute slightly more than 40% of total unpaid domestic work in contemporary Sweden (Esping-Andersen, 2016, p. 50; Statistics Sweden, 2018, p. 44). The fact that the positive effect of income on OPH-living that we observed in the 1990s in Sweden had disappeared by 2011 is an indication that a continued shift towards more gender-symmetrical values has worked to further decrease disincentives to family formation among employed women with higher levels of human capital. Potentially, this is also a contributing factor to the shift from an increase to a decrease in OPH-living in Sweden since 1990, in particular among women in the age range 40–64 years, while decreases in OHP-living among those aged over 65 years have been the result of a mechanical effect of decreased differences in longevity between men and women (Statistics Sweden, 2021b).

Lastly, we return to the two partially competing theoretical models of the SDT and dual equilibrium that have been used to explain changes in the levels of OPH-living in developed countries since the 1960s, and the hypotheses stated in the last section of the introduction. There we stated that we expected a weakened socioeconomic gradient of OPH-living among working-age women in Sweden, while we expected a distinctly positive gradient in Japan. In summary, these expectations are confirmed by our findings, and how the association between individual-level characteristics and the probability to be an OPH have evolved since 1989/1990 in Sweden and Japan. We conclude that our empirical results are more in line with dual equilibrium theory than SDT theory, because SDT theory as it was originally formulated by Lesthaeghe and Van de Kaa in the 1980s predicts a persistent shift to less family, while dual equilibrium theory argues that this should be considered a temporary stage that persists only as long as no new egalitarian alternatives emerge. Both the fact that the positive SES gradient of OPH-living has disappeared among women in Sweden and that the aggregate level of OPHs has started to decline make our results hard to reconcile with the SDT perspective. These results do not fit well with the idea of a permanent shift towards "less family" due to the spread of post-materialist values. However, Lesthaeghe also acknowledged in a paper in 2010 that a "split correlation" had emerged between advanced SDT countries such as the Nordic ones, where fertility had bounced back to levels close to replacement level, and countries in Southern Europe and South-East Asia, which so far seem stuck at fertility rates below 1.5 children per woman. His explanation for this "split correlation" closely resembles those put forward in the dual equilibrium framework in terms of higher levels of gender equality "that facilitate the combining of work and parenthood for women" and structural change that works to "alleviate the opportunity cost of parenthood" in countries where fertility has recuperated (Lesthaeghe, 2010, pp. 231–231).

Additionally, even though Japan is still a strongly traditional society in terms of its gender regime, and it exhibits clear contrasts with Sweden in the way in which women's income influences the probability of living alone, there are some signs that the positive income and education gradients are moving slowly towards a situation closer to that of Sweden. Specifically, although we do not have relevant data for Japan to assess how the educational gradient has changed over time, we find that the gradient was negative in 2016 after controlling for income. That working-age women with university-level education are currently less likely to live alone than their peers with the lowest level of education might indicate that the trade-off between family formation and economic independence is undergoing a transformation in Japan, which could potentially counteract the factors that are presently leading to a marked rise in the OPH population among working-age women. However, in light of the rapidly ageing population of Japan and the growing trend of middle-aged women living alone, the elderly care system of the country is likely to be confronted with an increased demand for its services in the future. This surge in demand can be attributed not only to the higher number of elderly, but also to changes in the living arrangements of those reaching retirement age in the coming decades.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s41118-023-00192-y.

Additional file 1: Table S1. Odds ratios of living alone in Japan 1990–2016. **Table S2.** Odds ratios of living alone in Sweden 1990–2016.

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Author contributions
All authors contributed to the conceptualization and design of the study. GS, MP and RF conducted the statistical analyses. GS led, and MP and RF assisted in drafting the first version of the article. HN assisted in interpreting the findings, commented on the article and helped in the manuscript preparation. All authors read and approved the final manuscript.

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Availability of data and materials
The Swedish dataset supporting the conclusions of this article is available in the MONA (Microdata Online Access) system at Statistics Sweden. The Japanese data are available at Waseda University. Restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available.

Declarations

Competing interests
The authors declare that they have no competing interests.

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References

Ålhvik, K., & Gillingsjö, E. (2016). *Kommungruppsindelning 2017*. Sveriges kommuner och landsting.
Andersson, G., & Kolk, M. (2015). *Trends in childbearing, marriage and divorce in Sweden: An update with data up to 2012* (2015:20; Stockholm Research Reports in Demography).

Arpino, B., Esping-Andersen, G., & Pessin, L. (2015). How do changes in gender role attitudes towards female employment influence fertility? A macro-level analysis. *European Sociological Review, 31*(3), 370–382.
Atoh, M. (2001). Very low fertility in Japan and value change hypotheses. *Review of Population and Social Policy, 10*, 1–21.
Atoh, M. (2008). Family changes in the context of lowest-low fertility: The case of Japan. *International Journal of Japanese Sociology, 17*(1), 14–29.
Atoh, M., Kandiah, V., & Ivanov, S. (2004). The second demographic transition in Asia? Comparative analysis of the low fertility situation in east and south-east Asian countries. *The Japanese Journal of Population, 2*(1), 34.
Beck, U., & Beck-Gernsheim, E. (1995). *The normal chaos of love*. Polity Press.
Becker, G. S. (1991). *A treatise on the family*. Harvard Univ.
Becker, G. S., Landes, E., & Michael, R. (1977). An economic analysis of marital instability. *Journal of Political Economy, 85*(6), 1141–1188.
Blossfeld, H.-P., & Kiernan, K. (1995). *The new role of women: Family formation in modern societies*. Routledge.
Brändström, A., Meyer, A. C., Modig, K., & Sandström, G. (2022). Determinants of home care utilization among the Swedish old: Nationwide register-based study. *European Journal of Ageing, 19*(3), 651–662. https://doi.org/10.1007/s10433-021-00669-9.
Brewster, K. L., & Rindfuss, R. R. (2000). Fertility and women's employment in industrialized nations. *Annual Review of Sociology, 26*(1), 271–296.
Cheng, Y. A. (2020). *Ultra-low fertility in East Asia: Confucianism and its discontents*. Verlag der Österreichischen Akademie der Wissenschaften.
Cherlin, A. (2004). The deinstitutionalization of American marriage. *Journal of Marriage and Family, 66*(4), 848–861.
Choe, M. K., Bumpass, L. L., Tsuya, N. O., & Rindfuss, R. R. (2014). Nontraditional family-related attitudes in Japan: Macro and micro determinants. *Population and Development Review, 40*(2), 241–271.
Demey, D., Berrington, A., Evandrou, M., & Falkingham, J. (2013). Pathways into living alone in mid-life: Diversity and policy implications. *Advances in Life Course Research, 18*(3), 161–174.
Doepke, M., Hannusch, A., Kindermann, F., & Tertilt, M. (2022). *The economics of fertility: A new era (No. w29948)*. National Bureau of Economic Research.
Dribe, M., & Smith, C. D. (2021). Social class and fertility: A long-run analysis of Southern Sweden, 1922–2015. *Population Studies, 75*(3), 305–323. https://doi.org/10.1080/00324728.2020.1810746.
Duvander, A.-Z. (1999). The transition from cohabitation to marriage: A longitudinal study of the propensity to marry in Sweden in the early 1990s. *Journal of Family Issues, 20*(5), 698–717.
Espenshade, T. J. (1985). Marriage trends in America: Estimates, implications, and underlying causes. *Population and Development Review, 11*(2), 193–245.
Esping-Andersen, G. (1999). *Social foundations of postindustrial economies*. Oxford University Press.
Esping-Andersen, G. (2009). *The incomplete revolution: Adapting to women's new roles*. Blackwell Publishers.
Esping-Andersen, G. (2016). *Families in the 21st century*. SNS Förlag.
Esping-Andersen, G., & Billari, F. C. (2015). Re-theorizing family demographics. *Population and Development Review, 41*(1), 1–31.
Esteve, A., Reher, D. S., Treviño, R., Zueras, P., & Turu, A. (2020). Living alone over the life course: Cross-national variations on an emerging issue. *Population and Development Review, 46*(1), 169–189.
Eurostat. (2021). *Distribution of households by household size—EU-SILC survey*. https://ec.europa.eu/eurostat/databrowser/view/ilc_lvph03/default/table?lang=en
Fukuda, N. (2016). *Marriage and fertility behaviour in Japan economic status and value-orientation*. Springer.
Fukuda, S., Raymo, J. M., & Yoda, S. (2020). Revisiting the educational gradient in marriage in Japan. *Journal of Marriage and Family, 82*(4), 1378–1396.
Fuwa, M. (2004). Macro-level gender inequality and the division of household labor in 22 countries. *American Sociological Review, 69*(6), 751–767.
Gałęzewska, P., Perelli-Harris, B., & Berrington, A. (2017). Cross-national differences in women's repartnering behaviour in Europe: The role of individual demographic characteristics. *Demographic Research, 37*, 189–228.
Giddens, A. (1992). *The transformation of intimacy: Sexuality, love and eroticism in modern societies*. Polity Press.
Goldscheider, F., Bernhardt, E., & Lappegård, T. (2015). The gender revolution: A framework for understanding changing family and demographic behavior. *Population and Development Review, 41*(2), 207–239.
Hank, K. (2007). Proximity and contacts between older parents and their children: A European comparison. *Journal of Marriage and Family, 69*(1), 157–173.
Human fertility database. (2022). *Human fertility database, Max Planck Institute for Demographic Research (Germany) and Vienna Institute of Demography (Austria)*. The Human fertility database. https://www.humanfertility.org
Hughes, M. E., & Waite, L. J. (2002). Health in household context: Living arrangements and health in late middle age. *Journal of Health and Social Behavior, 43*(1), 1–21.
Iacovou, M., & Skew, A. J. (2011). Household composition across the new Europe: Where do the new Member States fit in? *Demographic Research, 25*, 465–490.
Inglehart, R. (1990). *Culture shift in advanced industrial society*. Princeton University Press.
Jalovaara, M., Neyer, G., Andersson, G., Dahlberg, J., Dommermuth, L., Fallesen, P., & Lappegård, T. (2018). Education, gender, and cohort fertility in the Nordic countries. *European Journal of Population, 35*, 563–586.
Kato, A. (2021). *The Japanese family system: Change, continuity, and regionality in the long twentieth century*. Springer.
Klinenberg, E. (2012). *Going Solo: The Extraordinary Rise and Surprising Appeal of Living Alone (1st Printing)*. Penguin Press.
Kohler, H.-P., Ortega, J. A., & Billari, F. C. (2001). *Towards a theory of lowest-low fertility* (No. 32; 0 ed., MPIDR Working Paper, pp. 1–57). Max Planck Institute for Demographic Research.
Kumagai, F. (2010). Forty years of family change in Japan: A society experiencing population aging and declining fertility. *Journal of Comparative Family Studies, 41*(4), 581–610.
Lamidi, E. O., & Nash, S. P. (2022). Two decades of change in living arrangements and health of middle-aged and older adults in the US, 1997–2018. *Journal of Applied Gerontology, 41*(5), 1407–1420.

Lesthaeghe, R. (2010). The unfolding story of the second demographic transition. *Population and Development Review, 36*(2), 211–251.
Lesthaeghe, R. (2020). The second demographic transition, 1986–2020: Sub-replacement fertility and rising cohabitation—a global update. *Genus, 76*(1), 10.
Lesthaeghe, R., & Van de Kaa, D. (1986). Twee demografische transities. In *Groei en Krimp?* Van Loghum Slaterus, Deventer Mens en Maatschappij.
Long, J. S., & Mustillo, O. S. A. (2021). Using predictions and marginal effects to compare groups in regression models for binary outcomes. *Sociological Methods & Research, 50*(3), 1284–1320.
Matsuda, S. (2020). Employment and marriage among young adults: Features of Japan and Asia compared with Europe. In S. Matsuda (Ed.), *Low fertility in advanced Asian economies: Focusing on families, education, and labor markets* (pp. 21–39). Springer.
McDonald, P. (2000). Gender equity in theories of fertility transition. *Population and Development Review, 26*(3), 427–439.
Ministry of Health, Labour and Welfare (MHLW). (2021). *Kokumin seikatsu kiso chōsa [Comprehensive survey of living conditions]—Trends in number and percentage distribution of households by household structure, 1986–2019*. Ministry of Health, Labour and Welfare.
National institute of population and social security research (NIPSSR). (2023). *Population statistics*. https://www.ipss.go.jp/p-info/e/Population%20%20Statistics.asp
Nishioka, H. (2000). Parent-adult child relationships in Japan. *Review of Population and Social Policy, 9*, 221–238.
OECD. (2016). *OECD Family database: SF1.1:Family size and household composition*. OECD—Social policy division—Directorate of employment, labour and social affairs.
OECD. (2022). *LFS by sex and age—Indicators* [Database]. OECD. Stat. https://stats.oecd.org/
Ohlsson-Wijk, S., Turunen, J., & Andersson, G. (2020). Family forerunners? an overview of family demographic change in Sweden. In D. N. Farris & A. J. J. Bourque (Eds.), *International handbook on the demography of marriage and the family* (pp. 65–77). Springer international publishing.
Padyab, M., Reher, D., Requena, M., & Sandström, G. (2019). Going it alone in later life: A comparative analysis of elderly women in Sweden and Spain. *Journal of Family Issues, 40*(8), 1038–1064.
Raymo, J. M. (2015). Living alone in Japan: Relationships with happiness and health. *Demographic Research, 32*, 1267–1298.
Raymo, J. M., Iwasawa, M., & Bumpass, L. (2004). Marital dissolution in Japan: Recent trends and patterns. *Demographic Research, 11*(14), 395–420.
Raymo, J. M., Park, H., Xie, Y., & Yeung, W. J. (2015). Marriage and family in east Asia: Continuity and change. *Annual Review of Sociology, 41*(1), 471–492.
Raymo, J. M., Uchikoshi, F., & Yoda, S. (2021). Marriage intentions, desires, and pathways to later and less marriage in Japan. *Demographic Research, 44*(3), 67–98. https://doi.org/10.4054/DemRes.2021.44.3.
Reher, D. S. (1998). Family ties in Western Europe: Persistent contrasts. *Population and Development Review, 24*(2), 203–234.
Reher, D. S., & Requena, M. (2017). Elderly women living alone in Spain: The importance of having children. *European Journal of Ageing, 14*, 311–322.
Ruggles, S. (1997). The rise of divorce and separation in the United States, 1880–1990. *Demography, 34*(4), 455–466.
Sandstedt, E. (1991). *Att bo ensam: Om enboendeliv i Sverige*. Statens råd för byggnadsforskning.
Sandström, G. (2012). *Ready, willing and able: The divorce transition in Sweden 1915–1974* [Dissertation, Umeå University].
Sandström, G., & Karlsson, L. (2019). The educational gradient of living alone: A comparison among the working-age population in Europe. *Demographic Research, 40*(55), 1645–1670.
Sandström, G., Namatovu, F., Ineland, J., Larsson, D., Ng, N., & Stattin, M. (2021). The persistence of high levels of living alone among adults with disabilities in Sweden, 1993–2011. *Population Research and Policy Review, 40*(2), 163–185.
Sandström, G., Strömgren, M., & Stjernström, O. (2014). Socioeconomic determinants of divorce in Sweden, 1960–1965. *Social Science History, 38*(1–2), 127–153.
Shibuya, K., Hashimoto, H., & Yano, E. (2002). Individual income, income distribution, and self rated health in Japan: Cross sectional analysis of nationally representative sample. *BMJ, 324*(7328), 16.
Sobotka, T. (2021). World's highest childlessness levels in East Asia. *Population Societies, 595*(11), 1–4.
Stanfors, M. (2003). *Education, labor force participation and changing fertility patterns: A study of women and socioeconomic change in twentieth century Sweden*. Almqvist & Wiksell.
Stanfors, M., & Goldscheider, F. (2017). The forest and the trees: Industrialization, demographic change, and the ongoing gender revolution in Sweden and the United States, 1870–2010. *Demographic Research, 20*(6), 173–226.
Statistics Bureau of Japan. (2021). *Labour Force Survey/Historical data, Table b-5: Labour force participation rate by age group*. https://www.stat.go.jp/english/data/roudou/lngindex.html
Statistics Sweden. (1992). *Population and housing census 1990*. Statistics Sweden (SCB).
Statistics Sweden. (2011). *Multi-generation register 2010: a description of contents and quality*. Örebro: Avdelningen för befolknings- och välfärdsstatistik, Statistiska centralbyrån (SCB).
Statistics Sweden. (2013). Lägenhetsregistret- Efterlängtad statistik. *Källa: SCB* (3):10–13.
Statistics Sweden. (2014). *Generationer genom livet: En demografisk beskrivning av födda under 1900-talet = [Generations through the years : A demographic description of those born during the 20th century*. Statistics Sweden (SCB).
Statistics Sweden. (2018). *Women and men in Sweden 2018—Facts and figures*. Statistics Sweden (SCB).
Statistics Sweden. (2019). *Longitudinal integrated database for health insurance and labour market studies (LISA) (LISA) [Longitudinell integrationsdatabas för Sjukförsäkrings- och Arbetsmarknadsstudier]*. Statistics Sweden (SCB).
Statistics Sweden. (2020). *Women and men in Sweden 2020—Facts and figures [På tal om kvinnor och män, Lathund om jämställdhet 2020]*. Statistics Sweden (SCB), Population Statistics Unit.
Statistics Sweden. (2021a). *Labour force Survey (AKU). [Befolkningen 15–74 år (AKU), andel i procent efter kön, ålder, arbetskraftstillhörighet och år.]*. Befolkningen 15–74 År (AKU), Andel i Procent Efter Kön, Ålder, Arbetskraftstillhörighet och År. Statistical Database. http://www.statistikdatabasen.scb.se
Statistics Sweden. (2021b). *Life-table by age and sex 1960–2019 [Ettårig livslängdstabell för hela riket efter kön och ålder. År 1960—2019]*. Statistical Database. http://www.statistikdatabasen.scb.se

Statistics Sweden. (2022a). *Number of persons by region, age, household status and sex. Year 2011—2021*. Statistical Database. http://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__BE__BE0101__BE0101S/HushallT08/
Statistics Sweden. (2022b). *Population register*. Statistics Sweden, Statistical Database. http://www.statistikdatabasen.scb.se
Ulmanen, P., & Szebehely, M. (2015). From the state to the family or to the market? Consequences of reduced residential eldercare in Sweden: From the state to the family. *International Journal of Social Welfare, 24*(1), 81–92.
UNDP. (2020). *Tackling social norms: A game changer for gender inequalities*. United Nations Development Program.
United Nations. (2019). *World population prospects—Population division—United Nations*.
Welzel, C., Norris, P., & Inglehart, R. (2002). Gender equality and democracy. *Comparative Sociology, 1*(3–4), 321–345.
World Economic Forum. (2018). *The global gender gap report 2018*. World Economic Forum.
World Value Survey. (2020). *World values survey—Inglehart–Welzel Cultural Map*. World Values Survey—Inglehart–Welzel Cultural Map. https://www.worldvaluessurvey.org/WVSContents.jsp
Yeung, W.-J.J., & Cheung, A.K.-L. (2015). Living alone: One-person households in Asia. *Demographic Research, 32*, 1099–1112.

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