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Descriptive Finding

The surge in living alone among young and middle-aged adults: A decomposition analysis of the rise in one-person households in Germany, 1991 to 2021

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# Contents

1	Introduction	1038
2	Data and sample	1039
3	Analysis	1040
4	Results	1041
5	Discussion	1045
6	Conclusion	1046
	References	1048

# The surge in living alone among young and middle-aged adults: A decomposition analysis of the rise in one-person households in Germany, 1991 to 2021

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## Abstract

#### BACKGROUND

Worldwide, the number of people living in a one-person household (OPH) is rising, and young and middle-aged adults play an essential role in this trend. Germany has one of Europe's highest rates of OPHs. Due to the country's unique sociohistorical background, this paper looks at a 30-year period to examine how the increase in OPHs among 20–54-year-old men and women has developed since German reunification.

#### **METHODS**

We use data from the German Microcensus from 1991 to 2021 to calculate the annual share of individuals living in an OPH. Following an algebraic decomposition approach proposed by Evelyn Kitagawa and adapted by Glenn Firebaugh, we split the sample into 13 5-year birth cohorts to examine the effects of within-cohort change and cohort replacement in the rising share of OPHs.

#### RESULTS

After German reunification, the increase in OPHs was first driven by within-cohort change, most likely caused by different mechanisms in East and West Germany. Since the mid to late 2000s, cohort replacement has become the main force behind the increase in OPHs. West German women deviate from this in showing only a moderate rise in OPHs almost entirely driven by cohort replacement throughout the 30 years analysed here.

#### CONTRIBUTION

Considering East–West and gender differences extends our knowledge of how structural factors add to the increase in OPHs. Living alone is not merely the result of individual choices but also of sociohistorical circumstances. Future research must consider that a

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growing number of adults will have experienced an episode of living alone at least once in their lifetime.

## 1. Introduction

The increase in one-person households (OPHs) is a global phenomenon that has been going on for decades. While living alone has long been associated primarily with widowed persons, the latest research shows that the recent increase is mainly due to a growing number of individuals living alone in early and middle adulthood (Esteve et al. 2020).

Even though Germany has one of Europe's highest shares of OPHs, most research focusing on living alone in young and middle adulthood comes from other European countries such as Spain, Sweden, or the United Kingdom (e.g., Cámara et al. 2021; Sandström 2020; Mansfield et al. 2024). Hence, little is known about the nature of the process and the mechanisms that have caused the remarkable rise in OPHs found in Germany in recent decades. However, given the country's unique sociohistorical background, turning to Germany might be particularly insightful when investigating the trend towards living alone.

For four decades, Germany was divided into the Federal Republic of Germany (FRG; now West Germany) and the German Democratic Republic (GDR; now East Germany). How these two countries differed in political, economic, and normative systems significantly impacted their citizens' life course and family planning. For example, men and women living in the GDR benefited from early family formation, as the housing shortage in the socialist system meant that apartments were primarily allocated to married couples with children (Engelhardt, Trappe, and Dronkers 2002). The GDR's rich supply of childcare facilities encouraged childbearing and women's participation in the labour market. Consequently, the GDR always had a higher total period fertility rate than the FRG, which was marked by a more traditional family model and limited public childcare (Kreyenfeld 2004). Simultaneously, the extensive state-provided financial security and the high level of female employment in the GDR weakened the importance of marriage, which led to higher divorce and single-parenthood rates than in the FRG (Salles and Dutreuilh 2006).

Research has shown how German reunification triggered changes in demographic behaviour and thus in the country's population structure (Dudel and Kluesener 2016; Rosenfeld, Trappe, and Gornick 2004; Witte and Wagner 1995). This was primarily the case for East Germany, where the total fertility rate fell to its lowest level of only 0.83 live births per woman in 1994 (Federal Institute for Population Research 2022), divorce

rates dropped, marriage numbers halved between 1989 and 1991 (Federal Institute for Population Research 2023), and the large number of East German women migrating to West Germany led to an imbalanced sex ratio in East Germany (Eckhard and Stauder 2018). However, over the past three decades demographic trends such as fertility and divorce rates have steadily converged in East and West Germany.

Against this background, it is reasonable to assume that East Germany and West Germany also differed in terms of living alone in young and middle adulthood – not only during the German division but also in the decades following German reunification that were marked by rising numbers in OPHs. Following Firebaugh (1992), changes in living alone during this period could be triggered by two mechanisms: (1) cohort replacement affecting the population composition of East and West Germany, e.g., due to East–West migration or low fertility rates in the early 1990s; or (2) within-cohort change, e.g., due to men and women changing their individual decisions regarding living arrangements as a result of the structures and opportunities in reunified Germany. To examine the extent of the impact of these mechanisms on the increase in OPHs since German reunification, the following analysis uses an algebraic decomposition method proposed by Kitagawa (1955) and adapted by Firebaugh (1997). We account for possible gender differences by performing the analyses separately for men and women. Before presenting the result of the decomposition analysis, we first provide a description of the development by visualising the rise of OPHs over time for 13 5-year birth cohorts.

#### 2. Data and sample

We use data from the German Microcensus. Due to the large sample of about 1% of the total population and respondents being legally required to provide information, the Microcensus is representative of the people living in Germany, with no missing data on the variables relevant for the present analyses. To ease data preparation, we relied on the harmonised and cumulated Microcensus Trendfile provided by GESIS – Leibniz Institute for the Social Sciences (Lengerer et al. 2020). As the harmonisation of the Microcensus Trendfile currently ends in 2016, we additionally harmonised data from 2017 to 2021, which simply required mapping variable names on each other. Consequently, this paper is based on cross-sectional data from the Microcensus Scientific Use Files from 1991, 1993, and 1995 to 2021 (RDC of the Federal Statistical Office and Statistical Offices of the Federal States of Germany, 1991–2021). The years 1992 and 1994 are excluded as no Scientific Use Files are provided for these years. While the description of the increase in living alone relies on all available Microcensus Scientific Use Files, the decomposition analysis is based on 5-year intervals and therefore draws on the Microcensus Scientific Use Files for the years 1991, 1996, 2001, 2006, 2011, 2016, and 2021.

We limited the sample to individuals between 20 and 54 as our research question focuses on living alone in young and middle adulthood. The upper age limit was set to 54 because – according to Microcensus data – most people are in their early 50s when they see their children move out. Moreover, regardless of age, we excluded all individuals living in community or institutional housing (e.g., monasteries, refugee accommodation, retirement homes) and those who designated their household as their secondary rather than primary residence. The analytical sample comprises 6,686,502 individuals.

The analysis of group differences in living alone is based on three dimensions: Place of residence (East vs. West Germany), gender (female vs. male), and birth cohort. The latter was operationalised by clustering the final sample into 5-year cohorts. This yielded 13 5-year cohorts, with the oldest born between 1937 and 1941 and the youngest between 1997 and 2001. These preparatory steps were conducted using Stata/SE 18.0.

## 3. Analysis

The present paper focuses on descriptive findings. It starts with visualising how the proportion of individuals who do not share their household with a partner, children, or any other cohabitant developed between 1991 and 2021. This development is presented in line graphs grouped by cohort, generated using R version 4.4.0.

The second part of the analysis uses an algebraic decomposition of repeated crosssectional data. This approach was originally proposed by Evelyn Kitagawa (1955), who investigated differences in (demographic) rates between populations by separating them into two components: (1) a component that accounts for rate differences within a population, and (2) a component that accounts for rate differences between populations. Firebaugh (1997) adapted this method to analyse cohort differences and algebraically decomposed changing rates (i.e., social change) into within-cohort change (i.e., changing rates within a group born in the same period of time) and cohort replacement (i.e., changing distribution of cohorts, e.g., due to migration or shifts in birth rates). In the present paper, we apply this approach to the increasing rate of men and women living in an OPH:



where  $\Delta \mu$  is the overall change in the share of OPHs across time points 1 and 2. The subscript j indexes birth cohorts; thus,  $\Delta \mu_j$  is the change in the share of OPHs over time in cohort j, and  $\Delta p_j$  is the change in population share over time in cohort j.

Within-cohort change is calculated by weighting the change in the share of OPHs in a cohort between two points in time by the cohort's average population share. Cohort replacement, on the other hand, is calculated by weighting the change in a cohort's population share between two points in time by the average share of OPHs in the cohort.

The present analysis is structured in 5-year intervals, with time point 2 constantly occurring 5 years after time point 1. Covering 30 years, this approach includes seven time points: 1991, 1996, 2001, 2006, 2011, 2016, and 2021. Each time point covers 7 of the 13 5-year birth cohorts mentioned above. With each new time point, the oldest cohort from the previous time point is removed from the analysis, while a new, younger cohort is added. Thus, each time point spans the same age range, allowing a comparison of individuals of the same age at different points in time. However, due to the replacement of cohorts between the seven time points, only the cohort born between 1967 and 1971 is present at each time point. This must be taken into account when interpreting the changes between time points.

#### 4. Results

The four panels in Figure 1 show the development of the share of men and women aged 20 to 54 who lived in an OPH in East and West Germany between 1991 and 2021. In each panel the development is shown separately for 13 5-year birth cohorts, which are observed at individual age intervals – e.g., the oldest cohort, born between 1937 and 1941, is only included at ages 50 to 54, and the youngest cohort, born between 1997 and 2001, is only included at the ages of 20 to 24.

The share of OPHs increased more rapidly with each new cohort for men and women from East Germany than for men and women from West Germany. Thus, while for both men and women in 1991, East German cohorts had lower shares of OPHs than West German cohorts, the ratio reverses in 2021, with East German cohorts having considerably higher shares of OPHs than West German cohorts.

#### Figure 1: Share of women and men living in an OPH in East and West Germany between 1991 and 2021 (grouped by birth cohort)



Source: RDC of the Federal Statistical Office and Statistical Offices of the Länder, Mikrozensus 1991, 1993, 1995–2021; own calculations.

However, differences were found not only between but also within cohorts. While those aged 40 and older in 1991 (i.e., cohorts born before 1951) experienced only a modest increase in living alone in West Germany, a more substantial increase can be observed for the same cohorts in East Germany. This observation is even more pronounced for men born between 1952 and 1966. While West German men of these cohorts experienced almost no increase in living alone in the 1990s, the share of East German men of that age increased continuously. Like East German men, East German women of that age also experienced a more substantial increase than their Western counterparts. However, this increase only occurred from the late 1990s to early 2000s.

#### Figure 2: Share of women and men living in an OPH in East and West Germany between the ages of 20 and 54 (grouped by birth cohort)



Source: RDC of the Federal Statistical Office and Statistical Offices of the Länder, Mikrozensus 1991, 1993, 1995-2021 own calculations.

The patterns of living alone converge in East and West Germany starting from the cohort born between 1967 and 1971. This is not only the one cohort tracked over the entire period, but also the cohort that was aged between 19 and 24 at the time of German reunification and therefore at the beginning of adulthood.

For men, this is the first cohort in the age groups analysed here in which East German men reached West German levels of living alone. Moreover, all subsequent East German cohorts surpassed West German levels of OPHs while simultaneously having the same age structure as West German men: an increase in living alone in their 20s, followed by a period of decline which levels off in their early 40s (see Figure 2, panel B and D). While the peak value of living alone in the mid- and late-20s is almost ten percentage points higher in East than in West Germany, the East–West difference in living alone among men in their 40s and early 50s is considerably smaller.

For women, the cohort born between 1967 and 1971 also indicates a convergence of women's share of OPHs in East and West Germany. However, this convergence becomes even more pronounced with the East German cohorts born after 1972, which increasingly show the age structure typical among West German women: an initial increase in living alone that results in the highest share of OPHs when women are in their mid-20s followed by a sharp decline that levels off in women's late-30s to mid-40s, and then, contrary to the male pattern, increases again (see Figure 2, panels A and C). While the increase for women in their 40s and early 50s occurs similarly in all cohorts and in both East and West Germany, the peak of living alone in their mid-20s becomes remarkably higher for East German women with each new cohort. At this stage of life, the rate of East German women's rate by almost ten percentage points. In this respect, the East–West differences for women are similar to those for men.

So far, the results have revealed that only some of the older cohorts who entered the study at age 35 and above show a continuous increase of living in OPHs during the observation period. However, all other cohorts show episodes of increasing and decreasing shares of OPHs between the ages of 20 and 54, which could theoretically level out the overall trend in the number of OPHs. For that reason, it is essential to consider the cohort size when investigating the drivers of the overall increase in living alone. This is done using the decomposition method described above that weights cohorts' shares in living alone by their relative population shares, i.e., cohort sizes.

The results in Table 1 show that for a period of 15 to 20 years after German reunification, the overall increase in OPHs was predominantly driven by within-cohort change (i.e., changing rates of OPHs among individuals of the same birth cohort). However, this stopped in the mid to late 2000s when, instead, cohort replacement (i.e., the succession of younger cohorts with a higher rate of OPHs) becomes increasingly important in explaining the growing number of men and women living alone.

While this observation applies to both women and men in East Germany and for West German men, West German women deviate from this pattern, as their relatively modest increase in OPHs is primarily driven by a cohort-replacement effect throughout nearly the entire period from 1991 to 2021.

		1991– 1996	1996– 2001	2001– 2006	2006– 2011	2011– 2016	2016– 2021	Sum	
Foot Common woman	within-cohort change	1.4	1.8	2.6	1.2	-0.2	0.5	7.3	
East German women	cohort replacement	0.4	-0.1	0.0	0.7	1.9	2.0	4.8	
East Cormon mon	within-cohort change	3.2	4.2	4.7	0.8	0.2	-0.6	12.7	
East German men	cohort replacement	0.7	-0.5	0.1	0.9	9 3.0 3.5	3.5	7.6	
West Cormon women	within-cohort change	0.5	-0.4	0.4	0.8	-0.5	-0.6	0.2	
west German women	cohort replacement	0.6	0.2	0.4	0.5	0.5 <b>0.9 1</b>		3.8	
West Cormon mon	within-cohort change	2.1	1.1	1.4	1.7	0.0	0.2	6.4	
west German men	cohort replacement	0.8	0.3	0.5	0.7	1.2	1.6	5.2	

# Table 1:Decomposition of the increase in OPHs between 1991 and 2021 in<br/>within-cohort change and cohort replacement for women and men in<br/>East and West Germany

Note: The 'Sum' column is subject to rounding errors and may therefore differ from the sum of the values reported in the corresponding columns.

# 5. Discussion

The presented results show that there has been a convergence between East and West Germany in the share and age structure of living alone since German reunification. According to the decomposition results, the increase in living alone two decades after 1991 was dominated by a within-cohort change. Explaining this observation by an increasing prevalence of living alone among the large cohorts of the baby boomer generation as they age is insufficient, as we also found that living alone altered in younger age groups during this time. In addition, West German women show a stable pattern, which would be inconsistent with referring to the baby boomer generation. Therefore, we provide hypothetical explanations for other mechanisms that could have driven the within-cohort change in living alone in East and West Germany. However, these mechanisms should be further investigated in future research.

In East Germany, the within-cohort change is most likely attributable to German reunification. On the one hand, German reunification provided new opportunities (e.g., in the housing market) that made living alone more accessible for all cohorts. On the

other hand, especially for East German men, German reunification initially led to instability, unemployment, and an unbalanced partner market. These factors may have contributed to the increase in living alone.

The mechanisms proposed to explain the increase in OPHs after German reunification in East Germany do not apply to West German men. Instead, during the 1990s and early 2000s, West German men – independently of German reunification – likely caught up with a development that West German women had already undergone: an increase in temporarily living alone in young adulthood. Initially, this trend may have been triggered by the Second Demographic Transition causing women's independence to grow due to the change in gender roles and educational expansion, from which women benefited more than men (Lesthaeghe 2014). Hence, leaving home to complete an education instead of starting a family seems to have promoted living alone in young adulthood among West German women. In the 1990s and 2000s this development apparently also gained momentum among West German men, albeit with a time lag.

The decomposition analysis reveals a shift in the mid to late 2000s from withincohort change to cohort replacement. Therefore, it can be assumed that the mechanisms for the rise of OPHs we proposed for the two decades following German reunification were replaced by another driving force. Instead of East German women and men adapting to the new circumstances in reunified Germany and West German men catching up with West German women, the current increase in OPHs is presumably the result of a generally higher propensity of younger cohorts to live alone. This is also expressed in the distinctive pattern of an emerging peak in living alone in young adulthood, followed by a decline, that has been recognisable for women and men from East and West Germany since the cohort born between 1972 and 1976 at the latest. This pattern is almost certainly linked to postponed family formation, which is associated with various causes such as longer periods of education, financial insecurity, increasing residential mobility, or the realization of personal and professional goals (Datta et al. 2023).

The gradual emergence of this peak in living alone in young adulthood among younger cohorts underscores the interplay of age, period, and cohort. Thus, future studies could apply an age-period-cohort analysis to the phenomenon of increasing numbers in OPHs. However, these analyses will always be limited by the identification problem inherent in the three interdependent dimensions of time (Fosse and Winship 2019).

## 6. Conclusion

This paper's descriptive findings aim to encourage further research on young and middleaged adults living in an OPH. In Germany's case, the results show that the unique sociohistorical event of German reunification must be considered when assessing Germany's position as the European country with the highest share of individuals living alone. In the years following German reunification, different mechanisms seem to have driven the increase in OPHs in East and West Germany, which underlines that existing country studies on living alone cannot necessarily be generalised. Furthermore, the results highlight the importance of looking at more extended periods to identify determinants for living alone. After all, the mechanisms driving the development directly after German reunification no longer applied after the mid to late 2000s.

Regarding the study of living alone in old age, the presented findings suggest that the number of older men and women living in an OPH who have already experienced living in an OPH in their younger adult years is likely to increase. Thus, future research might look at how living alone in old age differs depending on whether or not it is a firsttime experience. In general, it is important to look more closely at the potential implications of temporary episodes of living alone in young adulthood, as these are becoming more prevalent in younger cohorts. For example, previous studies have shown that living alone is associated with poorer mental health (McElroy et al. 2023) and that it can lead to social isolation if there are no connections in other areas such as family, friends, or employment (Mansfield et. al 2024).

Algebraic decomposition of within-cohort change and cohort replacement revealed that cohort replacement was the main driver behind the increasing number of OPHs among 20–54-year-old residents in Germany in recent years. To target the needs of these young-to-middle-aged adults living in OPHs effectively, for example in areas such as social security, urban development, or housing policy, we must better understand their reasons for living alone.

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