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**109 Report** by Fiona Herrmann and Katharina Wrohlich

## Gender pay gap increases with age among all educational backgrounds

- Study investigates the gender pay gap by age and level of education
- Gender pay gap increases with age for people of all levels of education, but the most for people with a university degree
- Policymakers should create incentives for a more equal division of paid and care work



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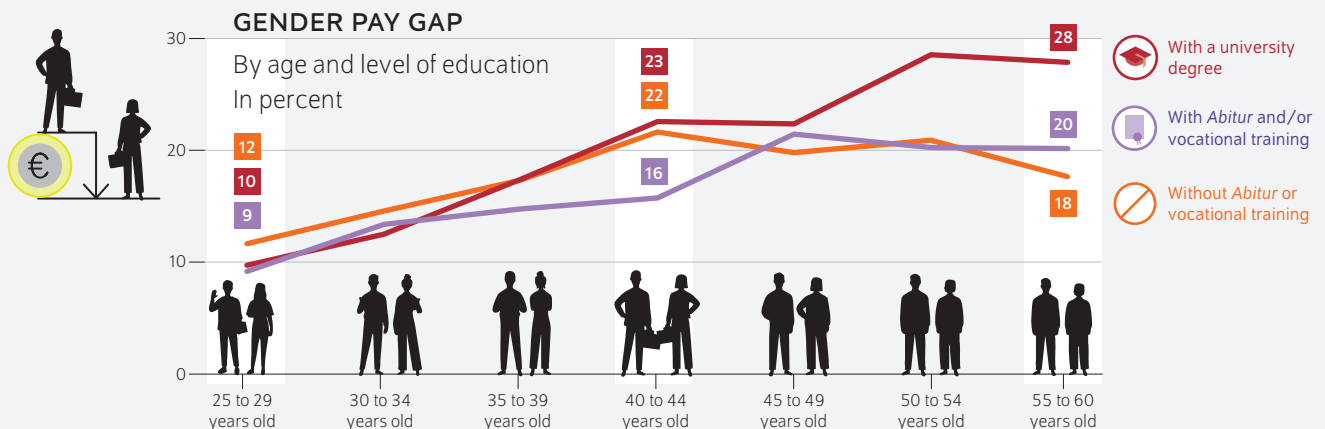
AT A GLANCE

# Gender pay gap increases with age among all educational backgrounds

By Fiona Herrmann and Katharina Wrohlich

- This Weekly Report investigates the gender pay gap by age and level of education using data from the Socio-Economic Panel (SOEP)
- Gender pay gap increases with age regardless of a person's level of education, but the most for people with a university degree
- The age pattern in the west is considerably more pronounced than in the east
- To reduce the gender pay gap, policymakers should create more incentives for a more equal division of paid and care work such as childcare and housework
- Starting points are reforming joint taxation of married couples with full income splitting and the tax treatment of mini jobs; both make part-time and marginal employment attractive for women

## The average gender pay gap increases with age, especially for people with a high level of education



Sources: Socio-Economic Panel (SOEP v39), 2013 to 2022 waves (weighted); authors' calculations.

Note: Calculations based on employees' average gross hourly wages.

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### FROM THE AUTHORS

*“Full-time work protects individuals from the gender pay gap more than education does. We know that among the various factors influencing the gender pay gap, the difference in work hours, i.e., the number of weekly hours worked, is a very important explanatory factor. Part-time workers also earn less per hour.”*

— Katharina Wrohlich —

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Audio Interview with Katharina Wrohlich (in German)  
[www.diw.de/mediathek](http://www.diw.de/mediathek)

# Gender pay gap increases with age among all educational backgrounds

By Fiona Herrmann and Katharina Wrohlich

## ABSTRACT

The average gender pay gap in Germany is 16 percent according to the most recent data. On the occasion of the 2025 Equal Pay Day, this Weekly Report using Socio-Economic Panel (SOEP) data shows that considerable differences according to age and level of education are hiding behind this average gap. For example, the gender pay gap increases significantly with age for people of all educational backgrounds and increases the most for older employees with a university degree. This age pattern is much more pronounced in the west of Germany than in the east. If policymakers want to counteract the large gender pay gap, they must create incentives for a more equal division of paid and care work between women and men. Starting points include reforming the joint income taxation of married couples (*Ehegattensplitting*) and the tax treatment of income from mini-jobs. Currently, these two factors make part-time or marginal employment financially attractive for married women, at least in the short term, thereby reinforcing existing gender-specific labor market inequalities.

According to the Federal Statistical Office, the gender pay gap,<sup>1</sup> which is the difference between the average gross hourly wages of men and women relative to the average wage of men, was 16 percent in 2024.<sup>2</sup> This is two percentage points less compared to previous years, when the gender pay gap was stagnating at 18 percent. However, significant differences between socio-demographic groups are hidden behind this average pay gap: For example, the gender pay gap is considerably lower in the east than in the west. According to the Federal Statistical Office, it was five percent in the east in 2024 and 17 percent in the west.<sup>3</sup>

On the occasion of Equal Pay Day<sup>4</sup> on March 7, 2025, this Weekly Report uses Socio-Economic Panel (SOEP, Box 1) data to evaluate gender pay gaps according to age and level of education and compares these gaps to gender differences in the number of paid work hours.<sup>5</sup>

## Gender pay gap increases as employees age

The increase in the gender pay gap as employees age has been frequently documented already.<sup>6</sup> While the gender pay

<sup>1</sup> For more information, see the entry on the gender pay gap in the DIW Berlin Glossary (in German; available online. Accessed on February 17, 2025. This applies to all other online sources in this report unless stated otherwise).

<sup>2</sup> Federal Statistical Office, "Gender Pay Gap sinkt 2024 im Vergleich zum Vorjahr von 18 Prozent auf 16 Prozent," press release from February 13, 2025 (in German; available online).

<sup>3</sup> Cf. Federal Statistical Office, "Gender Pay Gap sinkt 2024 im Vergleich zum Vorjahr von 18 Prozent auf 16 Prozent."

<sup>4</sup> The Equal Pay Day initiative began in the United States and was officially acknowledged for the first time in Germany in 2007. It represents the day each year until which women essentially work unpaid, cf. the website of the Equal Pay Day campaign. In 2025, Equal Pay Day is on March 7 because 18 percent (the gender pay gap in 2023, which was used to calculate the Equal Pay Day in 2025) of 365 is 66 days.

<sup>5</sup> The Socio-Economic Panel (SOEP) includes a significantly smaller sample than the Federal Statistical Office's Structure of Earnings Survey, but the results from the analyses of both data sets are comparable, as recent tests of the gender pay gaps have shown.

<sup>6</sup> Cf. Annekatri Schrenker and Aline Zucco, "The gender pay gap begins to increase sharply at age of 30," *DIW Weekly Report* no. 10 (2020): 75–82 (available online); Annekatri Schrenker and Katharina Wrohlich, "Gender Pay Gap ist in den letzten 30 Jahren fast nur bei den Jüngeren gesunken," *DIW Wochenbericht* no. 9 (2022): 149–154 (in German; available online); Clara Schäper, Annekatri Schrenker, and Katharina Wrohlich, "Gender Care Gap and Gender Pay Gap Increase Substantially until Middle Age," *DIW Weekly Report* no. 9 (2023): 83–88 (available online); as well as Federal Statistical Office, "Gender Pay Gap 2023: Frauen verdienten pro Stunde 18 Prozent weniger als Männer," press release from January 18, 2024 (in German; available online).

Box 1

Data and methodology

The calculations in this Weekly Report use data from the Socio-Economic Panel (SOEP).<sup>1</sup> The SOEP is the longest-running representative longitudinal study in Germany and contains detailed information about the respondents' earned income, number of hours worked, and socio-demographic characteristics. The most recent SOEP data is from 2022. This Weekly Report uses data from the 2013 to 2022 survey waves.

The calculations consider employees aged 20 to 60 from the east and west of Germany. The analyses include full-time and part-time employees as well as people in marginal employment (mini jobs). Civil servants, the self-employed, people in training, and the non-employed were not considered.

The gender pay gap measures the percentage difference between the average gross hourly wages of men and women compared to the average gross hourly wages of men. To calculate gross hourly wages, monthly gross earnings are first divided by the number of contractually agreed-upon work hours. Gross hourly wages are then adjusted for nominal price trends using the consumer price index (base year 2022). In addition, before calculating average wages, the top and bottom percent of the data for each survey year

are excluded (trimming) to reduce the influence of measurement errors. When calculating averages, weighted figures are outputs that consider the specifics of the sample design and changes in sample composition over time.

Three educational level groups are compiled using the Comparative Analysis of Social Mobility in Industrial Nations (CASMIN): The group of people without an *Abitur* (university entrance qualification) or vocational training includes those who have no qualification, but have completed intermediate school (in Germany, a *Hauptschulabschluss* or *mittlere Reife*) and have no further training. The group of people with an *Abitur* and/or vocational training have all completed a form of professional training, regardless of the type of end qualification, or have at least obtained the general higher education entrance qualification (*allgemeine Hochschulreife*). Finally, people with a bachelor's degree or higher from a university or college belong to the group with a university degree.

Full-time employment is defined as employment with at least 30 contractually agreed weekly work hours. All jobs with less than 30 contractually agreed hours are considered part-time jobs.

<sup>1</sup> The SOEP is an annual representative survey of private households. It began in West Germany in 1984 and expanded its scope to include the new federal states in 1990; cf. Jan Goebel et al., "The German Socio-Economic Panel (SOEP)," *Journal of Economics and Statistics* 239, no. 29 (2018): 345–360 (available online).

gap for 25- to 29-year-olds is around seven percent, it rises to 23 percent for people over 50 (Figure 1).<sup>7</sup> It is particularly noteworthy that the wage trends for 20- to 30-year-old men and women develop in parallel (Figure 2, top). Beginning around the age of 33, wage growth for women flattens out, while the average gross hourly wage for men continues to rise. The resulting considerable increase in the gender pay gap roughly coincides with the time a couple has their first child.<sup>8</sup>

A separate analysis for the east and west shows that the increase in the gender pay gap as employees age is primarily driven by the development in the west (Figure 2, bottom). In the east, the gender pay gap increases from the age of 33 as well, but nowhere near as strongly as in the west.<sup>9</sup>

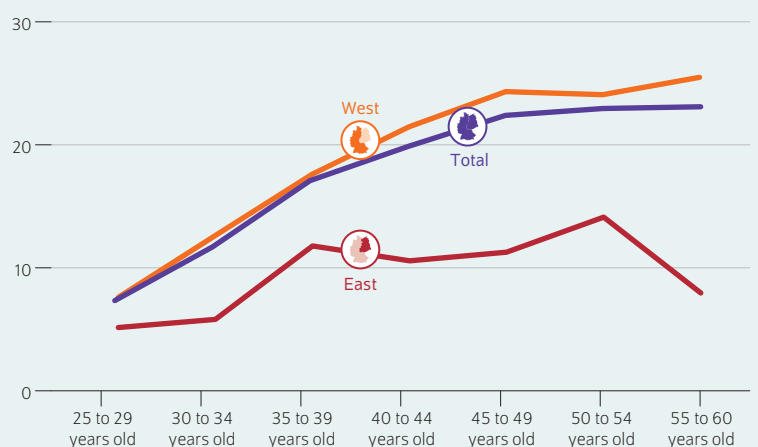
<sup>7</sup> For analyzing the gross hourly wage according to age, ten SOEP survey waves (for 2013 to 2022) were combined. Thus, it is not an analysis of individual life courses between the ages of 25 and 60, but rather an average value of the age groups in the years between 2013 and 2022.

<sup>8</sup> Cf. Schrenker and Zucco, "The gender pay gap begins to increase sharply at age of 30" as well as Schrenker and Wrohlich, "Gender Pay Gap ist in den letzten 30 Jahren fast nur bei den Jüngeren gesunken."

<sup>9</sup> The "jagged" shape of the curve for the east is due to the lower number of cases for the east compared to the west in the underlying calculations. For the same reason, the confidence intervals around the curves for the east are wider than for the west.

Figure 1

Gender pay gap in Germany by age and by region  
In percent



Note: Calculations based on employees' gross hourly wages.

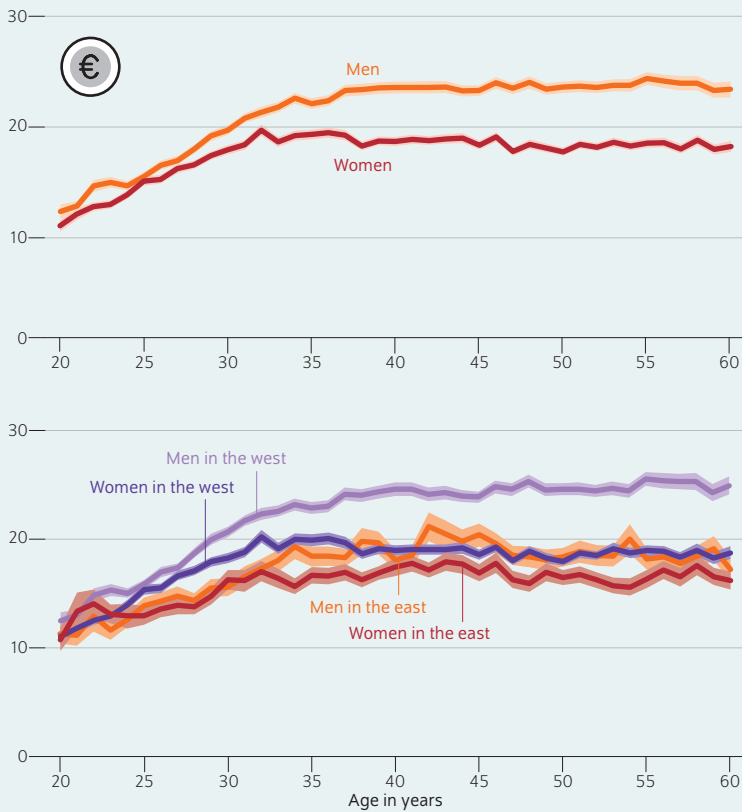
Sources: Socio-Economic Panel (SOEP v39), 2013 to 2022 waves (weighted); authors' calculations.

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The gender pay gap in the west is larger than in the east for all age groups.

Figure 2

**Average gross hourly wages in Germany by age and region**  
In euros



Notes: Calculations based on employees' gross hourly wages. The shaded areas indicate the 95 percent confidence interval; the probability of error is thus five percent.

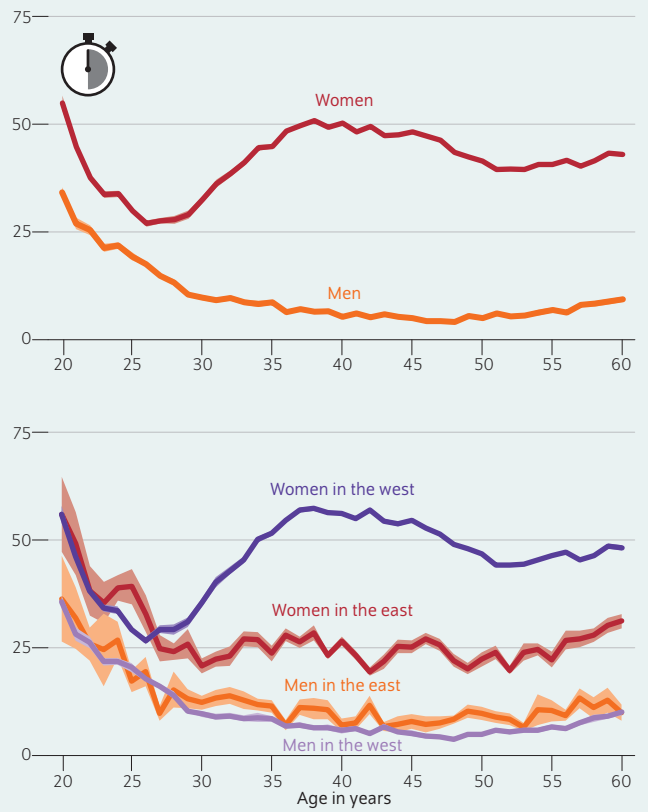
Sources: Socio-Economic Panel (SOEP v39), 2013 to 2022 waves (weighted); authors' calculations.

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From around the age of 33, wage growth for women flattens out.

Figure 3

**Share of part-time work in Germany by age and region**  
In percent



Notes: Calculations based on employees' gross hourly wages. The shaded areas indicate the 95 percent confidence interval; the probability of error is thus five percent.

Sources: Socio-Economic Panel (SOEP v39), 2013 to 2022 waves (weighted); authors' calculations.

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From the age of 30, women work part time more often. For men, the trend is the opposite.

**Development of the gender pay gap reflects the development of number of hours worked**

The share of men and women working part time over the life course develops inversely to the gross hourly wage. While the share declines to a similar extent up until around the age of 26 for both men and women, women work part time more often from the age of 30 (Figure 3, top). The share of women working part time is highest for 38- to 42-year-olds; around half of employed women in this age group are not working full time. After age 42, the part-time share declines slightly, but is still at 40 percent or higher for women over 50. In contrast, the share of part-time workers drops further to around six percent for men between 35 and 55. Previous DIW Berlin analyses have shown that this growing inequality in the number of hours worked between men and women over

the life course goes hand in hand with increasing inequality in unpaid care work, such as childcare and housework.<sup>10</sup>

There are also major differences between the east and west when it comes to the development of gender-specific differences in the shares of men and women working part time, similar to the development of the gross hourly wage: The share of women working part time is particularly high in the west, where it is nearly 60 percent for women between 37 and 42 (Figure 3, bottom). In the east, the share of 37- to 42-year-old women working part time is only half as high at a maximum of 30 percent. There is no significant difference in the share of men working part time in the east and the west: For both groups, around ten percent (east) or a little under ten percent (west) of men over 30 are working part time. The major differences in the number of hours worked between

<sup>10</sup> Cf. Schäper, Schrenker, and Wrohlich, "Gender Care Gap and Gender Pay Gap Increase Substantially until Middle Age."

## Box 2

**Adjusted versus unadjusted gender pay gap**

The discussion around the gender pay gap often distinguishes between the adjusted and unadjusted gender pay gaps. The unadjusted gender pay gap, which is the 16 percent figure for 2024 mentioned at the beginning of this Weekly Report, is the difference in the average gross hourly wages of all employed men and women. However, it does not consider that wage differences are partially due to differences in characteristics of men and women relevant to the labor market, such as different weekly work hours, different careers, and hierarchical differences in their positions. When factors such as occupation, sector, occupational complexity, number of weekly hours worked, and other characteristics are included, there is an adjusted gender pay gap of six percent.<sup>1</sup>

The discussion around the gender pay gap often also asks which of the two is the "true" gender pay gap. There is no clear answer; the unadjusted and adjusted gender pay gaps provide different interpretations. The unadjusted value compares the average gross hourly wages of women and men, thereby reflecting general structural gender-specific inequalities on the labor market, such as differences in the frequency and length of family-related employment breaks, part-time employment, or structural discrimination in being

promoted to executive positions. However, it does not measure gender pay gaps within careers at the same hierarchical level.

The adjusted gender pay gap measures the gender pay gap between employees with the same labor market-relevant characteristics. Thus, the adjusted gender pay gap measures the pay gaps within an industry, an occupation, and a hierarchical level between employees with the same characteristics, such as number of weekly hours worked and level of education. The adjusted gender pay gap can reveal information on the various causes for differences in gross hourly wages. For example, the most recent analysis by the Federal Statistical Office shows that the number of weekly hours worked and marginal employment play a major role in gender-specific differences in earnings,<sup>2</sup> in contrast to differences in level of education.<sup>3</sup>

<sup>1</sup> Federal Statistical Office, "Gender Pay Gap sinkt 2024 im Vergleich zum Vorjahr von 18 Prozent auf 16 Prozent," press release from February 13, 2025 (in German; available online).

<sup>2</sup> Previous DIW Berlin studies have shown that in the same occupation, regardless of gender, part-time employees earn less per hour than full-time employees, see, for example, Patricia Gallego Granados, Rebecca Olthaus, and Katharina Wrohlich, "Teilzeiterwerbstätigkeit: überwiegend weiblich und im Durchschnitt schlechter bezahlt," *DIW Wochenbericht* no. 46 (2019): 845–850 (in German; available online).

<sup>3</sup> Cf. for example Frauke Mischler, "Verdienstunterschiede zwischen Männern und Frauen. Eine Ursachenanalyse auf Grundlage der Verdienststrukturerhebung 2018," *WISTA* 4 (2021): 110–125 (in German).

women in the east and west reflect, among other things, the differing societal norms regarding women (especially mothers) and paid work between the two regions.<sup>11</sup>

**Gender pay gap grows in all education groups as people age**

While the level of education cannot explain the gender pay gap to the extent it previously did (Box 2), it is still a significant determining factor of wages overall. There are differences in the average gross hourly wages of employees according to their level of education by age 25 (Figure 4): Employees with the lowest level of education (no *Abitur* or vocational training) are earning an average gross hourly wage of 13 euros an hour, while those with an intermediate level of education (*Abitur* or vocational training) earn 15 euros an hour and those with the highest level of education (university degree) earn 18 euros an hour. Additionally, gross hourly wages increase with age, and more so the higher an employee's level of education. At age 40, the differences are thus even more pronounced: For employees with a low level of education, the average gross hourly wage has not changed from 13 euros, while the gross hourly wage of employees with an

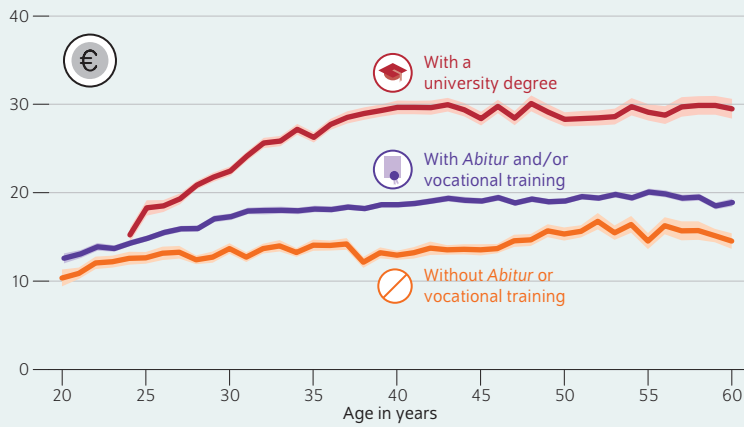
intermediate level of education grows to 19 euros. Employees with a university degree experience the greatest increase in their wage: By 40, their gross hourly wage is 30 euros.

Some of the large gender pay gaps within these three groups increase sharply with age. Evaluating the SOEP data shows that the gender pay gap for employees up to age 25 is comparatively low for people of all levels of education (nine to 12 percent) (Figure 5). From age 25, however, the gap increases until 40 to 44 for people from all educational backgrounds, sometimes substantially. For employees with the lowest and highest levels of education, the gender pay gap in this age group is around 22 percent. For the group with an intermediate level of education, the gender pay gap is much lower at only 16 percent. However, it increases to the level of those with the lowest and highest levels of education by the ages of 45 to 49. In the group of employees with a university degree, the gender pay gap increases even more from the mid-40s to nearly 30 percent for people over 50. This is because men between 35 and 55 with a university degree are able to increase their wages considerably, while women of the same age with a university degree are not (Figure 6).

<sup>11</sup> Cf. for example Denise Barth et al., "Mütter in Ost und West: Angleichung bei Erwerbstätigenquoten und Einstellungen, nicht bei Vollzeiterwerbstätigkeit," *DIW Wochenbericht* no. 38 (2020): 699–706 (in German; available online).

Figure 4

**Average gross hourly wages in Germany by age and level of education**  
In euros



Notes: Calculations based on employees' gross hourly wages. The shaded areas indicate the 95 percent confidence interval; the probability of error is thus five percent.

Sources: Socio-Economic Panel (SOEP v39), 2013 to 2022 waves (weighted); authors' calculations.

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The higher their level of education, the greater a person's gross hourly wage increases as they age.

**Conclusion: A higher level of education does not protect from the gender pay gap**

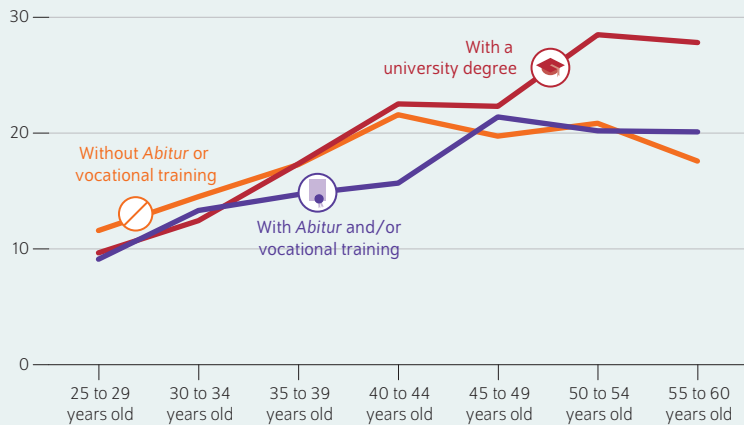
Evaluating SOEP data on the development of the gross hourly wages for men and women of various educational backgrounds over the life course clearly shows that a higher level of education leads to higher wages on average for both men and women. However, the gender pay gap is also the largest for highly educated employees, especially from age 50. Thus, higher education does not protect from the gender pay gap. Earlier studies have shown that this is due to, among other things, the fact that the hourly wage increases disproportionately as the number of weekly hours worked increases in careers that tend to require a higher level of education.<sup>12</sup> As the share of women working part time among all levels of education is significantly higher than the share of men, the average wage development of women with the highest level of education lags behind that of men even more than in groups with a low or intermediate level of education.

Wage inequalities are strongly linked to inequalities in paid employment and care work.<sup>13</sup> If policymakers are serious about achieving equal pay, they should pay more attention to the division of paid work and unpaid care work. However, the German tax and transfer system has financial incentives that promote an unequal division of paid and care work, primarily through the interplay of *Ehegattensplitting* (the joint taxation of married couples with full income splitting), the tax treatment of income from mini jobs, and non-contributory dependents' insurance, where spouses can be insured for free on statutory health insurance.<sup>14</sup>

Redesigning *Ehegattensplitting* by moving more toward individual taxation with a transferable amount would be one possible reform option;<sup>15</sup> alternatives to non-contributory dependents' insurance should also be discussed. Reforming the tax treatment of income from mini jobs would be especially important. In light of growing labor shortages as well as tight public budgets, subsidizing marginal employment in the form of mini jobs, and thus solidifying existing labor market gender inequalities, does not seem to be helpful.

Figure 5

**Gender pay gap in Germany by age and level of education**  
In percent



Note: Calculations based on employees' gross hourly wages.

Sources: Socio-Economic Panel (SOEP v39), 2013 to 2022 waves (weighted); authors' calculations.

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The gender pay gap increases even more from the mid-40s onward for people with a university degree.

<sup>12</sup> Cf. Claudia Goldin, "A Grand Gender Convergence: Its Last Chapter," *American Economic Review* 104, no. 4 (2014): 1091–1119.

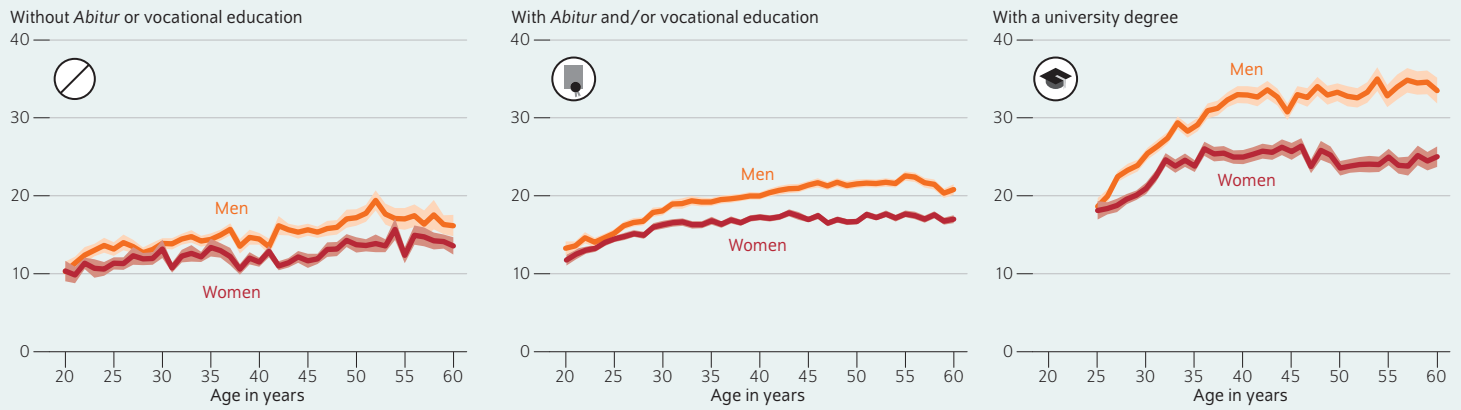
<sup>13</sup> Cf. for example Claudia Goldin, Sari Pekkala Kerr, and Claudia Olivetti, "The parental pay gap over the life cycle: Children, jobs and labor supply," *Journal of Economic Dynamics and Control* (forthcoming, 2025). Descriptive analyses for Germany can be found in Schäper, Schrenker, and Wrohlich, "Gender Care Gap and Gender Pay Gap Increase Substantially until Middle Age."

<sup>14</sup> Cf. for example Maximilian Blömer, Przemyslaw Brandt, and Andreas Peichl, *Raus aus der Zweitverdienerinnenfalle: Reformvorschlage zum Abbau von Fehlanreizen im deutschen Steuer- und Sozialversicherungssystem* (Bertelsmann Stiftung and ifo Institute: 2021) (in German; available online); as well as Ludovica Gambaro et al., "Division of paid and care work between parents: Reality often differs greatly from the ideals," *DIW Weekly Report* no. 29/30/31 (2024): 167–176 (available online).

<sup>15</sup> Stefan Bach et al., "Reform proposal for marriage taxation in Germany: de facto income splitting with a low transferable amount," *DIW Weekly Report* no. 41/42 (2020): 423–432 (available online).

Figure 6

**Average gross hourly wages in Germany by age and level of education**  
In euros



Notes: Calculations based on employees' gross hourly wages. The shaded areas indicate the 95 percent confidence interval; the probability of error is thus five percent.

Sources: Socio-Economic Panel (SOEP v39), 2013 to 2022 waves (weighted); authors' calculations.

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High wage increases are recorded for men with a university degree between the ages of 35 and 55. These increases do not occur for women.

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