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ARTICLE

Does young adulthood caring influence educational attainment and employment in the UK and Germany?

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Abstract

Informal care plays an important role in the provision of care. However, previous research has mainly focused on middle- or older-aged informal carers and less is known about informal care among young adults, its consequences on educational achievement and employment transitions and whether this varies across country contexts. Using data from the 2009–2018 waves of the UK Household Longitudinal Study ($N = 25{,}856$) and the German Socio-Economic Panel ($N = 16{,}666$), we investigated the influence of informal care responsibilities of 17–29 year olds on their chances of achieving a university degree using logistic regression and employment transitions using Cox proportional hazard regression models. Our results revealed that young adulthood caring was negatively associated with the likelihood of obtaining a university degree, reduced the likelihood of entering employment and increased the likelihood of unemployment. These associations were more pronounced if people reported caring for more weekly hours (especially in the UK) or caring for longer durations (especially in Germany). The potential negative influence of caring in young adulthood on education was stronger for women than for men in Germany, and the influence of caring on entering unemployment was stronger for women than for men in the UK.

Keywords: young adult care; informal care; education; employment; United Kingdom; Germany

Introduction

Studies on the provision of informal care usually focus on middle or older aged informal carers, and only a few deal with young adult carers (i.e. adults aged 17 to 29).

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Given that young adult carers (YAC) are increasingly confronted with the necessity of providing informal care (e.g., to own parents), this is surprising. Moreover, caring during this important life stage may have important consequences for carers' lives. For example, provision of informal care might disrupt education and entry into employment, which in turn may lead to the accumulation of lifelong disadvantages and the development of long-term inequalities, including gender inequality (Crystal et al., 1992). Additionally, country contexts may impact the care situation of YAC and their ability to continue education and work and affect how gender norms are shaped. The United Kingdom (UK) and Germany can be regarded as examples of two countries with distinct types of educational, employment (and care-related) types of policies targeting young adults as well as with different images of youth (Chevalier, 2016). Because of this, we aim to investigate the association between informal caring and educational attainment and employment outcomes of YAC in the UK and Germany together with gender differences in those associations.

This study is structured as follows: we first present an overview of studies on informal care during early adulthood and its associations with gender, education and labour market participation. We then briefly describe the welfare context using Chevalier's concept of *youth welfare citizenship*. We then analyse and discuss the association between informal caring between the ages of 17–29 and obtaining a university degree or making employment transitions, including potential gender differences in our associations using the average marginal effects of logistic regression models for the education outcomes and Cox proportional hazards regression models for the employment outcomes respectively. The paper ends with a detailed discussion of the consequences of caring in young adulthood on employment and education.

Background

YAC are young adults who are providing care for a relative in need of care due to some form of existing physical or mental disability, chronic illness or other conditions (Becker & Becker, 2008). As such, the majority of care recipients are a (grand-) parent of the YAC (Di Gessa et al., 2022). Young adults may provide care because of a lack of other available alternatives, for example, due to insufficient access to public care services or limited financial resources to spend on private care services (Day, 2015). The experience of young adulthood for YAC can differ substantially compared to non-carers, given that YAC on the one hand are often required to 'grow up' faster and become independent sooner due to their care responsibilities, while on the other hand often have to delay moving out of their parental home (Becker & Becker, 2008). As such, YAC are required to constantly manage being a carer with the rest of their social, educational and work life, further shaping and often limiting prospective opportunities (Day, 2015). Obtaining an overview of the prevalence of informal caring among young adult is challenging, since YAC often do not identify as carers or disclose their caring responsibilities for fear of negative consequences (Kettell, 2020). Studies often also use different age ranges to define YAC. Di Gessa et al. (2022) estimate that about 9% of young adults aged 16–29 provide informal care in the UK. In Germany, Kochskämper et al. (2020) found that about 8.8% of young adults aged 17–29 provided informal care.

Associations between young adult caring and education and employment outcomes

Education

Numerous studies demonstrate how education has long-term consequences for socioeconomic factors across the life course. For instance, early school leaving and a lack of educational qualifications have been linked with a disadvantaged socio-economic position throughout adulthood (McDonough et al., 2015), while university degrees often increase the chance of being employed, entering the most advantaged occupational classes and earning higher salaries (Blundell et al., 2005).

For young adult carers, there may be problems in combining care responsibilities and (higher) education. YAC may have less time to complete assignments, participate in group activities or prepare for exams, and leaving home for education could be problematic for primary carers (Day, 2015; Kettell, 2020). Some young carers may feel less able to concentrate on their studies due to planning or thinking about care needs. However, only a few studies have assessed the association between young adulthood caring and education, and existing studies are either qualitative or cross-sectional in small samples of carers. Qualitative studies from the UK and Australia revealed that YAC had more difficulties attending higher education than non-carers and reported deviating from their academic study due to the competing caring roles (Day, 2019; Kettell, 2020). Cross-sectional quantitative results from the UK showed that 16% of YAC were considering dropping out of college or university (Sempik & Becker, 2013), but it was not possible to compare the figure with the non-carers due to the design of the study which only interviewed carers. Research from Mindermann et al. (2021) showed that, for students at a German university, 37% of primary carers reported a very high time-related burden of caring. Cross-sectional descriptive figures from Australia showed that YAC were 7% more likely to have post-secondary education qualifications than non-carers, but this study acknowledged that this figure may be unreliable due to the small sample size of carers (Cass et al., 2009).

Employment

Employment provides a significant source of identity formation, social status, participation in society and access to financial resources. For young adults, there is a relatively wide range of flexibility in their employment biographies due to common periods of temporary employment relations (Escudero et al., 2018). Studies suggest that those who experience work interruptions often face a 'wage penalty' when they return to work (Staff & Mortimer, 2012), with this lack of employment in young adulthood likely leading to 'constant scar rather than a temporary blemish' (Freeman & Blanchflower, 2000: 2).

YAC may have limited employment opportunities due to conflicting demands between caring responsibilities and the workplace (Hamilton & Adamson, 2012). For working YAC, caring commitments may make them miss out on job promotions, lead to insufficient support at work (Pope et al., 2022), and interfere with long-term career goals (Cass et al., 2009; Hamilton & Adamson, 2012). As with educational outcomes, most empirical evidence on the association between care and employment among young adults comes from qualitative research or quantitative

cross-sectional studies. For instance, a qualitative study from Australia found that YAC, regardless of their employment status, all expressed concerns about the difficulty of combining work and care (Hamilton & Adamson, 2012). A small-scale survey of 77 UK YAC who had left school showed that almost half were unemployed (Sempik & Becker, 2014). To our knowledge, there is only one longitudinal study assessing the association between young adult care and employment. Using two waves of the UK Household Longitudinal Study, Brimblecombe et al. (2020) found that young adults who provided care at baseline (2014–2016) were less likely to be in employment at follow-up one year later (2015–2017) compared with non-carers. This study did not assess how caring characteristics, such as duration and intensity, influence YAC employment.

Gender difference

Traditional gender norms regard men as breadwinners with less responsibility for unpaid family obligations than women (McMunn et al., 2020). Even though female part-time employment rates in the UK and Germany have been similar since the mid-2000s, the UK historically had overall higher rates of female (part-time) employment compared to (West-) Germany, where a lot of women typically managed domestic tasks at home (Aust & Bönker, 2004; Taylor-Gooby & Larsen, 2004; OECD, 2022). Studies from older or midlife carers revealed, that women are more likely to provide care and at a higher intensity, and that caring women are also more likely to reduce working hours or leave the labour market than men (Navaie-Waliser et al., 2002; Ciccarelli & van Soest, 2018). Cross-sectional analysis from the UK 2001 Census revealed that young adult men who were providing 20+ hours of care per week were three times and female YAC were almost four times more likely to not work full-time, compared to non-carers and those caring for fewer hours per week (Young et al., 2006). To our knowledge, there are no cross-sectional studies evaluating gender differences in the provision of informal young adult care in Germany. Similarly, gender differences in responding to care in early adulthood and their effect on employment have not yet been investigated in longitudinal studies.

UK and Germany

Welfare states differ in their consideration of young adults. In his youth welfare citizenship typology, Chevalier (2016) distinguished four types of youth welfare citizenship: second-class, monitored, denied and enabling youth citizenship. These types are based on a two-dimension approach differentiating dimensions of social and economic citizenship. The social citizenship dimension distinguishes between forms of familialised and individualised citizenship. Familialised citizenship is characterised by high levels of parental obligation to support young adults up to their mid-twenties, an image of youth as dependent children, social policies depending on the parental financial situation. Individualised citizenship in turn is characterised by young adults being considered as full independent adults, with parental obligations ending around eighteen years of age and social policies targeted at young adults themselves. In the case of the economic citizenship dimension, it can be categorised into encompassing and selective economic strategies. Encompassing

economic strategies are characterised by an education system that aims to provide a base set of skills to every young adult. Encompassing strategies against youth unemployment are based on opening access to education with the overall goal of enhancing the human capital of young adults. Selective economic strategies are characterised by an education system aimed at providing (higher educational) skills to a smaller group of young adults, leading to a higher share of low or no qualification youth, workfare youth unemployment policies and lowered youth labour costs via sub-minimum wages for young adults aged below 23.

In this typology, second-class youth citizenship combines selective economic and individualised social citizenship, monitored youth citizenship combines encompassing economic and familialised social citizenship, denied youth citizenship combines selective economic and familialised social citizenship and enabling youth citizenship combines encompassing economic and individualised social citizenship. According to Chevalier, young adults in the UK have a second-class and young Germans have a monitored youth citizenship.

Furthermore, the individualised policy system of the UK and the more family-focussed system of Germany are also embedded in (young adult) care-related policies. In the UK, those in need of or providing informal care can obtain publicly funded social care or monetary grants. Informal carers are entitled to a *Carer's Allowance* of £66.15 a week if caring for more than 35 hours a week. However, this applies only to informal carers who are *not* in full-time education and who study for 20 hours or less per week. If carers are obtaining other types of income support (i.e. Jobseeker's Allowance, Universal Credit, etc.) and they are eligible for Carer's Allowance, they can also apply for a *Carer's Premium* for an additional payment of up to £38.85 per week. More recently, young carers aged 16-18 in Scotland can receive yearly payment of £326.65. Compared to other countries, the UK has a more advanced awareness of young carers as an intervention group, guaranteeing young carers access to a carers assessment, and implementing support structures for young carers in need (Leu & Becker, 2017). However, until 2020, there was no formal legislation in the UK aimed at allowing people to combine care and work responsibilities (Yeandle & Buckner, 2017). Since 2020–2021, employees have the right to *carer's leave* that allows them to take up to one week (5 working days) of unpaid leave per year. So far, YAC are dependent on individual universities' policies on combining care and education, which are often perceived by YAC as very rigid and do not match their flexible needs (Kettell, 2020).

In Germany, long-term care insurance (LTCI) policies aim at the care-recipients, providing a plethora of formal ambulant (at home), (semi-)stationary short-term or full stationary (in hospitals or typically nursing homes) care services. Alternatively, recipients can receive a money-transfer (*Pflegegeld*) ranging from 316€ up to 901€ per month instead of ambulant care, which they can use to cover the loss of income of relatives providing informal care for them, as there isn't financial support directly targeted at informal carers. Central for the German care regime are subsidiary care relations, which promote a mix of home-/family based and publicly financed services for arising care needs (Theobald & Luppi, 2018). Contrary to the UK, there is no existing legislation directly targeting young carers or YAC as a specific intervention group in Germany (Leu & Becker, 2017). Two important policies targeting informal carers in employment are the *Pflegezeitgesetz* and the

Familienpflegezeitgesetz, which aim to ease combining care and work responsibilities. The former offers short-term (10 days a year) or long-term (6 up to 24 months) time-off for informal carers. The latter – implemented as law in 2015 – enables carers to reduce their weekly worktime for a maximum of 2 years to a minimum of 15 hours per week. Both laws, however, do *not* apply to university students who have to rely on the individual university policies (Buß, 2019).

These different social and economic citizenships, different gender norms and country contexts and awareness and policies targeting YAC in the UK and Germany may directly structure the (day-to-day) care situation of YAC and their participation in education and employment.

This study

Our study aims to examine and contrast the relationship between providing informal care and educational qualifications and employment transitions among young adults aged 17 to 29 from two nationally representative household panel studies in the UK and Germany and to understand how gender influences these associations. Based on the findings of previous studies, we expect young adult caring to reduce the likelihood of obtaining higher educational qualifications and entering employment as well as increasing the chance of being unemployed. We also expect country differences in the occurrence of caregiving and weaker negative associations between young adult caregiving and employment or education outcomes in Germany. Finally, we expect stronger negative associations for female YAC in both education and employment outcomes in both countries.

Data and sample

We used data from the UK Household Longitudinal Study (UKHLS) and the German Socio-Economic Panel (GSOEP). Both the UKHLS and the GSOEP are ongoing large household panel studies with information on a broad range of social, cultural, economic and behavioural topics (Goebel et al., 2019; ISER, 2021). The UKHLS started in 2009, and participants from 40,000 households have been surveyed annually. The GSOEP, which started in 1984 and has yearly information on about 15,000 households, successfully interviewed 20,000 people in 2009. The 2019 wave is the latest available in both countries but was not used, as that wave in the UKHLS was mainly conducted during the Covid pandemic (fieldwork period is 2019 to 2021). We have, therefore, ten waves of data (2009–2018) from the UK and Germany. The University of Essex Ethics Committee approved all data collection of the UKHLS, and the GSOEP is being advised by the independent SOEP Survey Committee and regularly being evaluated by the DIW Berlin Scientific Advisory Board.

We are interested in young adulthood caring and thus only selected those who had the care information during young adulthood. Young adulthood was defined as age 17–29, because informal care questions were collected among those aged 17 and over in GSOEP and 16 and over in UKHLS, and we defined young adults as those aged below 30 to reflect the extension of 'young adulthood' as a life course period over the last few decades (Syed, 2015). Therefore, we selected only respondents who

provided information about informal care provision at one or more waves when they were aged 17-29 (n = 25,856 in the UK and 16,666 in Germany).

Depending on the outcome of interest (see below), we drew on four main sample types. For the education analysis, we excluded those adults who were younger than 21 when last interviewed to ensure that they would be old enough to have attended university. Additionally, we excluded carers who already achieved a university degree before or at the wave of the first provision of informal care resulting in 18,312 respondents for the UK and 10,725 respondents for Germany. For entering employment, we only included those who were not already in employment at baseline (n = 12043 for the UK; n = 5846 for Germany) and for becoming unemployed (being officially registered as unemployed or looking for a job), we restricted the sample to respondents who were not unemployed at baseline (n = 17921 for the UK; n = 9181 for Germany).

Measures

Caring characteristics

We analyse care provision (yes/no), the intensity and duration of care. The intensity of caring was originally reported as a categorical variable in UKHLS (0–4; 5–9; 10–19 hours/week; ...) and as a continuous one in GSOEP. Given the distribution of both variables (with 10 hours being the median number of hours of care provided in Germany), we categorised individuals into no care, regular care (less than 10 hours/week) and intensive care (10 hours/week or more). Similarly, due to its distribution, the duration of care was grouped into no care, caring for only one wave, and caring for two waves or more. Original care-related questionnaires in both datasets and the process of harmonisation are shown in Supplementary Table S1.

Educational attainment outcome

To assess educational attainment, we used the self-reported highest educational qualification across all ten waves and dichotomised it into "no degree" and "have a degree or higher qualification" for the UK dataset. In the case of Germany, the pre-generated International Standard Classification of Education (ISCED)-97 levels provided by the GSOEP were used and dichotomised to harmonise both datasets.

Employment transition outcomes

For both datasets, the self-reported current employment status was collected at each wave. Those who reported in 'paid employment (either full-time or part-time)', 'self-employed' or 'on maternity leave' were considered as 'in paid employment' and those who self-reported as 'unemployed' were considered as 'in unemployment'. We assessed two measures of employment transitions: entering paid employment and entering unemployment.

Measures of covariates

Covariates include age, sex, ethnicity (UK only), migration status (Germany only), household income, highest parental occupational class and educational attainment.

Due to differences in the information available between datasets, we included ethnicity for the UK, which is grouped into 'White', 'Black', 'Indian', 'Pakistani', 'Bangladeshi', and 'other Asian/other'. For the German analysis, we included a dichotomised migration background ('No migration background' and 'Migration background'). Parental class was measured by the National Statistics Socio-economic Classification (NS-SEC) three-class version ('managerial/professional', 'intermediate', and 'routine/manual') in the UK. For the German analysis, we transformed Erikson-Goldthorpe schemes (based on ISCO88-scores) to match the NS-SEC three-class version. Parental education was categorised into 'degree or higher', 'lower than degree', 'some qualification' and 'no qualification'. We had the occupational class and education information from both parents when participants were age 14 (UK) or 15 (Germany) and used the highest value among parents. Age and household income were collected at baseline (i.e., the wave when first interviewed). The household income was measured as quintiles of the total net household income divided by the OECD equivalence scale.

Statistical analysis

Education outcome analysis

Logistic regression was used to analyse the association between caring and whether a respondent had a degree qualification as the highest qualification. Coefficients of regular logistic regressions are hard to compare across groups and models, and one solution to this is to calculate the average marginal effects (AME). AME gives the average effect of an independent variable on the probability of the dependent variable to be 1 – in this case obtaining a university degree (Mood, 2010). Models adjusted for age, sex, ethnicity (UK only), migration status (Germany only), household income, parental occupational class and parental education. To account for the different chances of being observed to provide care, the total number of waves participated between ages 17 and 29 was also adjusted. Each caring characteristic (three in total) was tested in separate logistic regression models.

Employment outcomes analysis

When investigating the association between young adult caring and employment transitions, Cox proportional hazards regression models were used (having established that the proportional hazards assumption was not violated). We modelled the hazards of entering paid employment and unemployment in separate Cox regression models. Each employment transition was considered as an 'event occurred' in the Cox regression models (Cox, 1972). Age of 'event occurred' was defined as the participant's age when the event of interest first happened (e.g., age when first entering employment). Participants whose event of interest had not occurred at the end of the follow-up or left the study before the 'event occurred' were treated as right-censored. Age was used as the timescale to account for age effects. In terms of covariates, sex, ethnicity (UK only), migration status (Germany only), household income, parental occupational class and parental education were also

included in the models. Participants' own highest educational qualifications were additionally adjusted. We also adjusted for the birth year (categorical variable) to account for possible period effects on employment.

All Cox regression models were additionally stratified by two age groups: younger than age 23 when last interviewed and age 23 or older when last interviewed. We chose 23 as the age by which most young adults are likely to have completed full-time education (ONS, 2016; Statistisches Bundesamt, 2021). The stratification provides insights into whether caring is associated with employment outcomes differently for young people at two different transition stages, i.e., the full-education stage and the employment stage.

Multiple imputation and weighting

All missing data on covariates and aspects of caring were imputed using multiple imputation by chained equations (MICE). Variables from the analyses (i.e., independent variables, outcome variables and covariates) were included in the imputation model. We produced thirty imputed datasets to ensure that the number of imputations would be at least equal to the percentage of incomplete cases (White et al., 2011). In the final MICE step, the thirty estimates are combined into an overall estimate. After that, we excluded imputed outcome values before running regression models (von Hippel, 2007).

While weighting can improve the precision of estimates (Solon et al., 2015), it can also cause some problems in multivariate analysis. One main aspect is that weighting the sub-population of a data set is usually not advisable as the adjustments made by the weight might not apply to a specific subset (in this case YAC) (Würbach et al., 2021). One common problem of weighted analyses can be the estimation of reliable standard errors (Winship and Radbill, 1994). Different from ordinary regression models, where significance is influenced by the sample size, the significance in event-history models is dependent on the number of events (Blossfeld et al., 2019). If cases with an event are (down-) weighted, this can lead to rather high standard errors. Due to these reasons we decided to report unweighted results in the main text and weighted point-estimators in Supplementary Table S6.

Gender differences and robustness analysis

We tested the gender difference with regard to the provision of care on its associations with education and employment outcomes by including an interaction term. To ensure the robustness of our education analysis, we ran our models using different exclusion ages (age 23 and age 25) for selecting analytic samples.

Results

Descriptive results

Young adults in the UK were three times more likely (16.2%) to provide informal care than in Germany (4.5%). Socio-demographic characteristics of our young adults sample by their caring status are shown in Table 1. In both countries, carers

Table 1. Description of demographic, socioeconomic and caring characteristics in the UK and Germany

	UK			Germany		
	No care $N = 21671$	Yes care $N = 4185$	P	No care $N = 15925$	Yes care $N = 741$	P
Age, mean (SD)	21.66 (4.16)	20.99 (3.86)	<0.001	21.62 (4.25)	21.56 (3.83)	<0.001
Gender %			<0.001			<0.001
Male	49.1	41.2		51.3	41.0	
Female	50.9	58.8		48.7	59.0	
Migration background %			X			<0.001
No	X	X		60.1	52.8	
Yes	X	X		39.9	47.2	
Ethnicity %			<0.001			X
White	72.7	70.3		X	X	
Black	8.5	6.9		X	X	
Indian	5.0	4.6		X	X	
Pakistani	5.0	8.1		X	X	
Bangladeshi	3.4	6.5		X	X	
Asian/Other	5.5	3.5		X	X	
Household net equivalence income %			<0.001			<0.001
First quintile (lowest)	19.3	23.8		19.6	29.4	
Second quintile	18.8	26.0		19.9	22.7	
Third quintile	19.8	21.2		20.0	19.7	
Fourth quintile	20.6	16.9		20.2	15.0	
Fifth quintile (highest)	21.5	12.1		20.3	13.2	
Parental educational attainment %			<0.001			<0.001
No qualification	33.1	42.7		16.6	25.5	
Some qualification	40.2	37.3		17.8	15.5	
Lower than degree	14.3	13.2		48.4	45.6	
Degree or higher	12.5	6.8		17.2	13.4	
Parental occupational class %			<0.001			<0.001
Routine/Manual	35.2	38.2		20.7	19.7	
Intermediate	14.0	11.0		27.9	25.2	
Managerial/Professional	38.0	24.7		41.3	37.4	
Not working	12.8	26.1		10.1	17.7	

(*Continued*)

Table 1. (*Continued*)

	UK			Germany		
	No care $N = 21671$	Yes care $N = 4185$	P	No care $N = 15925$	Yes care $N = 741$	P
Number of waves participated, mean (SD)	2.97 (2.23)	4.29 (2.55)	<0.001	2.80 (2.14)	3.79 (2.55)	<0.001
Care intensity %						
No care	100.0	0.0	<0.001	100.0	0.0	<0.001
Regular care	0.0	64.6		0.0	50.2	
Intensive care	0.0	35.4		0.0	49.8	
Care duration %						
No care	100.0	0.0	<0.001	100.0	0.0	<0.001
1 wave care	0.0	58.6		0.0	80.8	
2 waves or more care	0.0	41.4		0.0	19.2	
University degree						
No	72.9	79.1	<0.001	91.7	95.1	<0.001
Yes	27.1	20.9		8.3	4.9	
Employment						
In paid employment	44.5	36.2	<0.001	21.8	10.5	<0.001
Unemployed	9.7	14.6		32.7	43.9	
Other not in work	45.7	49.3		45.5	45.6	

Note: *N* is based on pooled sample of all age-eligible (age 17–29 at first interview) young adults across ten waves of data. Data were imputed. *P* values were calculated based on the difference between carers and non-carers.

were more likely to be female and were slightly younger than non-carers when they were first interviewed. Carers in the UK were slightly more likely to be Pakistani or Bangladeshi than non-carers. In Germany, carers were more likely to have a migration background than non-carers. In both countries, half of the carers resided in a family with low household income (first or second quintile), compared to less than 40% of non-carers. Although the German sample had higher parental educational levels than the UK in general, we observed similar patterns of inequality between carers and non-carers. Carers were also more likely to have non-working parents when they were aged 14–15 than non-carers. YAC in both countries were less likely to have a university degree and were more likely to be unemployed at base entry compared to non-carers. Carers participated, on average, for four waves in both countries, one wave longer than non-carers.

Carers in the UK cared for more years than those in Germany (41.4% vs. 19.2% carers cared for two or more waves). However, half of the German carers provided regular care (less than 10 hours per week), and half provided more intensive care, while in the UK, only one in three carers provided intensive care.

Table 2. Average marginal effect (AME) of the association between young adulthood care and degree qualification in the UK and Germany

	UK (N = 18312)			Germany (N = 10725)		
	AME	95% CI		AME	95% CI	
Yes/no care						
No care	Ref			Ref		
Yes care	**−1.52**	−1.66	−1.39	**−0.90**	−1.23	−0.58
Care intensity						
No care	Ref			Ref		
Regular care	**−1.35**	−1.51	−1.19	**−0.96**	−1.37	−0.55
Intensive care	**−1.88**	−2.13	−1.63	**−0.82**	−1.32	−0.31
Care duration						
No care	Ref			Ref		
1 wave care	**−1.74**	−1.94	−1.54	**−0.73**	−1.07	−0.38
2 waves or more care	**−1.31**	−1.49	−1.13	**−1.69**	−2.55	−0.84

Note: Those younger than age 21 (when last interviewed) or that had already achieved a university degree before or at the wave of the first provision of informal care were excluded from the analysis. Each caring characteristic was tested in separate logistic regression models. All models adjusted for age, gender, ethnicity (UK only), migration status (Germany only), household income, parental occupational class, parental education and number of waves participated between age 17 and 29. All the analyses were imputed. P values <0.05 were shown in bold.

Multivariable analysis

Education

Average marginal effects (AME) from logistic regression are shown in Table 2. AME of care had a value of –1.52 in the UK, indicating that the probability of achieving a higher education was reduced by 152 percentage points for those who were carers. For the UK, high-intensity care was the most important, reducing the probability of achieving higher education by 188 percentage points. Providing care for less than 10 hours per week reduced the probability of achieving higher education by 135 percentage points in the UK. Caring for a short- and long-term period reduced the probability of obtaining a higher education degree by 174 and 131 percentage points respectively. In Germany, carers had a 90 percentage points lower probability of achieving a higher education compared to non-carers. Providing regular care was associated with a reduction of 96 percentage points and providing high-intensity care with a reduction of 82 percentage points in the probability of achieving a higher education. Providing long-term care was especially important in Germany, reducing the probability of achieving a higher education degree by 169 percentage points. Providing care for one wave revealed a reduction of 73 percentage points. All these associations were statistically significant at the 5% level and have large effect sizes.

AME for covariates are shown in Supplementary Table S2 (only for yes/no care provision).

In the robustness analysis for the association between caring and education (Supplementary Table S3), different age samples led to similar results, although the

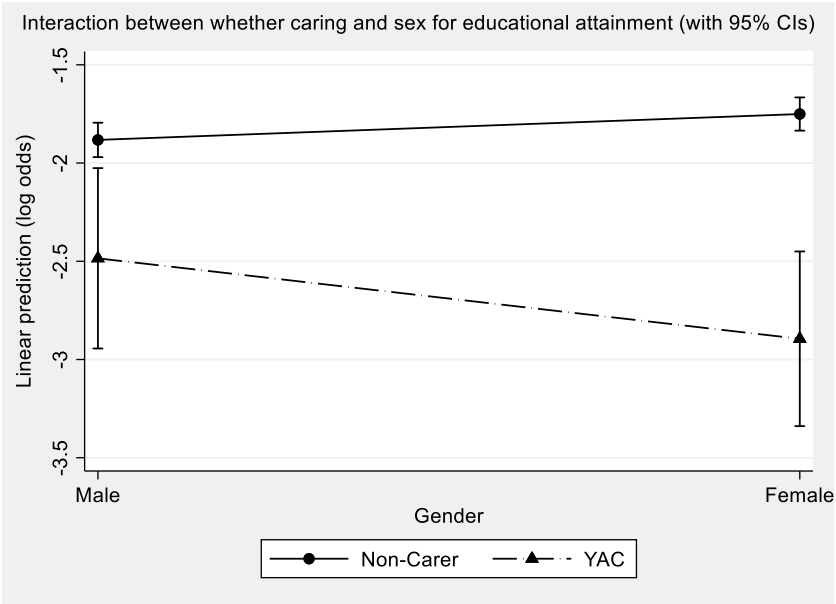

Figure 1. Gender differences in the association between care and obtaining a university degree in Germany.

effect sizes were slightly attenuated albeit still significant in both age groups for both countries.

Regarding gender differences in the association between care and the university degree, we found that the potential negative influence of young adulthood caring was significantly stronger for women than for men in Germany at the 10% significance level (Figure 1 and Table S5). No gender differences were found in the UK.

Employment

Table 3 shows the Cox regression results for the association between young adulthood caring and entering into employment. In both countries, a lower likelihood of entering employment was only found when the caring happened after the full-time education age period (i.e., older than age 23), and no association was found among those younger than age 23. Among those older than age 23 in the UK, carers had, on average, an 11% lower likelihood of entering employment. In the UK, only intensive care (Hazard Ratio = 0.69, 95% CI: 0.61, 0.78) and long-term care (Hazard Ratio = 0.87, 95% CI: 0.79, 0.97) significantly reduced the likelihood of entering employment. YAC aged older than 23 in Germany had, on average, a 21% lower likelihood of entering employment. In Germany, providing regular care (Hazard Ratio = 0.77, 95% CI: 0.61, 0.98) and especially providing care for two waves or more (Hazard Ratio = 0.61, 95% CI: 0.41, 0.89) significantly reduced the likelihood of entering employment.

Table 3. Hazard ratio (HR) of the association between young adulthood care and entering employment

	UK									Germany								
	Combined $N = 10317$			Age $>=23$ $N = 5534$			Age <23 $N = 4783$			Combined $N = 4783$			Age $>=23$ $N = 2574$			Age <23 $N = 2209$		
	HR	95% CI		HR	95% CI		HR	95% CI		HR	95% CI		HR	95% CI		HR	95% CI	
Yes/no care																		
No care	Ref			Ref			Ref			Ref			Ref			Ref		
Yes care	**0.92**	0.86	0.98	**0.89**	0.83	0.97	1.05	0.94	1.18	**0.83**	0.72	0.97	**0.79**	0.65	0.96	0.94	0.74	1.25
Care intensity																		
No care	Ref			Ref			Ref			Ref			Ref			Ref		
Regular care	1.02	0.95	1.10	1.03	0.94	1.12	1.05	0.92	1.20	**0.83**	0.69	1.00	**0.77**	0.61	0.98	0.97	0.72	1.31
Intensive care	**0.74**	0.66	0.82	**0.69**	0.61	0.78	1.06	0.86	1.30	0.84	0.65	1.09	0.82	0.60	1.13	0.95	0.58	1.57
Care duration																		
No care	Ref			Ref			Ref			Ref			Ref			Ref		
1 wave care	0.95	0.87	1.03	0.92	0.83	1.02	1.06	0.91	1.22	0.89	0.75	1.06	0.87	0.70	1.08	1.02	0.76	1.37
2 waves or more care	**0.89**	0.81	0.97	**0.87**	0.79	0.97	1.04	0.88	1.24	**0.68**	0.50	0.93	**0.61**	0.41	0.89	0.81	0.48	1.38

Note: Those in paid employment at baseline were excluded from the analysis. Each caring characteristic was tested in separate Cox regression models. All models adjusted for gender, ethnicity (UK only), migration status (Germany only), household income, parental occupational class, parental education and participants' own highest educational qualifications. Age was used as the timescale to account for age effects. All the analyses were imputed. *P* values <0.05 were shown in bold.

Table 4. Hazard ratio (HR) of the association between young adulthood care and entering unemployment

	UK									Germany								
	Combined $N = 16425$			Age $>=23$ $N = 11103$			Age <23 $N = 5322$			Combined $N = 7640$			Age $>=23$ $N = 4388$			Age <23 $N = 3252$		
	HR	95% CI		HR	95% CI		HR	95% CI		HR	95% CI		HR	95% CI		HR	95% CI	
Yes/no care																		
No care	Ref			Ref			Ref			Ref			Ref			Ref		
Yes care	**1.24**	1.13	1.36	**1.30**	1.16	1.44	1.13	0.95	1.35	**1.21**	1.00	1.45	**1.28**	1.03	1.60	1.08	0.78	1.49
Care intensity																		
No care	Ref			Ref			Ref			Ref			Ref			Ref		
Regular care	1.10	0.99	1.23	**1.17**	1.03	1.33	0.98	0.79	1.21	1.14	0.92	1.41	1.19	0.91	1.56	1.05	0.73	1.52
Intensive care	**1.56**	1.36	1.78	**1.58**	1.35	1.84	**1.53**	1.17	2.01	**1.40**	1.01	1.92	**1.51**	1.04	2.19	1.20	0.64	2.25
Care duration																		
No care	Ref			Ref			Ref			Ref			Ref			Ref		
1 wave care	**1.21**	1.08	1.37	**1.25**	1.09	1.45	1.17	0.94	1.45	1.20	0.97	1.49	1.20	0.92	1.57	1.21	0.85	1.72
2 waves or more care	**1.26**	1.12	1.42	**1.33**	1.17	1.52	1.08	0.84	1.40	1.21	0.87	1.70	**1.49**	1.02	2.18	0.72	0.34	1.53

Note: Those unemployed at baseline were excluded from the analysis. Each caring characteristic was tested in separate Cox regression models. All models adjusted for gender, ethnicity (UK only), migration status (Germany only), household income, parental occupational class, parental education and participants' own highest educational qualifications. Age was used as the timescale to account for age effects. All the analyses were imputed. *P* values <0.05 were shown in bold.

The association between care and entering unemployment (Table 4) was again concentrated amongst those older than full-time education age, with carers in this age group in the UK having an about 30% higher risk of entering unemployment than their peers who did not provide care. In the UK, providing regular intensity care was associated with an about 17% higher risk of entering unemployment and providing high-intensity care was associated with a 58% higher risk of entering unemployment. Providing care for either one wave or two waves or more in the UK increased the risk of entering unemployment by 25% and 33% respectively. In Germany, carers had a 28% higher risk of entering unemployment compared to non-carers. Our analysis revealed only significant associations for intensive caring, increasing the likelihood of entering unemployment by 51%. Similarly, only providing long-term care was associated with a significantly increased risk of entering unemployment by 49%.

Analysing gender differences in the associations between care and the employment outcomes, we found that women in the UK were significantly more likely than men to enter unemployment (Table S5).

Discussion

Compared to Germany, we found a noticeably higher share of carers in the descriptive analysis of the UK data. Possible explanations for this might be the high levels of familialisation and 'protection' of young adult carers in Germany as well as its emphasis on publicly funded care services that reduce the necessity for young adult Germans to provide informal care (Theobald & Luppi, 2018). However, it is noteworthy that the image of a protected and dependent youth, that is inherent of a monitored youth citizenship, may be jeopardised as young adult caring can invert dependencies between caring children and their (dependent) parents. We also found that YAC are more likely to be female and come from a disadvantaged socio-economic background in both countries.

In our study, we found that YAC in the UK and Germany are less likely to achieve a university degree than young adults who do not provide informal care. These findings are consistent with other already existing cross-sectional and qualitative research (Day, 2019; Kettell, 2020; Becker & Becker, 2008). The duration and intensity of caring also influence the chances of young adults obtaining a university degree, with high-intensity care in the UK and long-term care in Germany having the strongest associations. Providing high-intensity care will most likely lead to fewer mental resources and time for YAC to prepare for exams, finish assignments on time or even attend classes at all (Day, 2019). Short-term carers may be able to partially compensate the different social, bureaucratic and time-related problems that are associated with being a YAC in higher education (Kettell, 2020). These problems, are however most likely to add up over time if not being addressed adequately and thus – in case of long-term carers – inhibit the possibilities of YAC to finish their education successfully. Prolonged stays in education may lead to more financial hardships for carers in the UK than in Germany. Whereas tuition fees in Germany were abolished in 2014, students in the UK have to pay up to about £9,000 per year, leading to the overwhelming majority of students in the UK taking a

student loan. The subsequent loan debts, even though their repayments are income-contingent, may inhibit future economic resources and can be linked to reducing the likelihood of early homeownership after graduation (Gayardon et al., 2022). It is noteworthy that, in the German analysis, there was an interaction with gender, where women who would typically be more likely to achieve higher education now have an even lower probability of obtaining a university degree because of their caring responsibilities, compared to male carers. This might be a product of persisting gender norms in Germany leading to women being more likely to provide informal care than men (Theobald, 2014).

Similar to previous research (Brimblecombe et al., 2020), our findings suggest a negative association between caring and employment outcomes, by decreasing the likelihood of entering employment and increasing the likelihood of entering unemployment for YAC who were older than 23. The negative association between high intensity caring and the likelihood of entering employment might be explained by YAC not being able to find jobs that provide part-time or flexible working hour arrangements that are necessary to combine working with high intensity care responsibilities (Aylward et al., 2018). High-intensity carers might also have less time to look for jobs and prepare for job interviews. High-caring hours can also turn into active barriers for those already employed, forcing carers to reduce working hours or outright stop working altogether to meet increasing care demands. Highest intensity YAC in the UK (> 35 hours care per week) may use the available Carer's Allowance or Carer's Premium to offset some of the loss of financial resources associated with not finding payed employment or entering unemployment. The differences in effect size between short-term and long-term caring in Germany on entering unemployment are also noteworthy. This might be explained by the previously introduced Pflegezeitgesetz and Familienpflegezeitgesetz that offer short- or longer-term arrangements in combining caring and working. Thus, since both the maximum extension period of the Pflegezeitgesetz and the maximum duration of the Familienpflegezeitgesetz ends after 24 months, longer lasting spells of informal caring increase the likelihood of entering unemployment while short-term care arrangements can be compensated using these policies. For those YAC being or becoming unemployed in the UK, workfare-centred support programs like the Youth Contract (since 2017 the Youth Obligation) aim at (re-)integrating them into the labour market. However, especially high intensity caring may not be compatible with the "intensive work-focused support" (Clancy et al., 2020: 401) of such labour market policies. They can additionally also claim Jobseeker's Allowances, this is however, similar to other benefits of social assistance in the UK, only available at a reduced rate for young adults under the age of 25 (Crisp & Powell, 2016). For a lot of unemployed YAC in Germany, if they are receiving unemployment benefits, they are most likely to receive *Arbeitslosengeld II* (ALG II) as unemployment benefits (Shore & Tosun, 2019). These benefits are however, tied to and dependent on available parental resources (Chevalier, 2016). Thus, depending on the circumstances it might be that unemployed YAC in Germany also do not receive their full rates.

Testing for interactions between caregiving and gender revealed significant differences for the unemployment analysis in the UK leading to women being more likely to enter unemployment compared to men. A possible explanation for this may

be that the access to unemployment benefits and carer's allowances may incentive women who are more often in low-paid or part-time jobs to enter unemployment to solely concentrate on their care responsibilities. However, it is also noteworthy that, as Bev Skeggs (1997) explains, working-class young women with caring responsibilities (and experience of informal care) are often funnelled into the paid care sector due to their limited opportunities to access higher education and other jobs for which they have less experience. This may explain the lack of gendered differences in the transitions into paid employment.

Our study had some limitations. In this study, we only analysed YAC so comparisons of our findings with studies on young carers (aged under 17), who typically would be in a different stage of their education biography, may be limited. To make the two studies as comparable as possible, we only assessed whether a participant had a university degree qualification as our education outcome. Therefore, the vocational track, an important part of the German education system, could not be analysed. Moreover, we did not assess within-country differences despite some variations in education, employment and care systems. Furthermore, future studies might want to investigate whether and to what extent being a carer would lead YAC to work in specific sectors (such as becoming a formal carer, following a 'caring course'). It is also worth mentioning that our data covers a period from 2009 to 2018, YAC in our data were therefore not affected by more recent policy changes, such as the introduction of the right to *carer's leave* in the UK in 2020–2021, which will most likely change the situation of YAC in future. Also, given that our results rely on self-reported information and that YAC might not be inclined to disclose their caring responsibilities, our results may be underestimated. Additionally, we were not able to consider the nature of care provided (i.e., personal care or helping with chores), the reasons for providing care, and caring histories as this information was either not available or collected consistently across studies. In addition, German respondents were asked a less 'direct' question on care provision compared to UK respondents (Supplementary Table S1), which might account for the lower percentage of YAC in Germany. Finally, high intensity carers might have been less able to participate in the survey or more likely to drop out because of their caring responsibilities.

Conclusion

Our results suggest similar negative associations between young adult caring and their educational achievement and employment chances in both the UK and Germany, with high intensity care in the UK and long-duration care in Germany being most affected. As indicated by the effect that policies like the Pflegezeitgesetz or Familienpflegezeitgesetz might have on reducing the impact of short-term care on employment outcomes, it seems worthwhile to introduce similar state-wide policies that aim to help YAC to manage studying and caring at the same time. This might also help to increase the visibility of young adulthood caring more generally, making it easier for professionals to identify and target YAC (Leu et al., 2020). Similarly, the introduction of formal legislation aiming at easing the combination of informal care and employment in the UK since the 2020s may help current and

future YAC to mitigate the impact of short-term care. However, even then there are still substantial difficulties for young adults to combine long-term informal care with education or employment, which ought to be addressed especially after the previously mentioned policies end. Regarding combining care responsibilities and work in the UK, carer's leave is available as a possible short-term solution, however providing more long-term care policies might prove fruitful as well especially for those who anticipate caring for a long time. However, addressing the impact of high intensity care, there is still a lack of (affordable) solutions or policies. Thus, there is a necessity to increase the awareness and different modes of support (e.g. financial or emotional support) for high intensity carers in education or work. One such solution might be the introduction of more flexible work and educational arrangements, which allows YAC to better balance the flexible nature of their care responsibilities with their non-care related responsibilities and extending financial aid policies like Carer's Allowance to be available for YAC in full-time education. Also, increasing access to suitable formal care services may prevent some young adults from adopting a caring role or reduce YAC's caring intensity.

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