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Heterogeneity or disadvantage in partnership, childbearing, and employment trajectories of the descendants of immigrants in the United Kingdom? A multi-channel sequence analysis of longitudinal data

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Abstract

We investigate how partnership, fertility, and employment changes interact in the lives of immigrant descendants in the UK. Although these life domains are interrelated in individuals' lives, most studies on migrants and minorities have examined them separately. We use data from the UK Household Longitudinal Study, which contains information on individuals' fertility, partnership, and employment histories and their parents' country of origin. We apply multi-channel sequence analysis to establish the main types of joint trajectories of partnership, fertility, and employment among natives and the descendants of immigrants. We analyse women and men separately to explore gender differences in the patterns. Our analyses shows, first, that the descendants of European/Western immigrants exhibit family and employment trajectories similar to those of the native British population. Second, the descendants of Caribbean immigrants have diverse partnership and fertility patterns, but their employment outcomes are similar or even better compared to those of native women and men. Third, among the descendants of South Asian immigrants, conservative partnership and family formation patterns are coupled with low labour market attachment, especially among women. We argue that it is not the heterogeneity in partnership and family formation patterns, which poses a challenge, rather that these patterns co-exist with low labour market participation among

women. This is likely to have serious long-term implications for the (financial) well-being of second-generation women.

Keywords: employment, partnerships, fertility, gender, descendants, UK, multi-channel sequence analysis

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Introduction

Partnership formation, childbearing, and employment trajectories are inherently interrelated in individuals' lives. For example, partnership trajectories influence individuals' childbearing (e.g., Mikolai, 2017; Mikolai et al., 2018) and vice versa (Brien et al., 1999; Perelli-Harris et al., 2012). Similarly, childbearing and employment transitions are strongly interrelated (e.g., Matysiak & Vignoli, 2008) and a persistent gender gap exists in the labour market experiences of mothers compared to fathers (van der Lippe & van Dijk, 2002; Kreyenfeld, 2015; Angelov et al., 2016).

Whilst the interrelationships between these domains are well known for majority populations in Europe, their interlinkages among migrant populations are not well understood. Although many studies have examined the partnership, fertility, and employment of immigrants and their descendants across Europe, most studies have examined these three life domains separately. Only a handful of studies are available on the link between either partnership and fertility (Mikolai & Kulu, 2021; Delaporte & Kulu, 2022) or fertility and employment transitions (Dale et al., 2006; Wood & Neels, 2017; Khoudja & Platt, 2018; Kil et al., 2018; Maes et al., 2021) of immigrants and/or their descendants. For immigrants, previous studies show that those who come from culturally dissimilar countries have higher fertility (Kulu et al., 2017), more conservative partnership formation patterns (Hannemann et al., 2020), and display a stronger link between partnerships and parenthood (Mikolai & Kulu, 2021) compared to the natives across European countries. At the same time, they experience disadvantage on the labour market when it comes to employment levels and earnings compared to the natives largely due to their lack of human capital, location-specific skills, language fluency, and recognised qualifications (e.g., Dustmann et al., 2003; Cheung & Heath, 2007; Rendall et al., 2010).

However, the second generation are different from immigrants; they are born in the host countries to immigrant parents. As they are socialised and fully educated in the host countries, the conventional assimilation (or integration) hypothesis argues that their partnership and fertility behaviours would converge to those of the natives (Pailhé, 2015; Kulu et al., 2019) and, unlike their parents' generation, they should not experience disadvantage on the labour market compared to natives (Cheung & Heath, 2007). However, other, competing explanations also exist on the experiences of the second generation. For example, the minority subculture hypothesis explains differences in the experiences of the natives and the descendants of immigrants by emphasising that the lives of the second generation unfold within a family of immigrants (Adsera & Ferrer, 2015; Kulu et al., 2019). This means that whilst some groups are mainly socialised into the norms and behaviours of the majority population, others may primarily grow up in a minority subculture and thus have similar norms, preferences, and behaviours to those that are prevalent in their parents' country of origin (Kulu et al., 2019).

Alternatively, the minority-group status hypothesis (Milewski, 2010) argues that some groups of descendants may face discrimination, which, in turn, may influence their social relations including their partnership and fertility experiences (Glick et al., 2006). For example, discrimination against minorities may reduce women's labour market opportunities and thus they may decide to enter the 'motherhood track' (Kulu et al., 2019). The notions of minority subculture and minority-group status in migrant family research are in line with the segmented assimilation approach in research on the employment of migrants and their descendants. The descendants of immigrants are an interesting group to study to improve our understanding of how immigrants and their descendants assimilate into host societies.

In this study, we focus on the life course trajectories of natives and the descendants of immigrants in the UK. Our study has several novelties. First, we investigate the interplay between partnership, childbearing, and employment in the lives of immigrant descendants.

While there is a growing literature on family and employment patterns among the second generation in Europe, only a few studies have investigated these life domains in tandem. Research on migrant families report heterogeneity in partnership and fertility patterns among immigrant descendants in the UK (Hannemann & Kulu, 2015; Kulu & Hannemann, 2016b; Mikolai & Kulu, 2021). Studies on employment of the second generation show that some groups are economically well assimilated, whereas others experience difficulties in the labour market (Dale et al., 2006). However, it remains unclear whether heterogeneity in family patterns is an expression of cultural diversity and unrelated to employment patterns or coupled with economic disadvantage. Second, we use multi-channel sequence analysis to establish a typology of life courses by grouping together individuals with similar trajectories in the three life domains. The method is increasingly popular in social science research but remains rarely used in migration and integration studies. Third, we study the experiences of both women and men to provide new evidence on the gender differences in individuals' interrelated partnership, childbearing, and employment trajectories. Finally, many previous British studies have used information on self-reported ethnicity to explore the experiences of ethnic minority populations. However, most studies have not distinguished between immigrants and their descendants within the same ethnic groups. We identify the descendants of immigrants using information on their own and their parents' country of birth rather than self-reported ethnicity to avoid any bias due to self-selection into ethnic groups. In our study, the descendants of immigrants are defined as those who either arrived in the UK as children (i.e., before age 15) or who were themselves born in the UK but at least one of their parents was born outside the UK. We compare their experiences to those of the natives (i.e., who were born in the UK to two UK-born parents).

Background

Individuals' partnership, childbearing, and employment trajectories are interrelated across the life course. First, individuals' partnership transitions and childbearing decisions influence each other (Brien et al., 1999; Perelli-Harris et al., 2012; Mikolai, 2017; Mikolai et al., 2018). Most children are born to parents who are in a co-residential relationship (typically marriage but also increasingly cohabitation). Many cohabiting couples marry once they find out that they are expecting a child. Similarly, a couple who does not yet live together may move in together and/or marry once she becomes pregnant. At the same time, couples with young children are less likely to separate than those who do not have children (Kalmijn & Leopold, 2021).

When individuals' partnership status changes, their incentive to be employed may also change (Khoudja & Platt, 2018). Forming a co-residential relationship increases household income and the amount of housework, which is still mainly carried out by women. Both changes may reduce women's incentive to work, especially if there are individual or family expectations to do well as a homemaker. Conversely, being single or separated implies a reduced housework load but also a reduction in financial resources leading to a higher likelihood of being employed.

Finally, having (young) children decreases women's labour force participation. This is especially the case in the UK, where a one-year maternity leave is supported but access to low-cost childcare between age 1 and 3 of the child is limited. From age 3, 30 hours of free childcare for 38 weeks is available to working parents who earn at least minimum wage, and some free hours are available from age 2 for children of disadvantaged families (UK Government). As a result, mothers tend to adjust their working patterns and fathers become the main earners typically at least until the child reaches the age of eligibility for free childcare provision. As children get older, there is less need for mothers to stay at home and the increasing expenses associated with childrearing may also motivate mothers to return to the labour market (Khoudja & Platt, 2018).

Individuals' partnership, fertility, and employment decisions vary by their norms and values as well as socio-economic background. Among the descendants of immigrants, these decisions may also vary by the norms and values of their family of origin. For example, among descendants whose parents come from countries with conservative partnership and family formation patterns, childbearing may only take place within marriage regardless of whether the conception itself took place before or after the wedding. Similarly, being married and being a mother may be seen as incompatible with paid employment. However, descendants whose parents are from countries that are culturally similar to the UK may experience similar linkages between partnership, childbearing, and employment transitions to UK natives.

Partnership and fertility of immigrants' descendants

Studies across Europe consistently show that the partnership and fertility patterns of the descendants of immigrants vary according to their parents' country of origin. First, there are few differences between the partnership patterns of natives and the descendants of immigrants from geographically close and culturally similar countries such as European and (other) Western countries. This has been shown in the UK, where immigrants' descendants from Europe and Western countries displayed similar patterns of partnership formation and dissolution as British natives (Hannemann & Kulu, 2015; Mikolai & Kulu, 2021). Similar patterns were found among the descendants of Southern Europeans in France (Pailhé, 2015; Ferrari & Pailhé, 2017; Hannemann et al., 2020), Western, Southern, and Eastern European descendants in Sweden (Andersson et al., 2015), and Polish and Southern European descendants in Germany (Liu & Kulu, 2021).

There is somewhat more heterogeneity in the childbearing patterns of the descendants of European and Western immigrants. For example, in Sweden (Scott & Stanfors, 2011; Andersson et al., 2017; Lindström et al., 2022) and the UK (Kulu & Hannemann, 2016b; Kulu

et al., 2017), they have similar or lower first- and second-birth risks but higher third birth risks than native Swedish and British women. In Belgium and France, second-generation Southern European women had lower fertility than the natives (Kulu et al., 2017; Van Landschoot et al., 2017). In Spain, descendants of European and Western immigrants who moved to Spain as children (1.5 generation) had lower first- and second-birth risks but similar third birth risks to Spanish natives (González-Ferrer et al., 2017; Kulu et al., 2017). Finally, second generation Europeans in Switzerland had similar first-birth risks and lower second-birth risks than Swiss natives (Rojas et al., 2018).

Second, the partnership and fertility behaviours of immigrants' descendants from geographically distant and culturally dissimilar countries remains similar to their parents' experiences. For example, immigrants' descendants from countries with conservative patterns of partnership formation have higher marriage, lower cohabitation, and lower separation rates than the natives (Kulu & Hannemann, 2016a). These patterns have been observed for the descendants of immigrants from the Middle East, North Africa, and Turkey in Sweden (Andersson et al., 2015), from Turkey in Germany (Kuhnt & Krapf, 2020; Liu & Kulu, 2021), from Turkey and North Africa in France (Pailhé, 2015; Hannemann et al., 2020), and from India, Pakistan, and Bangladesh in the UK (Hannemann & Kulu, 2015; Hannemann et al., 2020; Mikolai & Kulu, 2021).

At the same time, the fertility levels of immigrants' descendants from these traditionally high-fertility regions tend to be higher than the natives' fertility. For example, in the UK, women of Pakistani and Bangladeshi origin have relatively high fertility levels compared to British natives (Coleman & Dubuc, 2010; Kulu & Hannemann, 2016b; Mikolai & Kulu, 2021). Similarly, in Sweden, descendants of immigrants from Turkey and Syria have higher first-birth risks (Scott & Stanfors, 2011; Andersson et al., 2017; Kulu et al., 2017) and those from South Asia, Turkey, the Middle East, and North Africa have higher third-birth risks than native

Swedish women (Andersson et al., 2017; Kulu et al., 2017). Higher levels of fertility were also observed among Turkish and Moroccan descendants in Belgium (Kulu et al., 2017; Van Landschoot et al., 2017), Turkish descendants in Germany (Milewski, 2007; Krapf & Wolf, 2015; Kulu et al., 2017), the descendants of immigrants from the Maghreb region in Spain (González-Ferrer et al., 2017; Kulu et al., 2017), and the descendants of immigrants from the Maghreb region, Sub-Saharan Africa, and Turkey in France (Kulu et al., 2017; Pailhé, 2017).

Some countries also have an immigrant population from geographically distant and culturally dissimilar countries compared to the host countries, where family and childbearing norms and values are less conservative and more heterogeneous. For example, descendants of Caribbean immigrants in the UK tend to form cohabiting unions, have low marriage rates, and high divorce rates (Hannemann & Kulu, 2015). At the same time, they display lower second-birth risks and similar first- and third-birth risks compared to UK natives (Kulu & Hannemann, 2016b; Kulu et al., 2017). Additionally, the descendants of Latin American immigrants in Spain who arrived as children had lower first-birth risks, but similar second- and third-birth risks as Spanish natives (González-Ferrer et al., 2017).

Although most previous studies have either focused on the partnership or childbearing experiences of immigrants' descendants, some recent studies have analysed partnership and fertility transitions jointly among immigrants and their descendants. For example, Mikolai and Kulu (2021) showed that women of Indian, Pakistani, and Bangladeshi descent displayed a strong link between partnership changes and fertility: they almost exclusively marry first and have children within marriage. However, women with a Caribbean background had the weakest link between partnerships and childbearing: some had births outside unions whereas some formed a union and had children thereafter. Similarly, in France, the descendants of immigrants from Turkey were more likely to experience early marriage and have large families than the French natives, whereas North and Sub-Saharan African descendants were more likely to be

single and childless (Delaporte & Kulu, 2022). Those with Sub-Saharan African and South-East Asian descent had a higher propensity to marry late and have one or two children than French natives.

Employment of immigrants' descendants

Many studies have analysed the labour market participation, labour market outcomes, and employment prospects of the second generation across Europe. Overall, these studies have shown that the second-generation experiences significant disadvantage on the labour market across European countries (e.g., Meurs et al., 2006; Clark & Drinkwater, 2010; Piton & Rycx, 2020; Zwysen & Demireva, 2020; Clark & Ochmann, 2022). For example, Algan et al. (2010) studied hourly wages and the probability of being employed among immigrants and their descendants in France, Germany, and the UK. They found that the labour market performance of immigrants' descendants is worse compared to the natives in all countries. Men and women with parents from the Maghreb region and Africa in France as well as men of Turkish and women of Southern European descent had significantly lower net hourly wages than native French men and women. Additionally, men and women from the Maghreb region, Africa, and Turkey had lower employment levels than the native French. Similarly, in Germany, all groups of second-generation women (EU, non-EU, Turkey, former Yugoslavia, Italy, Greece) and almost all men (except those with EU-16 or former Yugoslav heritage) had lower hourly wages and most groups had lower employment levels than native Germans. Finally, in the UK all groups of men (Indian, Pakistani, Bangladeshi, Black African, Black Caribbean, and Chinese) and almost all women (except Chinese and Bangladeshi) had lower hourly wages and all groups had lower employment rates than their White British counterparts. The gap in employment levels was larger for women than for men especially among the Pakistani and Bangladeshi

second-generation in the UK and those with Turkish origin in Germany. The gender gap was less consistent in patterns of hourly wages across countries and origin groups.

Another study (Heath et al., 2008) compared the available evidence on the labour market outcomes of the second generation in ten European countries. They found that the descendants of immigrants from less developed countries had higher risks of unemployment (especially those from Turkey, Morocco, Pakistan, and the Caribbean) and lower rates of labour market participation (especially women with Moroccan, Turkish or Pakistani background), than natives. However, once individuals were in employment, there were no ethnic penalties regarding occupational attainment in Austria, Belgium, France, Germany, and the Netherlands but in the other countries, they experienced additional disadvantages in access to professional and managerial jobs.

Many studies are available on the labour market and employment outcomes of the second generation in the UK. However, most studies primarily use information on ethnic origin rather than individuals' and their parents' country of birth (Heath et al., 2008). The definition of ethnic minorities includes anyone who identifies as part of an ethnic group. This implies that immigrants and their descendants (not only second but also third generation) are all included in the different ethnic minority groups. These studies report that ethnic minorities are less likely to be employed and to be employed full-time, tend to have worse jobs, and receive lower pay than their White peers (Berthoud, 2000; Catney & Sabater, 2015). There are differences between different ethnic groups; Caribbean, Pakistani, Bangladeshi, and Black African individuals tend to do worse whereas Indian, Chinese, and African Asians tend to do better than White individuals (Berthoud, 2000; Catney & Sabater, 2015; Li & Heath, 2020). These differences persist after controlling for socio-economic differences (Berthoud, 2000; Li & Heath, 2020). Additionally, unemployment has a scarring effect on subsequent employment and earnings particularly among Black Caribbean and Bangladeshi men and Pakistani and

Black African women (Li & Heath, 2020). However, these studies did not distinguish between individuals who were born abroad and those born in the UK making it hard, if not impossible, to assess how the second generation performs on the labour market.

Only a few British studies have distinguished immigrants and their descendants by origin groups. For example, Cheung and Heath (2007) used information on individuals' own and their parents' country of birth and showed that ethnic penalties in the likelihood of being employed persist across migrant generations even after controlling for education and marital status. This is especially the case for the descendants of Caribbean, Indian, Pakistani, and Bangladeshi immigrants. This pattern and the magnitude of the ethnic penalties was the same for women and men. However, once in employment, these groups had similar propensities to be in higher-class occupations to the natives with similar age, level of education, and marital status. Within occupational classes, ethnic groups also had similar salaries to their British counterparts. Additionally, Longhi (2020) used information on self-defined ethnicity and place of birth to study ethnic differences in unemployment in the UK. She found that Pakistani and Caribbean second-generation men and women had higher propensities to be unemployed than the White British even after controlling for individual characteristics.

Interrelationship between family formation and employment among immigrants' descendants

Only a few studies have investigated the interrelationship between the transition to parenthood and employment among the second generation. For example, in a cross-sectional study, Holland and de Valk (2017) compared the labour force participation of second-generation Turkish women with and without children across Germany, Sweden, the Netherlands, and France to those of native women. The gap in labour force participation between mothers and

childless women was similar for majority and second-generation Turkish women in Germany and Sweden but was larger in the Netherlands and France.

More recently, longitudinal evidence has become available on the link between employment careers and the transition to motherhood. For example, Wood and Neels (2017) analysed the transition to first, second, and third births by employment status and migrant origin. They showed that the propensity of a first and second birth is highest among those who are employed full-time, but the likelihood of a third birth is the largest among those who were unemployed or inactive. The negative effects of unemployment and inactivity on the propensity of a first birth were weaker for women with a non-European heritage, whereas the patterns for Belgian natives and the descendants of European immigrants were similar. In another study, Kil et al. (2018) found that following the transition to motherhood, descendants' activity and employment levels decreased more than those of native women. However, these differences in levels of economic activity are explained by socio-demographic or pre-birth job characteristics whereas differences in employment levels persist. Similarly, unemployment levels increase more among second-generation mothers than among natives even after adjusting for these factors. Finally, Maes et al. (2021) compared the employment trajectories of native and second-generation Southern European, Turkish, and Moroccan women in Belgium. They found that second-generation women reduce their working hours more than native women following childbirth if they were employed before the birth and increase their working hours to a smaller extent if they were not employed before the birth than native women. These differences are especially large between native and Turkish/Moroccan women. However, native and second-generation women have similar employment trajectories following parenthood once levels of pre-parenthood employment rates are considered. Second-generation women tend to have lower employment rates already before childbirth than native women, which also explains native-immigrant differences in labour market attachment following childbirth.

In the UK, limited evidence is available on whether and how the three life domains of partnerships, fertility, and employment are interrelated among the descendants of immigrants from different origin countries. Dale et al. (2006) showed that among single and childless women, the probability of being employed was very similar among White and all other ethnic groups. Among those who had a partner but no child, Indian and Pakistani/Bangladeshi women had lower probabilities of being economically active than White and Black women. Among those who had a partner and pre-school aged child (< 5), activity rates were lower overall, but they were the lowest among Pakistani/Bangladeshi women and the highest among Black women. Additionally, Khoudja and Platt (2018) studied ethnic differences in labour market entry and exit among women. They found that Indian and Caribbean women have similar probabilities of labour market entry and exit to White women, whereas Pakistani and Bangladeshi women are more likely to exit and less likely to enter the labour market. African women have higher entry rates than the White British. When studying the role of fertility and partnership changes, Pakistani and Bangladeshi women's employment transitions were less sensitive to childbearing – many of them were and stayed inactive. Most groups were more likely to enter employment if they were single. In contrast, among Caribbean women those who were single were as likely as those who were partnered to enter employment. Although these studies controlled for whether individuals were born in the UK, they did not distinguish different ethnic minority groups by migrant generation. To conclude, there is a lack of evidence on whether and how partnership, childbearing, and employment trajectories of the second generation are interrelated across the life course and whether and how these patterns differ by migration background.

Data and Sample

We use 9 waves (2009–2019) of the UK Household Longitudinal Study (UKHLS), a large, nationally representative, household panel (University of Essex, 2020b), that collects information from 30,000 households. Detailed and reliable information is collected on individuals' partnership, fertility, and employment. The year and month of childbirths, changes in employment status, and the formation and dissolution of up to 11 cohabitations and marriages since age 16 is collected retrospectively. In addition, information is collected on changes in partnership status, additional childbirths, and employment changes between the panel waves (Nandi et al., 2020). We use the Marital and Cohabitation Histories file (University of Essex, 2020a), which combines and harmonises retrospective and prospective information on partnerships.

Two boost samples are included in the UKHLS to ensure a sufficiently large sample size for studying the lives of the descendants of immigrants whose parents came from different origin countries. The first boost sample (4,000 households) was added in wave 1 and aimed to include at least 1,000 respondents from each of the five main ethnic groups in the UK (Indian, Pakistani, Bangladeshi, Caribbean, and African). The second boost sample was added in wave 6 and included 2,900 households (McFall et al., 2019).

Our analytical sample is restricted to natives and the descendants of immigrants born between 1940 and 1984, who were at least 16 years old at the time of the interview, were original or permanent sample members, and either completed a full interview in wave 1 or were included in the boost samples. We have removed individuals who had a first birth or first union before age 16, and who had missing information on their first child's birth year, gender, or on their mother's and father's country of origin. We follow individuals between age 16 and 35 because this allows us to study individuals in the younger as well as older birth cohorts. We conducted additional analyses by birth cohort and followed those born between 1940 and 1969 up to age 45 and those born between 1970 and 1984 up to age 35 (Appendix Figures A1 to

A4). Overall, the results are similar to what is shown in the paper. The main differences between birth cohorts reflect the postponement of partnership formation and childbearing and the expansion of higher education. Men and women in older cohorts form relationships (mainly marriages) and have children at younger ages, and experience a more rapid school to work transition than those born later. Cohabitation and separation are also more prevalent among younger than among older cohorts.

The sample is restricted to individuals who have complete information on all three life domains. Employment histories have only been collected for a subset of individuals. It was collected in the first wave from respondents who were interviewed in the first 6 months of the data collection and in wave 5 among the rest of the sample. Thus, employment histories are not available for the wave 6 ethnic minority boost sample and for respondents who were not asked the retrospective employment questions in wave 1 and were not present in wave 5. This leads to a reduction in sample size by about 30% (from 16,907 to 11,842 for women and from 13,324 to 8,992 for men). After also excluding individuals who do not have complete partnership, fertility, and employment histories up to age 35 (balanced data is a requirement of sequence analysis), the sample consists of 10,634 women and 8,005 men.

We study the partnership, fertility, and employment trajectories of natives and the descendants of immigrants. We define the descendants of immigrants as those who either arrived in the UK as children (i.e., before age 15, usually referred to as the 1.5 generation) or those who were themselves born in the UK but at least one of their parents was born outside the UK (the so-called second generation). We compare their experiences to those of the natives, i.e., those who were born in the UK to two UK-born parents. Additional analysis (not shown) revealed that the experiences of the 1.5 and second generation from different origin countries are very similar both regarding their trajectories in the three life domains and their propensities to belong to different types of joint trajectories by socio-demographic characteristics. Given

the lack of differences between the 1.5 and second generation within each origin group, we only distinguish between different groups of origin but not by migrant generation. This also leads to larger cell sizes for each migrant origin group and, hence, more statistical power.

Individuals' migration background is established using information on the mothers' and individuals' own country of birth. If individuals' country of birth is missing, we impute it using self-reported ethnicity. If the mother is UK-born, or no information is available on her country of birth, we use information on the father's country of birth. If the respondent is UK-born and information on the country of birth of both parents is missing or it is only available for one UK-born parent, we use information on individuals' own ethnicity.

Methods

To study joint trajectories of partnership, fertility, and employment among the descendants of immigrants, we use multi-channel sequence analysis (MCSA). MCSA is an extension of sequence analysis (SA), a data mining approach which considers individuals' life courses as sequences of states (Mikolai & Lyons-Amos, 2017), referred to as trajectories. Individual trajectories summarise information on the order and duration of the states individuals occupy during their life course. As only few individuals tend to experience the exact same trajectory, the first step of the analysis is to reduce the number of sequences in the data using Optimal Matching Analysis (OMA). OMA calculates the dissimilarity between each pair of sequences as the minimum cost of operations (insertion, deletion, or substitution) needed to turn one sequence into another (Abbott & Tsay, 2000; Barban & Billari, 2012; Mikolai & Lyons-Amos, 2017). The results are stored in a dissimilarity matrix. Next, hierarchical cluster analysis is used on the dissimilarity matrix to find the most typical trajectory types. Cluster analysis classifies individual sequences into groups (i.e., clusters) such that the within-cluster distances are minimised, and between-cluster distances are maximised. Finally, the cluster variable is used

as the dependent variable in a multinomial logistic regression to explore how individuals' characteristics influence their propensity to belong to the different trajectory types.

MCSA consists of the same steps as SA but the OMA is extended to analysing multiple dimensions corresponding to multiple life domains (Gauthier et al., 2010). We study individuals' sequences of events in three life domains: partnership (single, cohabiting, married, and separated or widowed), fertility (childless, 1 child, 2 children, and 3 or more children), and employment (full-time employee, part-time employee, self-employed, in full-time education (including government training schemes), inactive (retired, maternity/paternity leave, looking after family, long-term sick/disabled, or something else), or unemployed). Individuals who form a new cohabitation or marriage after separation or widowhood are included in the cohabiting or married category, respectively.

First, we describe and visualise the joint evolution of individuals' partnership, fertility, and employment trajectories by migrant origin. Then, to calculate the distances between pairs of sequences we use OMA with a cost of 1 for insertions and deletions, and substitution costs based on transition rates observed in the data. Next, we use agglomerative nested cluster analysis and Wards linkage to establish the main types of joint trajectories. Additional analysis (not shown) using different cost regimes (combining constant and transition rates-based substitution costs with indel costs of 1.5 and 2), distance measures (longest common subsequence, Hamming distance, and dynamic Hamming distance), and clustering methods (hierarchical clustering and hierarchical clustering combined with partition around medoids (pam) method) have revealed identical or very similar results to what is shown in the paper. Finally, we estimate a multinomial logistic regression to predict individuals' propensity to belong to each joint trajectory type by key socio-demographic variables. We present the results as average marginal effects. We conduct the analyses separately for women and men. We use the TraMineR (Gabadinho et al., 2011), TraMineRextras (Ritschard et al., 2021), and

WeightedCluster (Studer, 2013) packages in R to conduct the MCSA whereas the multinomial logistic regression and average marginal effects are estimated and plotted in Stata.

Variables

Table 1 shows the analytical sample of women and men by categories of the covariates included in the analyses. We distinguish between immigrant descendants with different origin. We compare the experiences of descendants of immigrants from Europe and other Western countries (Australia, New Zealand, Canada, and the USA), India, Pakistan and Bangladesh, the Caribbean region, and African countries to those of UK natives. Although the majority (85-86%) of the female and male sample are natives, we have a sufficient number of female as well as male descendants with different origins to conduct detailed analyses.

We adjust the analysis for individuals' highest level of education measured as high (university degree), medium (A level or higher degrees), or low (less than completed A levels or higher degrees). Furthermore, we control for birth cohort (1940-1949, 1950-1959, 1960-1969, 1970-1979, and 1980-1984).

Table 1. Analytical sample of women and men by covariates

	Women		Men	
	N	%	N	%
Migration background				
Native	9,062	85	6,892	86
Europe & West	700	7	535	7
India	198	2	137	2
Pakistan & Bangladesh	175	2	160	2
Caribbean	312	3	144	2
Africa	187	2	137	2
Level of education				
Low	4,769	45	3,270	41
Medium	3,270	31	2,591	32
High	2,595	24	2,144	27
Birth cohort				
1940-1949	2,267	31	1,877	23
1950-1959	2,490	23	1,967	25

1960-1969	2,982	28	2,208	28
1970-1979	2,415	23	1,665	21
1980-1984	480	5	288	4
Total	10,634	100	8,005	100

Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).

Results

Describing the life course trajectories of women and men by country of origin

First, we describe women's partnership, fertility, and employment trajectories by migration background (Figure 1). Most native women have formed a partnership by age 35 and only 10% have remained never partnered. Most partnerships are marriages, although 15% of natives are in a cohabiting relationship at age 35. Finally, 15% of native women have experienced union dissolution or widowhood by age 35. Regarding their fertility trajectories, most native women (60%) have two or more children, around 20% have one child, and the remaining 20% remains childless by age 35. Finally, native women are either in full-time education or full- or part-time employment at age 16. As they begin to form families, they either become economically inactive or switch to part-time employment. Over time, the share of those in part-time employment increases, whereas the share of those in full-time employment declines. By age 35, 40% are in full-time employment, 30% are inactive, and 30% are in part-time employment.

Next, we compare the experiences of the descendants of immigrants from different origin countries to those of native women. When comparing these patterns, we need to consider that some groups are younger than others (see Table A1). Overall, female descendants of European and Western immigrants have very similar patterns of partnership, childbearing, and employment to those of native women. The main difference is that women of European or Western descent form partnerships somewhat later than native women and a somewhat larger share experiences separation or widowhood. They also begin childbearing at later ages leading to a somewhat larger share of childless women at age 35 than among native women. Finally, women of European or Western descent remain in full-time education for longer than native

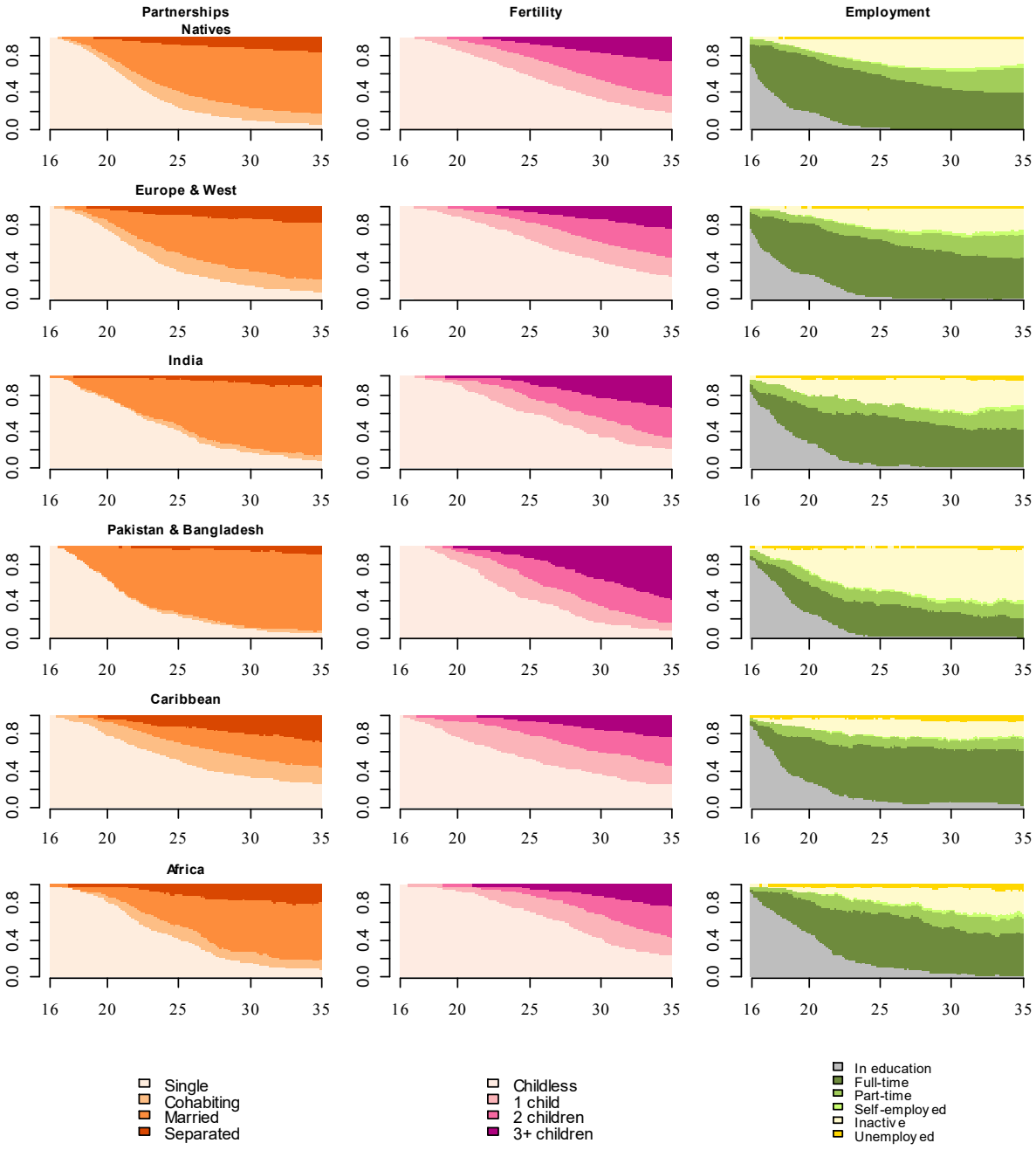
women and thus also transition to full- or part-time employment at later ages. By age 35, a somewhat larger share of them is in full-time employment and a smaller share is inactive compared to native women.

Women of Indian descent form partnerships even later but these partnerships are almost exclusively marriages and the share of unions that ends in dissolution is smaller than among native women. The childbearing patterns of Indian descendants is very similar to that of UK natives, although a somewhat larger share has three or more children, and a smaller share has two children. Around half of women of Indian descent are in full-time employment after completing education. By age 35, 40% are full-time employed, 30% are inactive, and around 20% are part-time employed.

The female descendants of Pakistani and Bangladeshi immigrants experience early and universal marriage with very little cohabitation or union dissolution. This is coupled with early and almost universal childbearing and large families; around 60% have three or more children and 10% are childless by age 35. The share of full-time employed women is the lowest among this group (20% at age 35) whilst the share of economically inactive women is the largest (60% at age 35).

Female Caribbean descendants have the most heterogeneous partnership experiences. Cohabitation, marriage, and union dissolution are equally likely experiences among them and almost 40% remain unpartnered and childless by age 35. Childbearing in this group starts somewhat earlier than among native women, although a larger share has only one child and a smaller share has three or more children. Regarding their employment trajectories, they have the highest share of full-time employed (60% at age 35) and the smallest share of economically inactive women (20% at age 35) among all groups.

Figure 1. Chronograms of partnership, fertility, and employment trajectories of natives and the descendants of immigrants over age in the UK by country of origin, women



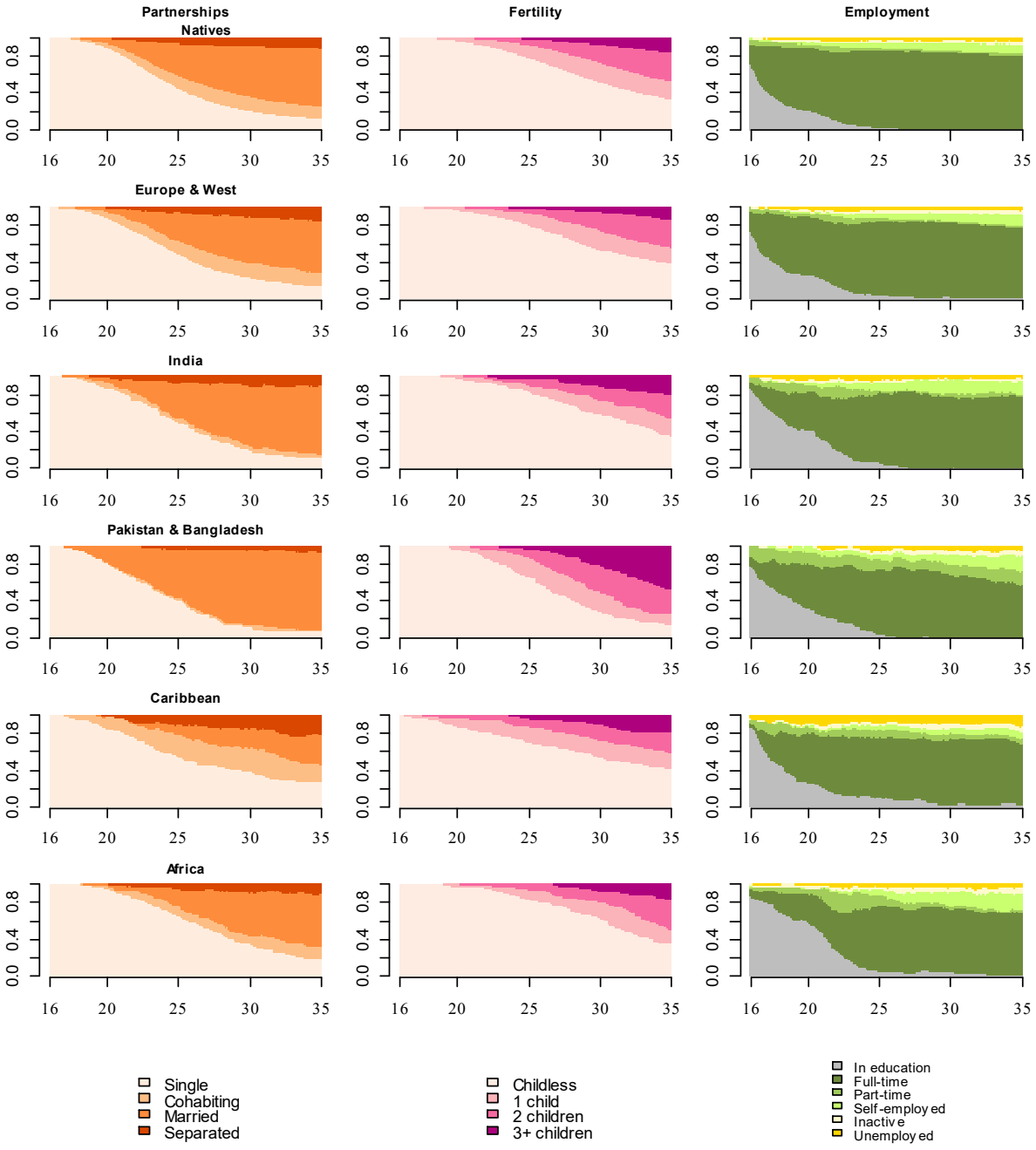
Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals.

Finally, women of African descent have similar partnership formation and dissolution patterns to native women. There are two key differences; women of African descent form partnerships somewhat later and union dissolution is more prevalent. Women of African origin

postpone having children the most among all groups. By age 35, the proportion of women with one, two, and three or more children is similar to those of female European/Western descendants. Regarding their employment trajectories, women of African descent are also the most similar to native women. The main difference is that descendants of Africans tend to stay in full-time education for longer and hence experience transitions to full-time employment and economic inactivity at later ages. Additionally, the share of part-time employed African women is smaller at age 35 than among native women.

Next, we examine men's partnership, childbearing, and employment trajectories by origin (Figure 2). Native men have similar partnership patterns as native women, although partnership formation takes place later among men. At age 35, 20% of native men are never partnered, 15% are in a cohabiting relationship, 10% are separated or widowed and the remaining 55% are married. In line with a delayed partnership formation, native men have children at later ages than native women. Whereas 50% of women had at least one child by age 25, among native men this proportion is only 30%. Accordingly, at age 35, 40% of native men are still childless, 20% have one child, 30% have two children, and 20% have three or more children. The largest differences between women's and men's experiences are in their employment trajectories. A larger share of native men stays in education for longer than native women and the transition out of full-time education is almost exclusively followed by a transition to full-time employment. From age 25 onwards, over 80% of native men are in full-time employment; this proportion declines somewhat as the share of self-employed men increases. At age 35, 80% are in full-time employment, 10% are self-employed, and the remaining 10% are either part-time employed or unemployed. Among native men, virtually no one is economically inactive.

Figure 2. Chronograms of partnership, fertility, and employment trajectories of natives and the descendants of immigrants over age in the UK by migrant origin, men



Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals.

Male descendants of European and Western immigrants have very similar partnership, fertility, and employment trajectories to native men, although most of their transitions are somewhat delayed compared to those of natives. This means that at age 35, a somewhat larger

share of European/Western male descendants are never partnered and childless, and a somewhat smaller share are in full-time employment compared to native men.

Male descendants of immigrants from India have similar partnership and childbearing patterns to native men, although their relationships are almost exclusively marriages, and they have slightly larger families than the natives. Regarding their employment trajectories, males of Indian descent stay in education for longer than native men and hence transition to full-time employment somewhat later than natives. The share of part-time employed and self-employed are also somewhat larger among men of Indian origin than among the natives.

Men of Pakistani and Bangladeshi descent form relationships (almost exclusively marriages) and families earlier than men from any other origin group. They experience very little cohabitation and separation and have the largest families among all groups. Their employment trajectories are most similar to those of men with Indian heritage. However, men of Pakistani and Bangladeshi descent are somewhat less likely to be in full-time education and are less likely to work full-time after finishing school than men in all other origin groups. Additionally, the share of part-time employed men is the largest among those with Pakistani and Bangladeshi background among all origin groups. At age 35, 60% of men with Pakistani and Bangladeshi background are employed full-time, 20% are employed part-time, and the remaining 20% are self-employed or unemployed.

Men of Caribbean origin delay partnership and family formation the most; at age 35, 35% are never partnered and 40% are childless. They are equally likely to experience cohabitation, marriage, or separation. Men of Caribbean descent stay in full-time education the longest and the majority then becomes employed full-time (70% at age 35). The share of part-time employed remains stable over time (10%), the share of unemployed declines somewhat, whereas the share of self-employed increases. Male descendants of immigrants from African countries have similar but delayed partnership and childbearing patterns to their female

counterparts. Regarding their employment, the majority (60%) becomes full-time employed after being enrolled in education, but part-time employment is also prevalent (more than in any other origin groups of men) from their 20s. Over time, self-employment becomes more common (20% at age 35).

Grouping and predicting women's trajectories

Figure 3 shows the results of cluster analysis for women. We identified five types of joint trajectories of partnership, fertility, and employment (Table A2 shows the measures of cluster quality). Trajectory types are depicted in the columns, e.g., individuals in the first trajectory type ('Type 1') experience partnership sequences labelled as 'Partnership 1', childbearing trajectories labelled as 'Fertility 1' and the corresponding employment trajectories labelled as 'Employment 1'. We first describe each trajectory type and then discuss the results of the multinomial logistic regression (Figure 4). The clusters are ordered from the largest to the smallest cluster.

Women in the first group (n = 2,999; 28%) form relationships (mainly marriages) and have children at young ages. By age 25, almost all women have formed a relationship and by age 30, all women have a child. Most women have a second child and 20% have three or more children. Cohabitation and union dissolution are rare in this group. Although almost all women are in full-time education at age 16, they quickly leave education for a full- or part-time job or become inactive. By age 27, only 40% are full-time employed and over 40% are inactive. After this age, the share of inactive women declines and the share of (especially part-time) employed women increases. The share of full-time employed women also increases somewhat between age 30 and 35. This group is called 'Early marriage, two children, inactivity/part-time employment'. Women of Caribbean descent are less likely than native women to be in this group while all other origin groups are as likely as native women to experience this trajectory

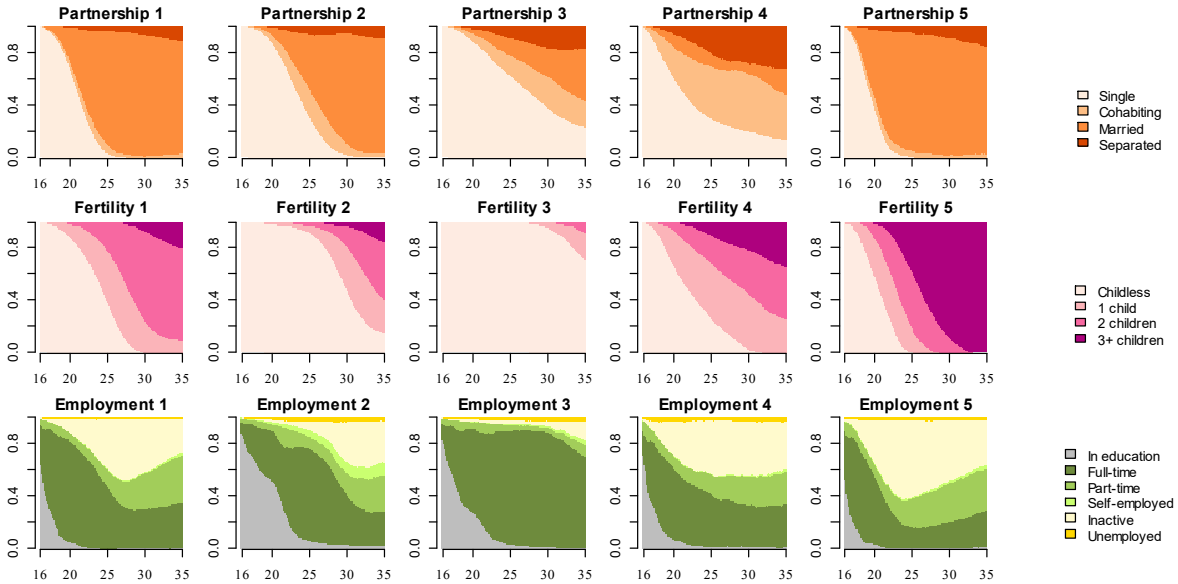
type. Additionally, women with higher education and those from younger birth cohorts are less likely to belong to this group than those with lower education and from older cohorts.

Women in the second group (n = 2,508; 24%) form relationships and have children at later ages than women in the first group. By age 30, all women in this group have formed a relationship. The majority (90%) of women are married, cohabitation and separation are rare. Childbearing in this group mainly takes place after age 25 with 80% of women becoming mothers by age 35. Most women in this group have one or two children whilst around 10% have three or more children. Regarding their employment trajectories, almost all women are in full-time education at age 16 and many of them remain in education for longer than women in the first group. Women tend to be full- or part-time employed until they have children after which they are either part-time employed or inactive. At age 35, 35% of women are full-time employed. This group is labelled 'Late partnership and childbearing, education/full-time employment'. Results of the regression analysis revealed that descendants of Caribbeans are less likely to experience this type of joint trajectory than native women and other descendant groups. Highly educated women are more likely to belong to this group than lower educated women whilst there were no differences between women from different birth cohorts.

Women in the third group (n = 2,433; 23%) are characterised by late or no partnership formation and childbearing. At age 35, 80% have formed a cohabiting or marital relationship and only 20% have one or two children. Separation and cohabitation are more common in this group than in the first two groups; around 20% of women formed a cohabitation and 20% have separated by age 35. These women are largely in full-time education followed by full-time employment; this is the case for 80% of women at age 30. At age 35, 60% are in full-time employment, 20% are economically inactive and the remaining 20% are either part-time employed or unemployed. This group is labelled 'Late heterogeneous partnerships, late or no fertility, full-time employment'. Women of European/Western and Caribbean descent have a

higher propensity, whereas those of Pakistani and Bangladeshi origin have a lower probability than native women to belong to this group. Highly educated women have a higher probability to belong to this group than women with lower levels of education. Finally, women born in the 1950s and 1960s are more likely to follow this life course pattern than those born in the 1940s but later born cohorts are increasingly less likely to do so.

Figure 3. Results of cluster analysis for women: five types of joint trajectories of partnership, fertility, and employment among natives and the descendants of immigrants in the UK

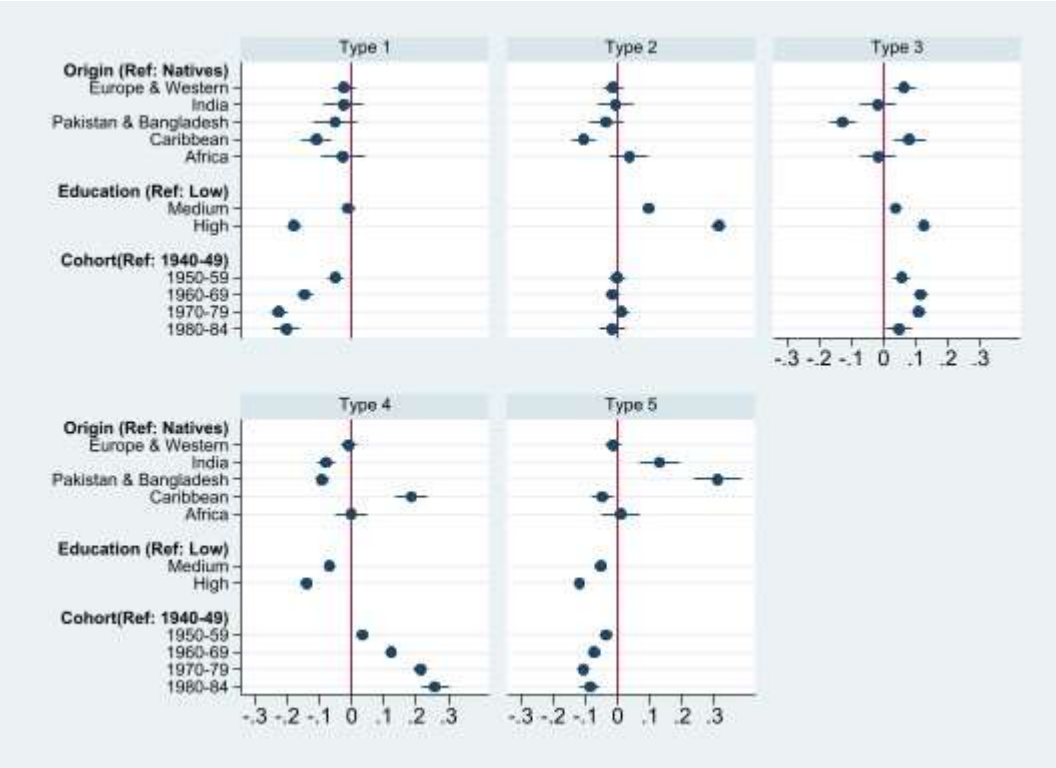


Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals.

The fourth group of women (n = 1,436; 14%) starts forming relationships at young ages but they are most likely to form a cohabiting relationship and to experience separation and least likely to marry. At age 35, 20% of women have never been in a co-residential partnership, 10% are married, 40% are in a cohabitation, and 40% have separated. Childbearing also happens at relatively young ages but the progression to higher order births is slow. At age 35, a third of women have one child, a third have two children, and a third have three or more children. Women's employment trajectories are similar to that of the first group with one key difference: after leaving full-time education, women are less likely to be in full-time employment and more

likely to be economically inactive than women in the first group. Around age 18, 60% of women are employed full-time, and this proportion reduces to 40% by age 35. At the same time, the share of part-time employed and economically inactive women increases. We label this group 'Early heterogeneous partnerships, early fertility, inactivity/part-time employment'. Women with a Caribbean background are most likely to experience this combination of partnership, fertility, and employment trajectories. Women of Indian as well as Pakistani and Bangladeshi origin are less likely than natives to experience these trajectories. Additionally, women with lower levels of education and from younger birth cohorts are more likely to belong to this group than those who are more educated and were born earlier.

Figure 4. Average marginal effects of belonging to the five different clusters by covariates, women



Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).

Finally, women in the fifth group (n = 1,258; 12%) form relationships (primarily marriages) and families even earlier than women in the first group. By age 23, almost all of them have formed a relationship and all of them had at least one child by age 25. Progression to a second and third child is rapid, and all women in this group have at least three children by age 35. Women in this group experience similar employment trajectories to women in the first group but in line with their earlier family formation trajectories, they also move from full-time employment into part-time employment or inactivity earlier and to a larger extent. By age 25, only 20% are full time employed, although this proportion then recuperates to 30% by age 35. This group is referred to as 'Early marriage, large families, inactivity/part-time employment'. Descendants of women from India as well as Pakistan and Bangladesh are particularly likely to belong to this cluster, whereas those with a Caribbean background are less likely than natives to belong to this group. Patterns by education and birth cohort are similar to what was found for the first group: low educated women and those from older birth cohorts are over-represented in this group.

Grouping and predicting men's trajectories

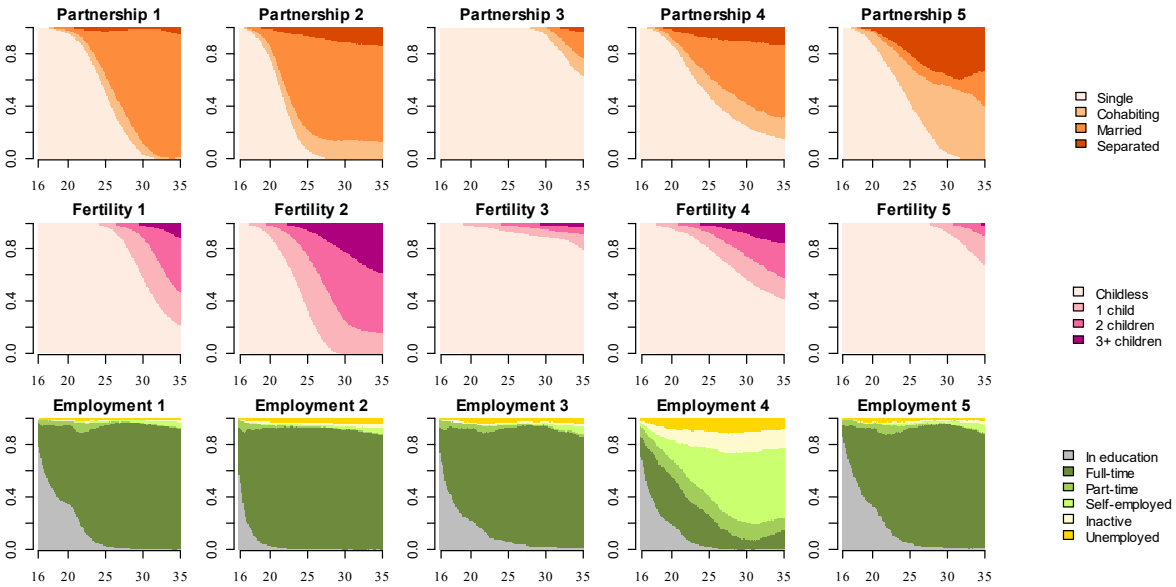
Next, we describe men's five joint trajectory types of partnership, fertility, and employment (Figure 5) and the propensity of men with different migration background, level of education, and birth cohort to belong to each group (Figure 6). Men in the first group (n = 2,493; 31%) form marriages and have children at later ages. Almost all men are married by age 30 and 80% have at least one child by age 35. Cohabitation and separation are very rare. Regarding their employment, men in this group are first in full-time education, followed by full-time employment (over 90% at age 35). This group is labelled 'Late marriage and fertility, full-time employment'. Men with Indian or Pakistani and Bangladeshi heritage and those with higher levels of education are more likely to experience these types of joint trajectories than native

men and men with low levels of education. Men born later (except for the youngest cohort) are increasingly less likely to belong to this cluster than those born earlier.

The second group consists of men (n = 2,179; 27%), who experience early and universal partnership formation and childbearing. Most men (65%) are married at age 35; but cohabitation (20%) and separation (15%) are also prevalent. By age 30, all men have at least one child and the majority (80%) have a second or third child. Men in this group have the largest families of all groups; almost 40% have three or more children. Their employment trajectories are characterised by full-time employment from a young age. In their 20s, 90% of men in this group are full-time employed; this proportion declines somewhat (to 80%) by age 35. This group is labelled 'Early partnership and fertility, full-time employment'. Regarding migrant origin, all groups are as likely as native men to belong to this trajectory type. Additionally, highly educated men and those who were born later are less likely to belong to this group than low educated men and those born in earlier years.

Men in the third group (n = 1,358; 17%) remain never partnered and childless until later ages. They form cohabitation or marriage after age 30 and have children at later ages. At age 35, 40% are in a relationship and 20% have one or two children. Around 70% of men in this group are in full-time education at age 16 and the vast majority then become full-time employed. At age 35, over 80% are full-time employed and the remaining 20% are equally distributed between those in education, part time employment, and unemployment. This group is labelled 'Very late or no partnership and fertility, full-time employment'. Men of Caribbean descent are most likely to belong to this group, whereas those with Indian or Pakistani and Bangladeshi background are the least likely to do so. We do not find large educational differences in the likelihood of belonging to this group. Men born in the 1950s and 1960s are more likely than those born in the 1940s to belong to this group.

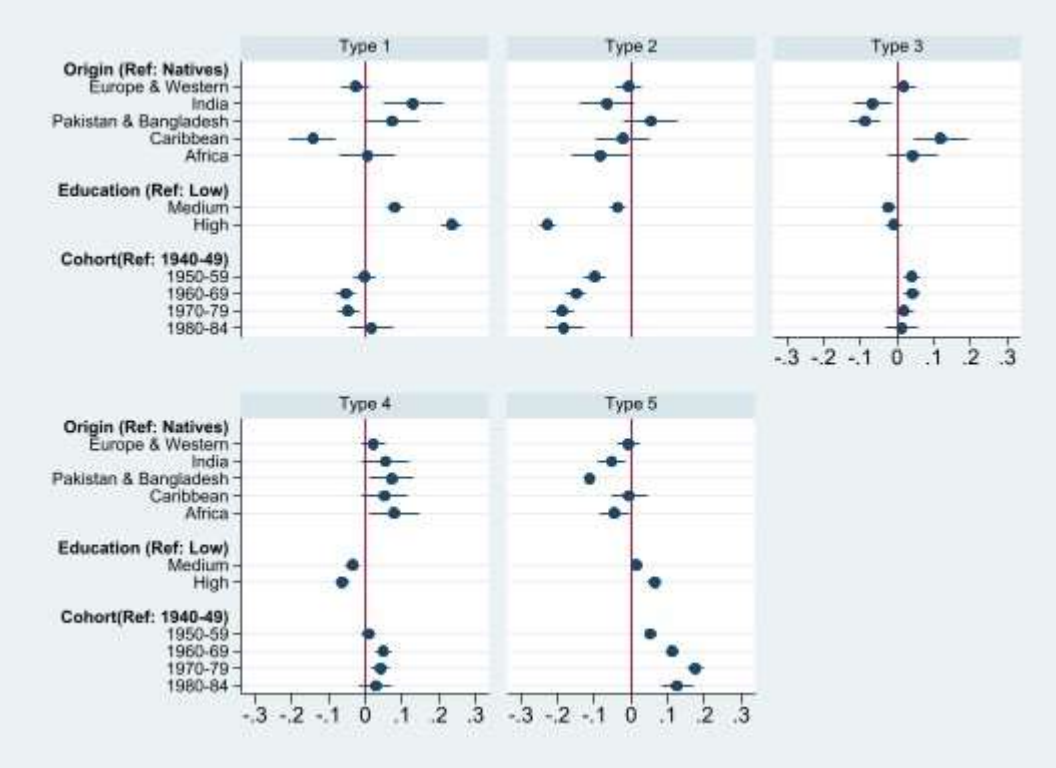
Figure 5. Results of cluster analysis for men: five types of joint trajectories of partnership, fertility, and employment among natives and the descendants of immigrants in the UK



Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals.

In the fourth group (n = 1,021; 13%), men form relationships later; at age 35 20% are never partnered, 15% are separated, and the remaining 65% are in a relationship (mainly marriage). They also have children at later ages; at age 35, 60% have at least one child. What distinguishes men in this group the most from the other groups is their employment trajectories. After being in full-time education, the majority becomes full-time employed followed by self-employment. At age 35, almost 60% of men in this group are self-employed and only around 20% are employed full-time. The remaining share is distributed equally between economically inactive, part-time employed, and unemployed men. We label this group 'Late partnership and fertility, self-employment'. Men from all origin groups are as likely as native men to belong to this trajectory type, although those with Pakistani or Bangladeshi and African origin have slightly higher propensities of belonging to this group than native men. Men with medium or high levels of education have a smaller propensity to belong to this group than low educated men. Finally, those born in the 1960s and 1970s are more likely than those born in the 1940s to belong to this group.

Figure 6. Average marginal effects of belonging to the five different clusters by covariates, men



Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).

Finally, men in the fifth group (n = 954; 12%) are characterised by heterogeneous partnership experiences. Most men form cohabiting relationships, many of which end in union dissolution. Only 20% of the unions become marriages. Men in this group do not have children before their 30s; by age 35 around 40% have at least one child. Their employment trajectories are similar to men in the first group. We call this group 'Heterogeneous partnerships, late fertility, full-time employment'. Men with Indian, Pakistani or Bangladeshi, and African origin are less likely than native men to experience these joint trajectories. Highly educated men and those who were born later are increasingly more likely than those born in the 1940s to belong to this trajectory type (except for the youngest cohort).

Conclusion and discussion

This study investigated the interrelationship between partnership, fertility, and employment trajectories of native and descendant women and men applying multi-channel sequence analysis to high quality longitudinal data from the UK. Our study highlights several new findings (see Table A3). First, the descendants of immigrants from culturally similar countries, such as European and other Western countries have similar partnership, fertility, and employment trajectories to British natives. This finding was the same among women and men, although female European/Western descendants were more likely than native women to work full-time and form partnerships and families at later ages (cluster 3). Interestingly, women of Caribbean origin were also more likely to work full-time than native women indicating that although they may have diverse partnership and childbearing experiences, these patterns do not translate to labour market disadvantage. These findings lend support to the classical assimilation or integration hypothesis and suggest that, on average, descendants of European, Western, and Caribbean immigrants are well integrated into British society regarding their partnership, childbearing, and employment trajectories.

Second, our study highlights that although the descendants of immigrants were socialised in the UK, heterogeneity in their family and partnership formation as well as employment patterns persists, especially among the descendants of culturally dissimilar immigrant groups such as those from India, Pakistan, and Bangladesh. The findings on family patterns seem to support the minority subculture hypothesis indicating that the patterns reflect cultural differences in norms and preferences attached to partnership and family formation. However, our study highlights that specific family formation patterns are coupled with a persistent disadvantage on the labour market, especially among women. Following partnership formation and childbearing, women tend to switch to inactivity or part-time employment and the proportion of those who work full-time does not recuperate over time. This is especially

the case for women of Indian, Pakistani, and Bangladeshi origin. These groups of women are more disadvantaged on the labour market than British natives and this disadvantage is linked to their partnership formation and childbearing patterns. However, whether women do not re-enter the labour market full-time following childbearing due to preferences, norms, or reduced labour market opportunities and/or discrimination remains an open question.

Our findings may also lend some indirect support to the minority-group status hypothesis (Milewski, 2010), which argues that discrimination may influence individuals' partnership and fertility decisions by, for example, entering the 'motherhood track' when faced with limited employment opportunities (Kulu et al., 2019). We found that, indeed, once women entered relationships and childbearing, their propensity to be in full-time employment reduced drastically and remained low. However, this pattern not only persists among the descendants of immigrants but also among native women. Thus, it is possible that in the UK context, the lack of affordable childcare between ages 1 and 3 of children together with the conservative family values among some groups of descendants combine to produce low levels of engagement with full-time employment overall and especially among South Asian women. This implies that policies need to ensure the availability of affordable, easily available, high-quality childcare to all women to enable them to re-join the labour market full-time as soon as they prefer following childbearing.

This study has some limitations. First, we have analysed natives as well as the descendants of immigrants together. As the majority of the sample consists of natives, this raises the question of whether the patterns are driven by the behaviours of the natives and whether we would find different patterns if the natives were excluded from the analysis. We have conducted additional analysis (Figures A6 and A7) by excluding native women and men from the analysis. We found similar clusters to what is shown in the paper and conclude that the results are not driven or biased by including natives in the analysis. Comparing the

behaviours of the descendants of immigrants to those of the natives brings the advantage of allowing us to draw conclusions about assimilation and integration processes. Second, as most descendants are still young, we can only follow their life histories until age 35. It is likely that we slightly underestimate employment levels among minority women as some of them may return to the labour market in their late 30s and early 40s when their children are older.

Taken together, this study highlighted persistent gender differences in the link between partnership, childbearing, and employment trajectories of the descendants of immigrants. This is especially the case for descendants of immigrants from culturally dissimilar countries such as India, Pakistan, and Bangladesh, whose conservative partnership and family formation patterns are coupled with low labour market engagement. Whilst it is unclear whether this is due to differences in norms and preferences or reduced labour market opportunities and discrimination, such gendered patterns of partnership and family formation and corresponding employment trajectories are likely to have serious long-term implications for the (financial) well-being of the female second-generation (e.g., economic independence, wealth, or pensions) generating further gender inequalities over time. It is not the diversity in partnership and family formation patterns, which poses a challenge, rather that these patterns co-exist with unequal labour market opportunities and labour market participation among women.

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Appendix

Table A1. Distribution of the analytical sample by migration background and birth cohort among men and women.

	Men					
	1940-1949	1950-1959	1960-1969	1970-1979	1980-1984	Total
Natives	1,752	1,708	1,825	1,360	247	6,892
Europe & Western	101	155	162	104	13	535
India	12	28	48	47	< 5	137
Pakistan & Bangladesh	< 5	25	39	85	10	160
Caribbean	5	30	78	25	6	144
Africa	6	21	56	44	10	137
Total	1,877	1,967	2,208	1,665	288	8,005
	Women					
	1940-1949	1950-1959	1960-1969	1970-1979	1980-1984	Total
Natives	2,104	2,158	2,462	1,944	394	9,062
Europe & Western	117	210	202	146	25	700
India	21	25	71	72	9	198
Pakistan & Bangladesh	< 5	6	43	99	27	175
Caribbean	12	65	143	80	12	312
Africa	13	26	61	74	13	187
Total	2,267	2,490	2,982	2,415	480	10,634

Table A2. Measures of cluster quality for 3, 4, and 5 clusters, women and men

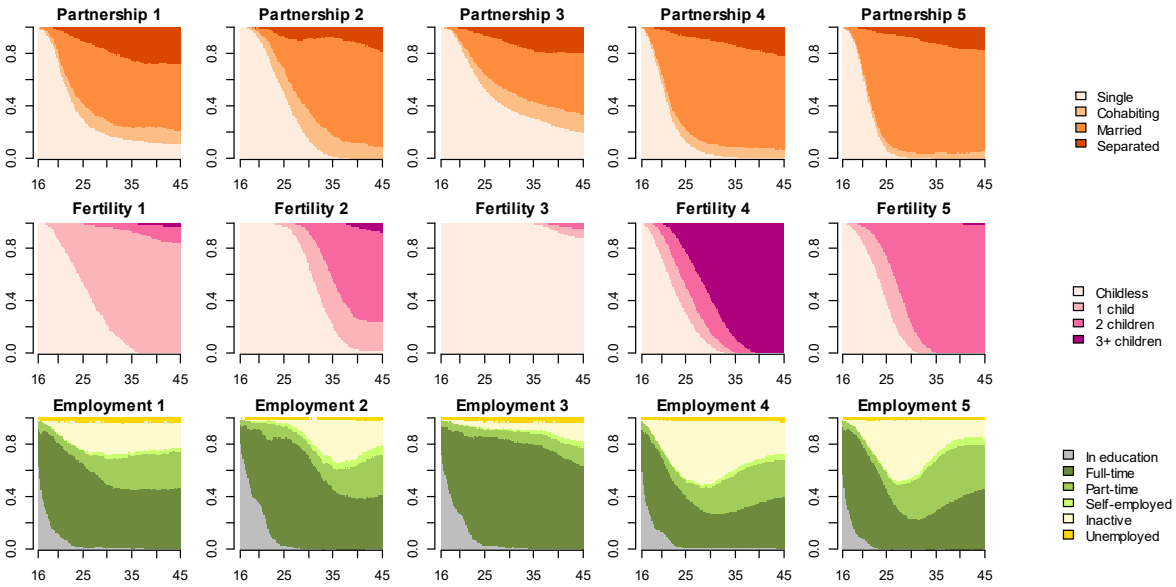
	3 clusters	4 clusters	5 clusters
Women			
Point Biserial Correlation (PBC)	**0.47**	0.40	0.41
Hubert's Gamma (HG)	0.55	0.50	**0.57**
Hubert's Somers' D (HGSD)	0.55	0.50	**0.57**
Average Silhouette Width (ASW)	**0.20**	0.12	0.12
Average Silhouette Width weighted (ASWw)	**0.20**	0.12	0.12
Calinski-Harabasz index (CH)	**987.78**	867.92	794.12
Pseudo R squared (R2)	0.16	0.20	**0.23**
Calinski-Harabasz index using squared distances (CHsq)	**2053.53**	1777.37	1665.94
Pseudo R squared using squared distances (R2sq)	0.28	0.33	**0.39**
Hubert's C (HC)	**0.21**	0.24	**0.21**
Men			
Point Biserial Correlation (PBC)	0.28	**0.40**	0.37
Hubert's Gamma (HG)	0.34	**0.53**	0.52
Hubert's Somers' D (HGSD)	0.34	**0.53**	0.52
Average Silhouette Width (ASW)	**0.14**	**0.14**	**0.14**
Average Silhouette Width weighted (ASWw)	**0.14**	**0.14**	**0.14**
Calinski-Harabasz index (CH)	**824.56**	761.15	678.92
Pseudo R squared (R2)	0.17	0.22	**0.25**
Calinski-Harabasz index using squared distances (CHsq)	**1494.91**	1427.09	1245.95
Pseudo R squared using squared distances (R2sq)	0.27	0.35	**0.38**
Hubert's C (HC)	0.31	**0.22**	**0.22**

Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: Boldface highlights the best fit according to each measure. A higher value indicates better fit for all measures except for Hubert's C, where a lower value indicates better fit.

Table A3. Summary of the results

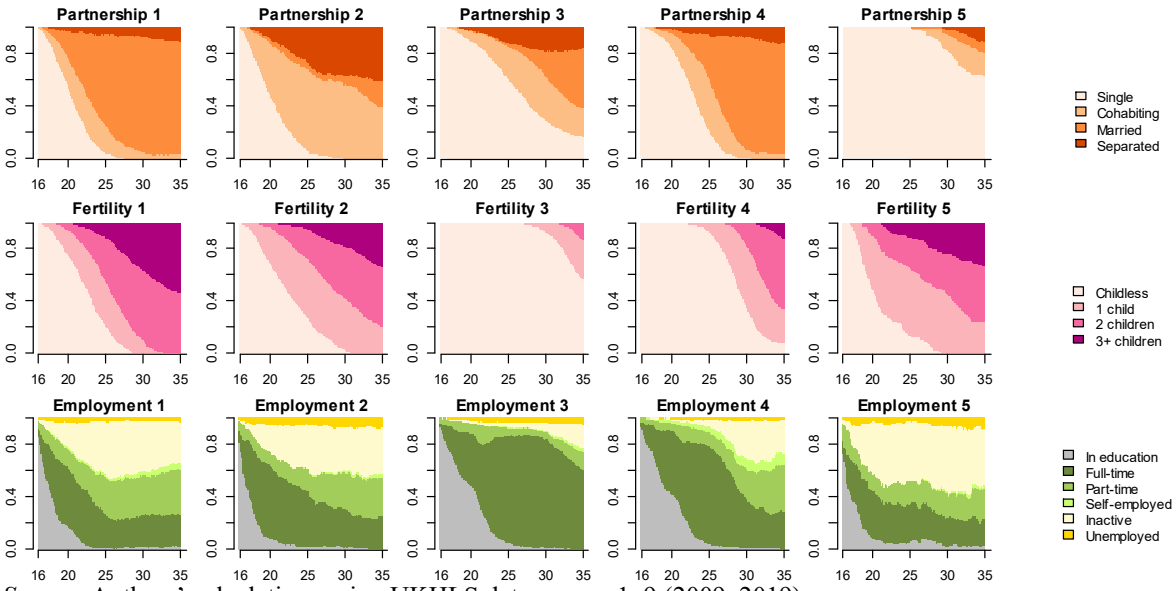
	Cluster	%	More likely than natives	Less likely than natives	Education	Cohort
			Women			
1	Early marriage, two children, inactivity/part-time employment	28%		Caribbean	negative	negative
2	Late partnership and childbearing, education/full-time employment	24%		Caribbean	positive	
3	Late heterogeneous partnership, late or no fertility, full-time employment	23%	Europe/Western, Caribbean	Pakistan and Bangladesh	positive	U-shaped
4	Early heterogeneous partnership, early fertility, inactivity/part-time employment	14%	Caribbean	India, Pakistan and Bangladesh	negative	negative
5	Early marriage, large families, inactivity/part-time employment	12%	India, Pakistan and Bangladesh	Caribbean	negative	negative
			Men			
1	Late marriage and fertility, full-time employment	31%	India, Pakistan and Bangladesh	Caribbean	positive	negative
2	Early partnership and fertility, full-time employment	27%			negative	negative
3	Very late or no partnership and fertility, full-time employment	17%	Caribbean	India, Pakistan and Bangladesh		positive
4	Late partnership and fertility, self-employment	13%	Pakistan and Bangladesh, Africa		negative	positive
5	Heterogeneous partnership, late fertility, full-time employment	12%		India, Africa, Pakistan and Bangladesh	positive	positive

Figure A1. Results of cluster analysis for women born 1940-69: five types of joint trajectories of partnership, fertility, and employment among natives and the descendants of immigrants in the UK



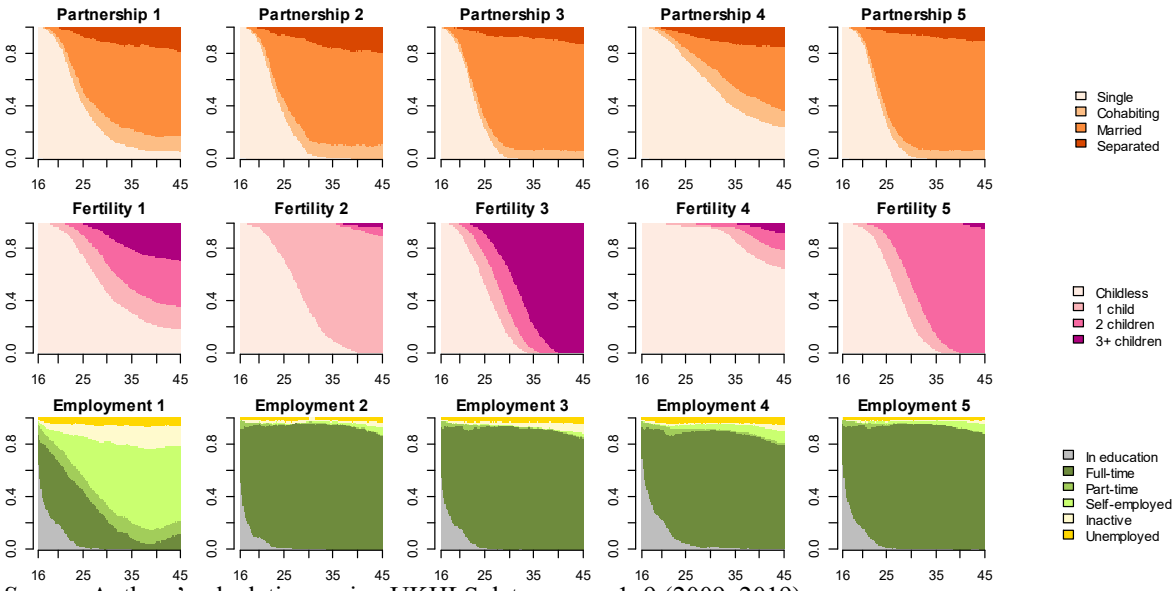
Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals. Cluster sizes are 786; 1,062; 1,160; 2,395; 2,131.

Figure A2. Results of cluster analysis for women born 1970-84: five types of joint trajectories of partnership, fertility, and employment among natives and the descendants of immigrants in the UK



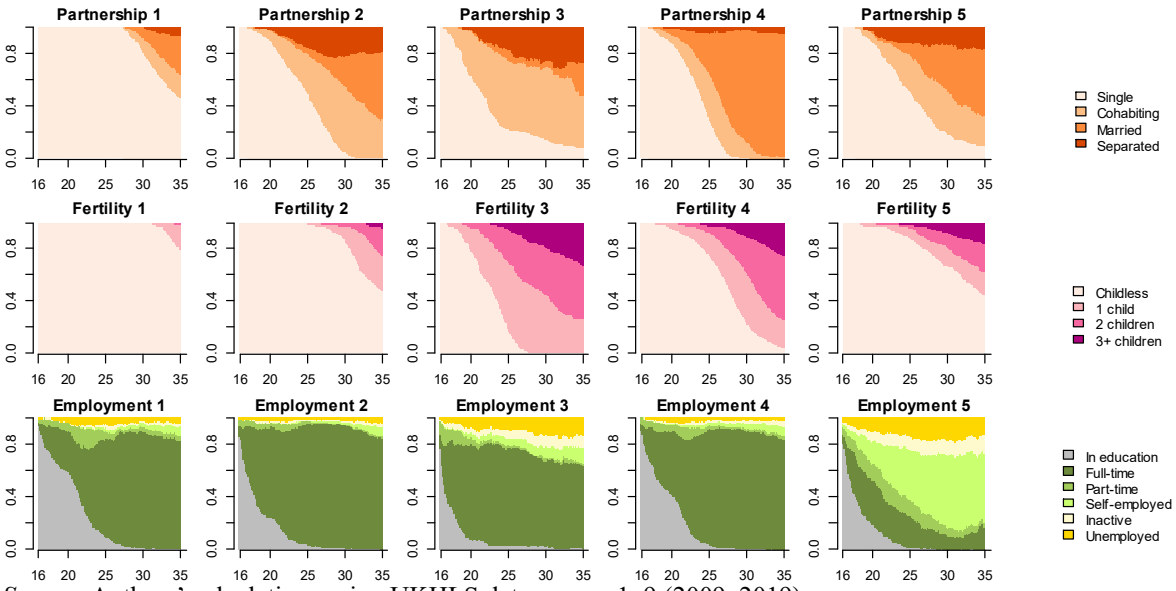
Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals. Cluster sizes are 593; 500; 996; 699; 117.

Figure A3. Results of cluster analysis for men born 1940-69: five types of joint trajectories of partnership, fertility, and employment among natives and the descendants of immigrants in the UK



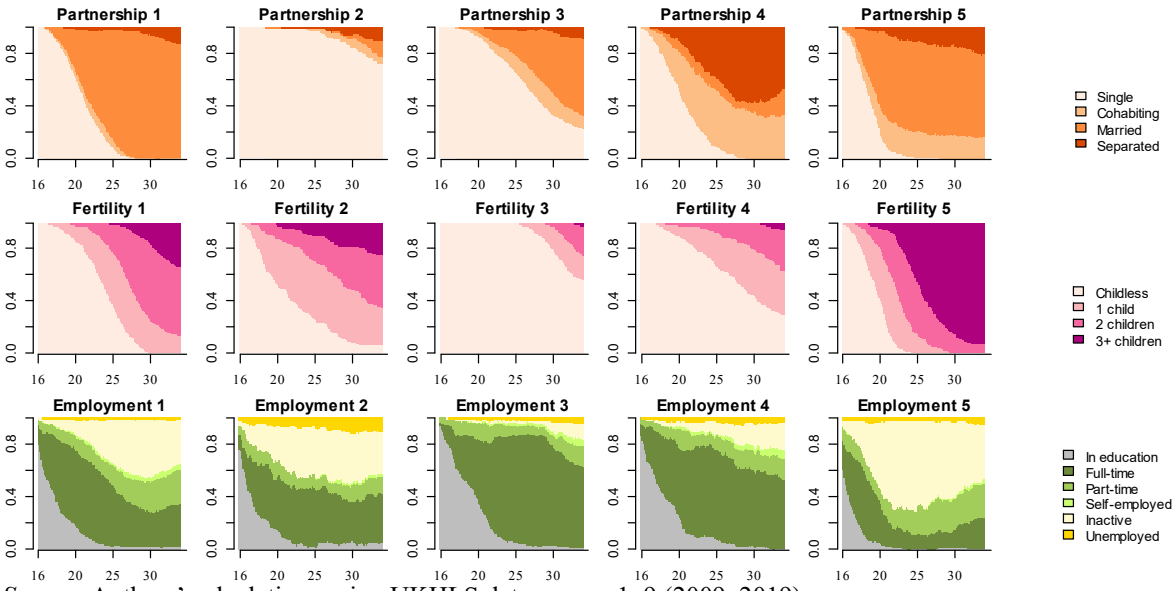
Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals. Cluster sizes are 769; 558; 1,093; 1,818; 1,635.

Figure A4. Results of cluster analysis for men born 1970-84: five types of joint trajectories of partnership, fertility, and employment among natives and the descendants of immigrants in the UK



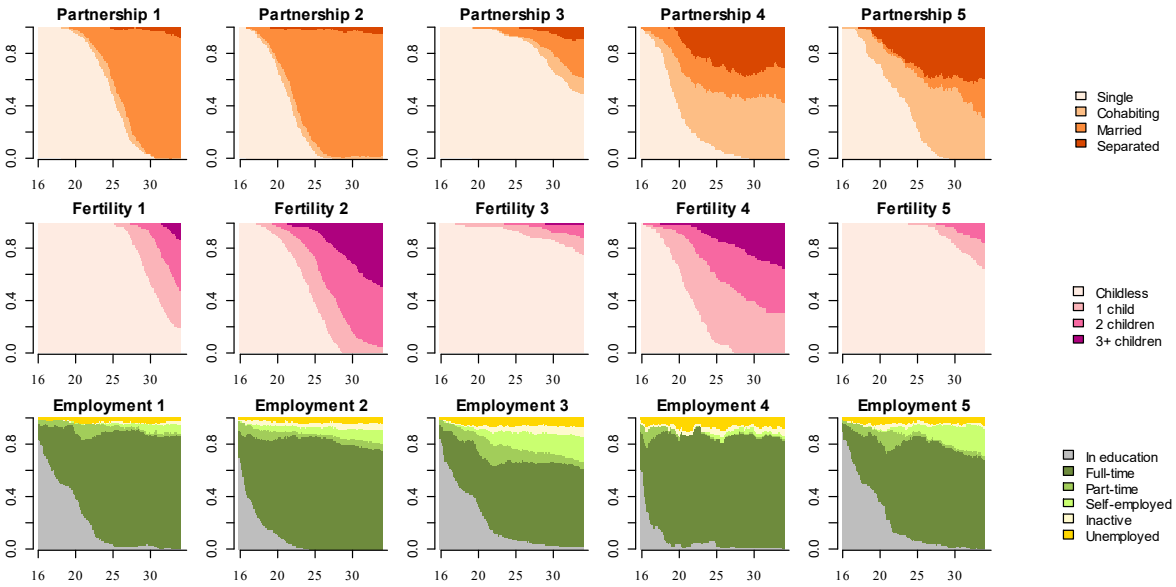
Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals. Cluster sizes are 381; 591; 171; 594; 216.

Figure A5. Results of cluster analysis for women: five types of joint trajectories of partnership, fertility, and employment among natives and the descendants of immigrants in the UK; excluding natives from the sample



Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals. Cluster sizes are 499; 104; 510; 224; 235.

Figure A6. Results of cluster analysis for men: five types of joint trajectories of partnership, fertility, and employment among natives and the descendants of immigrants in the UK; excluding natives from the sample



Source: Authors' calculations using UKHLS data, waves 1–9 (2009–2019).
Notes: The 'Separated' category includes separated as well as widowed individuals. Cluster sizes are 221; 324; 346; 90; 132.