Cohort Change in Family Life Course Complexity of Adults and Children

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Preprint, September 2022

ABSTRACT

This chapter presents how family complexity evolved over the life course of adults in the United Kingdom, how it varied by birth cohort, gender, and parenthood status, and most importantly, how it varied across the early life courses of children by birth cohort. Although research on the complexity of family lives is motivated by its potential consequences for children, few studies have assessed to what extent children have been exposed to increased family complexity. We define family complexity based on partnership lives of adults.

We used rich retrospective partnership histories from UKHLS and BHPS to reconstruct adults' family life courses born across the 20th Century and calculate their complexity. We then transposed parents' family sequences to reflect what their children experienced in their first 16 years of life. Our methodological approach provides a broader and more dynamic measure for children's family life compared to measurements literature on the impact of family live on children's outcomes has applied so far.

We find an increasing level and growth of life course family complexity over cohorts. Mothers have the largest family life course complexity, followed by fathers, childless women and, lastly, by childless men. Differences between parents and childless adults converge across cohorts. Changing the perspective from parents to children we reveal that children's family complexity has increased dramatically across birth cohorts – for both, mothers' and fathers' family lives. Indicating that children of the youngest cohorts experience a higher number of family transitions and unpredictability already at very young ages, our results set the starting point for future research on the consequences of such increasing family complexity for children.

INTRODUCTION

Scholarly and public interest in the complexity of family lives has increased in recent decades as a response to family demographic change (Cherlin, 2010; Frejka & Sobotka, 2008; Lesthaeghe, 2014). Across many western industrial democracies since the mid-20th Century, early family formation has shifted from a relatively simple and contracted pattern of early parental home leaving followed by marriage and childbirth to complex and protracted pattern including independent living and cohabitation (Billari & Liefbroer, 2010; Buchmann & Kriesi, 2011). Moreover, divorce and remarriage as well as non-marital and multi-partner childbirth has become more common (Cherlin, 2017; Guzzo, 2014). In sum, the family life courses of adults have become more complex, meaning they consist of more family demographic transitions and greater unpredictability (Van Winkle, 2018; Van Winkle & Fasang, 2021). However, since family complexity has been measured at the end of observed life courses so far, we know less about when over the life course family lives become complex and when they stabilize.

Research on the complexity of family lives is commonly motivated by its potential consequences for children (McLanahan, 2004; McLanahan & Jacobsen, 2015; McLanahan & Percheski, 2008). However, the research on the consequences of family life on children's outcomes and inequality of opportunity has mostly focussed on individual events, most often parental separation (Härkönen et al., 2017). In line with the notion that general family stability may be more important for children's wellbeing (Waldfogel et al., 2010) we argue that it is relevant to take a holistic perspective and assess the role of such single family events as a whole and across time, measured as family complexity over the life course.

Despite the open questions revolving around family complexity and children's wellbeing, there are no studies that have directly assessed whether the family life courses of

parents tend to be more complex than those of childless adults. For example, Kalmijn and Leopold (2021) recently demonstrated that the divorce revolution – the dramatic increase in divorce rates across the 20th Century – was concentrated mostly among adults without children. Thus, children were affected less by the increase in divorce than was previously assumed to be the case. Similarly, it is possible that family life course complexity is concentrated among childless adults and its increase over time has had little effect on children. It is important for researchers of family complexity and its impact on children to first assess the extent that life course complexity has also increased among parents compared to childless adults as well as among children themselves.

In this study, we address this important gap by assessing three research questions: First, how has the family complexity evolved over the life course of adults in the United Kingdom? We go beyond standard approaches in the literature that assess the complexity of life courses at a single point in time, but analyse family complexity dynamically as a process that unfolds as individuals grow older (Pelletier et al., 2020). This allows us to understand when in the life course family complexity tends to increase, for example through numerous partnership transitions, and when family lives become more stable and predictable. We define family complexity based on the partnership lives of adults.

Second, how does life course family complexity vary by birth cohort, gender, and parenthood status? This is important to understand whether parents or childless adults have more complex family lives and when in the life course. For example, it is possible that parents have more complex family lives before entering parenthood followed by stability. In addition, it's important to know whether these trends have changed across birth cohorts.

Third, how does family complexity vary across the early life courses of children by birth cohort? We are the first to investigate to what extent and when children are exposed to the family complexity of their mothers and fathers.

We make theoretical, methodological, and empirical contributions to the family sociological and demographic literature. Theoretically, we integrate three lines of literature that although similar have evolved separately: family life course complexity, relational family complexity, and family instability. Able studies in the field of differential life course sociology have demonstrated that the family life courses of adults have become more differentiated and complex as family formation entails a growing number of life courses events and transitions with greater uncertainty (Elzinga & Liefbroer, 2007; Van Winkle, 2018; Van Winkle & Fasang, 2021). In family sociology, numerous scholars have assessed the consequences of family events, such as divorce and remarriage, on the complexity of children's kinship networks (Kalmijn et al., 2019; Thomson, 2014, 2017) and its effects, for example on children's chances for interactions with non-resident fathers (van den Berg et al., 2021). Finally, another line of research concerns itself with how instability caused by multiple family transitions can impact children negatively (Cavanagh & Fomby, 2019; Wu, 1996). Our conceptualization of family complexity integrates these three perspectives by demonstrating how adults' life course complexity translates into complexity for children, both in kinship networks and household instability.

Methodologically, we present a method for analysing the family complexity of adults and children dynamically over the life course. To measure family complexity for individuals and their children in the United Kingdom (UK) we use rich retrospective data on partnership histories from UK Household Longitudinal Study (UKHLS) and the British Household Panel Survey (BHPS). Specifically, we use life histories to reconstruct adults' family life courses, concentrating on processes of union formation and dissolution, such as cohabitation, marriage,

separation, and divorce. We then use techniques developed in sequence analysis to calculate the complexity – incorporating both the number of family transitions and their unpredictability – of men and women born across the 20th Century. In a second step, we transpose mothers' and fathers' family sequences to reflect what their children experience in their first 16 years of life. Therefore, we are able to trace how children's experience of family complexity evolved across their early life course. This is important as it reveals whether parents' family lives are more stable after childbirth and how complexity progresses along the childhood of their children compared to the whole life course of parents themselves, including the periods before parenthood.

Empirically, we find considerable differences in family complexity across age groups, birth cohorts, gender, and parenthood status. We show not only that average levels of complexity have increased across birth cohorts, but that complexity increases faster during young adulthood and stabilizes later in the life course for cohorts born after the mid-1960s compared to those born before. Across all cohorts, we show that mothers have considerably higher family complexity followed by fathers and childless adults. One of our most important contributions is to show how family complexity develops from children's point of view. We find that for children of the baby boomer cohort born between 1946-64 levels of complexity were low and increased only to a minor degree. However, especially for children born after 1980, family complexity begins to increase dramatically in their second year of life and, for millennials, continues to increase as they grow older. These findings demonstrate not only that children are indeed exposed to increasing levels of family complexity, but that family transitions and unpredictability accumulate across their early life course.

CONCEPTUALIZING FAMILY COMPLEXITY

Previous Literature on Family Complexity

Family complexity has been conceptualized and studied in various manners across disciplines, especially in sociology and demography. In this section, we briefly review three distinct strands of literature on family complexity: life course family complexity, relational family complexity, and family instability. Each strand of literature defines and empirically operationalizes family complexity differently and is motivated by varying public and scholarly debates.

The first strand of literature on life course complexity revolves around debates on whether and to what extent family formation has become more differentiated and de-standardized across birth cohorts. There is general agreement that life course complexity should be conceptualized in terms of life course differentiation (Van Winkle, 2018; Van Winkle & Fasang, 2017). Brückner and Mayer (2005) define differentiation as an increase in the number of life course states experienced across the life course. As a result, complexity has often been operationalized using a simple count measure of the number of life course states or transitions experienced across individuals' lives. However, complexity is also associated with an increase in life course uncertainty (Mills & Blossfeld, 2013). Composite metrics developed in sequence analysis incorporate both the number of life course states as well as the degree of unpredictability (Elzinga & Liefbroer, 2007; Gabadinho & Studer, 2010). Sequence based complexity measures have the advantage that they can incorporate a large number life course states, i.e. the intersection of different life course dimensions, as well as a small number of simple states.

While research on the complexity of family trajectories using sequence-based complexity metrics is becoming more common, the bulk of studies on life course complexity

are interested in the differentiation of education-work-retirement trajectories (Biemann et al., 2011; Ciganda, 2015; Riekhoff, 2018). Although there are many studies that apply sequence and cluster analysis to family trajectories, Elzinga and Liefbroer (2007) first studied the complexity of early family life courses in a number of countries and across birth cohorts. They find that average early family life course complexity had only increased moderately across a small number of their study countries. Otherwise, average complexity had remained relatively stable. Van Winkle (2018) analyzed long-life family trajectories in a number of European countries and cohorts, and concluded that although complexity had increased across cohorts, cross-national variation was considerably larger (see also Van Winkle, 2019; Van Winkle & Fasang, 2021).

A limitation of previous studies is their static conceptualization and measurement of the complexity of family life courses. The studies reviewed above all estimate the complexity of life course sequences at the end of the process. For example, researchers studying early adulthood might calculate the complexity of family trajectories between ages 18-35 at age 35 (e.g., Elzinga & Liefbroer, 2007), while others studying longer segments of the life course might measure the complexity of sequences between ages 18-50 at age 50 (e.g., Van Winkle, 2018). Recently, Pelletier and colleagues (2020) proposed a dynamic life course approach to complexity. Specifically, they argued that family complexity should be conceptualized as an aspect of the life course that evolves as individuals grow older. Thus, family complexity will be low when the process begins, e.g. at age 18, but will increase quickly as adults transition into new family demographic states, such as cohabitation or marriage. As individuals grow older, complexity may continue to increase, for example due to divorce or remarriage, or complexity may level off due to relative stability and increased predictability in the life course. A dynamic approach is important to gain a better understanding of when in the life course the

complexity of family lives increases and to what level as well as when or whether family lives become stable.

The two other strands of literature shift the focus of family complexity from adults to children. Numerous scholars interested in the impact of the second demographic transition on family complexity have focused their attention on changes in kinship networks (Kalmijn et al., 2019; Thomson, 2014, 2017). Compared to children residing with both parents, children whose parents separate and re-partner create more complex kinship networks, which may affect the quality of the relationship. Processes such as multi-partner fertility and non-marital childbirth (e.g., Guzzo, 2014; Thomson, 2014), separation and divorce as well as repartnering and remarriage (e.g., Cherlin, 2009; van Houdt, 2021) create larger and more intricate webs of family relationships with less institutionalized and clearly defined roles (Thomson, 2017), such as step-parent, half-sibling, and non-resident parent. For example, it is well documented that intergenerational contact between children and non-resident separated fathers is lower across the life course than with resident fathers, which is exacerbated by the presence of a stepfather (van den Berg et al., 2021).

The third strand of literature on family complexity and its impact on children shifts the focus from kinship networks to instability within the household and its potential negative effects on children's wellbeing (Cavanagh & Fomby, 2019). The family instability perspective has emerged as one of the dominant theoretical approaches to the consequences of family transitions for children (Raley & Sweeney, 2020). The approach argues that it is not family structure that has a negative impact on children's life chances, but family transitions. Moreover, the effects tend to be cumulative: more family transitions incur greater consequences. Family transitions are thought to be linked not only with changes in household economic wellbeing and residential moves, but also with stress caused by disruption of child's sense of security, ambiguity in household rules and relationships, and parent's expectations of behaviour.

There is a tension in the family demographic and family sociological literature between family complexity and the family life course complexity. As discussed above, we conceptualize the complexity of family life courses to be a dynamic process of differentiation as individuals grow older incorporating both the number of family transitions, such as marriage and divorce, as well as the extent of unpredictability. However, the complexity of family relationships and life course family complexity are strongly linked. More complex and intricate family relationships are generated by more complex family life courses. In fact, one of the central pathways through which family complexity has a negative impact on children is by means of family life course instability inducing stress and conflict (Cavanagh & Fomby, 2019).

Research on the consequences of family life on children's outcomes and inequality of opportunity has mostly focussed on individual events, most often parental separation (Härkönen et al., 2017). In this study, we concentrate on family life course complexity, but we are the first to estimate using sequence-based techniques and to apply a dynamic life course approach to the extent that parents and their children are exposed to life course complexity. We thus follow Cavanagh and Fomby's (2019) call and develop a broader and more dynamic measure for children's family life.

THEORETICAL BACKGROUND

Family Complexity across Birth Cohorts

Three theoretical narratives have been applied when studying the complexity of family events and transitions within individual life courses (see Van Winkle, 2018). First, the Second Demographic Transition (SDT) thesis is an ideational account, which associates more complex family life courses with a shift from materialist to post-materialist values (Lesthaeghe, 2014). Second, an increase in family life course complexity has been connected with increasing

economic uncertainty following globalization and deindustrialization (Mills & Blossfeld, 2013). Third, life course sociologists and welfare state scholars argue that labor market and family policies are related to the complexity of family lives (Mayer, 2009; Van Winkle, 2019). The first two theoretical perspectives are generally invoked to account for change over time, while the latter is more commonly used to account for cross-national differences. In addition, a fourth and emerging biodemographic theoretical perspective on family life course complexity (Van Winkle & Conley, 2021) explores genetic factors that influence the components of family life course complexity and the extent that lower normative barriers to family demographic behaviour and increasing levels of inequality may lead to a greater expression of genetic predisposition for complex family lives.

Regardless of the theoretical approach, early family formation has shifted from a relatively simple, contracted and early pattern to complex, protracted and late pattern (Billari & Liefbroer, 2010; Buchmann & Kriesi, 2011). We therefore expect that *the level and the growth of life course family complexity has increased across birth cohorts (hypothesis 1)*. With *level of family life course complexity*, we refer to the overall highest achieved extent of complexity independent of age. With *growth of life course family complexity*, we refer to the speed with which family life course complexity increases in young adulthood and the age range when family lives become stable and complexity stops increasing.

Differences by Gender and Parenthood Status

Few studies on the complexity of family life courses concentrate on gender differences, although many demonstrate that women tend to have more complex family life courses compared to men (e.g., Van Winkle, 2018; Van Winkle & Fasang, 2021). Although men are more likely to live independently before entering marriage or cohabitation, women are more

likely than men to form cohabiting or marital unions and more likely to repartner or remarry following the dissolution of a cohabiting or marital union (Cherlin, 2010, 2017; Di Nallo, 2019). Possible explanations range from gendered norms surrounding the role of women in family and employment life and their roles as kinkeepers (Kalmijn et al., 2019; Kaufman, 2000). However, despite advances in women's and mothers' employment, labour market disadvantages by means of discrimination and human capital differences often make women economically more dependent on having a partner in the household (e.g., Charles & Grusky, 2004; Florian, 2018; Ludwig & Brüderl, 2018; Mari, 2019). Thus, in summary, *life course family complexity is likely larger for women compared to men across birth cohorts (hypothesis 2)*.

Furthermore, we expect the level and growth of family complexity to differ between parents and childless individuals, though there are reasons for either conceivable option. On the one hand, *the level and growth of life course family complexity will be largest for childless women and childless men followed by mothers and fathers across birth cohorts (hypothesis 3a)*, given that this group was shown to drive the divorce revolution (Kalmijn & Leopold, 2021). More general, the lack of children might give individuals more freedom and time to choose and change partners more frequently than when one's family life might impact the own children. In other words, the responsibility for children as well as the limited time for one's own intimate life due to more time spend for care work might be obstacles to repartner frequently for parents (Di Nallo, 2019). Additionally, in societies where being and staying a married parent is the norm like the UK, individuals might select into parenthood and have stable family lives, whereas others remain childless (Liefbroer & Billari, 2010). This norm-based selection into parenthood and childlessness might additionally drive the gap in family complexity between childless individuals and parents. On the other hand, childlessness might be due to the lack of partners over the life course (Jalovaara & Fasang, 2017; Mynarska et al.,

2015; Raab & Struffolino, 2019), and thus individuals without many partners and thus a low family complexity might select in this group. Reversely, parents might be a selective group with a very active partnership life before having children. It would follow that *the level and growth of life course family complexity will be largest for mothers and fathers followed by childless women and men across birth cohorts (hypothesis 3b).*

Differences between Adults and Children

To date, no research has assessed life course family complexity from a child's point of view. However, this is essential to know whether and to what extent cohort changes in the complexity of adults' family life courses actually translate to an increased exposure of children to family complexity. For example, Kalmijn and Leopold (2021) recently demonstrated that the divorce revolution was concentrated mostly among childless adults and therefore fewer children have been affected by the divorce revolution than would have otherwise been expected. However, as we argue that the family life courses of parents might be more complex than those of childless adults and family complexity has overall increased across cohorts, it is likely that *the level and the growth of life course family complexity for children has increased across birth cohorts (hypothesis 4a)*. However, it is possible that the complexity of to-be parents' family life courses stops increasing in complexity once children are born, for example if parents tend not to divorce and remarry. Therefore, we could also expect that *the level and the growth of life course family complexity for children has remained constant across birth cohorts (hypothesis 4b).*

DATA & METHODS

Study Sample

We apply harmonized data from Understanding Society[1], which combines longitudinal data from UK Household Longitudinal Study (UKHLS) and its predecessor, the British Household Panel Survey (BHPS), covering households in the UK since 1991. For the partnership history we use data from the marital and cohabitation histories, which provides spell data about partnership histories from all UKHLS and BHPS samples and waves up to wave 9 (Nandi et al., 2020) and match it with cross-wave information on sex as well as year and month of birth (University of Essex, Institute for Social and Economic Research, 2021). Our adults sample consists of all respondents covered in the marital and cohabitation histories and without missing information on the socio-demographics of interests. We further exclude individuals with missing information on start and end date for all partnership spells (n=178 respondents) as well as respondents with implausible spells (multiple overlapping partnership spells with the same partner, n=3,175) and with partnerships sequences containing missing spells (n=32).

All adults that were reported to have ever had a social child[2], independently on whether or when it lived in the same household, were defined as parents. Mothers and fathers were identified based on their reported sex. Adults were defined as childless if they have not reported to have ever had a social or biological child and were age 40 or older.[3] Harmonising information of the UKHLS and BHPS on child births manually, we end up with an analysis sample of 74,190 adult individuals.

The data for children is derived from retrospective data on childbirths and longitudinal data on the children living in the household. Children with missing birth dates were excluded

[1] Understanding Society is an initiative funded by the Economic and Social Research Council and various Government Departments, with scientific leadership by the Institute for Social and Economic Research, University of Essex, and survey delivery by NatCen Social Research and Kantar Public. The research data are distributed by the UK Data Service.
[2] This includes biological as well as step and adopted children likewise.
[3] This means for all analyses which includes parenthood status as dimension, we excluded childless adults observed last before age 40.

from the analysis. We match each child to the partnership spells of each of their linkable social parent from *both*, the UKHLS and BHPS sample, and create two separate datasets. The first one contains the children linked to their *mothers'* partnership history (n= 63,349 children) and the second one matches the children to their *fathers'* partnership history (n= 48,911 children).

Sequence Definition

The raw partnership data contains spells on cohabitation, marriage, and civil partnership. Combining this with information on union dissolution and the order of spells we define five new spell states, resulting in 6 distinct partnership spells (see table 1). Periods between the union dissolution of cohabitations reported as break-up and the start of a new partnership spell or the last observed date are defined as '*separated*'. Similarly, we define periods between the end of marriage through divorce or widowhood and the start of the subsequent partnership spell or the last observed date as '*divorced'* or *'widowed'*, respectively. *Singlehood* is defined as partnership category before any first partnership spell only. We summarize cohabitation, marriage and civil partnership as one state, namely '*union'*. We do not use cohabitation and marriage as separate states, since we assume, following Hiekel & Vidal (2020), that the transition from cohabitation to marriage does not add complexity to family lives. Periods with any missing start or end date as well as periods between partnership spells where the type of union dissolution of the previous partnership is not defined are labelled as '*missing'* spells. For the analysis, partnership sequences with any missing spells were excluded to prevent skewing family complexity of such cases.

Overlapping partnership spells were dealt with based on a hierarchy of partnership spells and union dissolutions that prevents concealing any partnership spells. The result is a

rich dataset containing the complete partnership history of respondents as distinct partnership spells in the correct order and without any gaps.[4]

Table 1. Overview and definition of sequence states.

Partnership status	Start of spell	End of spell
Single	Age 16, if no partnership reported yet	Start of first partnership spell or last observed date
Union	Start of marriage, civil partnership or cohabitation spell	End of marriage, civil partnership or cohabitation or last observed date
Divorced	End of marriage or civil partnership spell through divorce	Start of any subsequent partnership spell or last observed date
Widowed	End of marriage or civil partnership spell through widowhood	Start of any subsequent partnership spell or last observed date
Separated	End of cohabitation spell through break-up	Start of any subsequent partnership spell or last observed date
Missing	Start of a spell with missing start or end date or period between partnership spells with unknown union dissolution	Start of any subsequent partnership spell or last observed date

For adults, the sequences start with age 16 and for children, the matched partnership lives of their parents are analysed for the period between each child's birth and age 16. Based on these partnership histories we calculate the family complexity for each respondent and their children over the life course.

Measuring Family Complexity

We use a composite measure developed in sequence analysis to assess the complexity of sequences of categorical states: the sequence complexity index. This index measures variability

[4] The detailed documentation and syntax for creating the complete partnership histories will be available online.

within sequences as the geometric mean of normalized sequence transitions and normalized longitudinal sequence entropy (Gabadinho et al. 2010; 2011). The complexity index provides a more nuanced indicator of life course differentiation compared with just the number of transitions or distinct states because the degree of uncertainty within life courses is incorporated through sequence entropy. In addition, multiple transitions between different states are captured, not just the number of a specific transition.

Formally, the complexity, C, of a sequence, x, is defined as follows:

$$C(x) = 100 * \sqrt{\frac{q(x)}{q_{max}} * \frac{h(x)}{h_{max}}}, \quad (1)$$

where the number of transitions within a sequence, q(x), is divided by the theoretical maximum number of transitions possible, q_{max}; the longitudinal entropy of a sequence, h(x), is divided by the theoretical maximum, h_{max}.

Longitudinal sequence entropy is

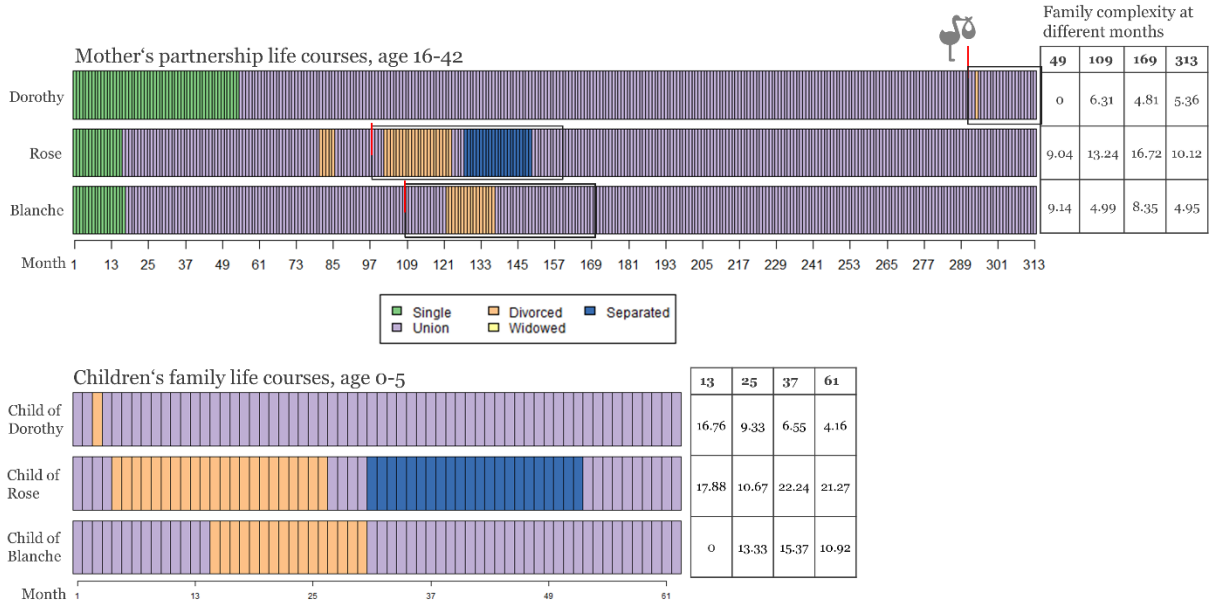
$$h(x) = -\sum_i^s \pi_i log \pi_i, \quad (1a)$$

where π is the proportion of occurrences in a given state, *i*, of the sequence alphabet, *s*. Entropy within sequences is maximal when each state occurs an equal number of times, which reflects that the unpredictability of a given state is maximal. We multiply the complexity by 100 to range between 0 and 100. Complexity is minimal in sequences composed of a single state and maximal in sequences that contain each state element with equal durations and have the maximum number of transitions. Empirically, the complexity ranges from a minimum of 0 to a maximum of 39.1, with a mean of 3.54 for mothers and of 1.11 for children in our study (see tables A3, A4). These are relatively comparable levels of complexity for adults compared to previous applications (Pelletier et al., 2020; Van Winkle, 2018a).

We follow an approach proposed by Pelletier and colleagues (2020) and calculate sequence complexity dynamically for each year of age. This means the complexity value for age 17 is based on the short family sequences of individuals starting at age 16 up until age 17, i.e. the first twelve months of each sequence. Complexity for age 18 is then calculated on family sequences 24 months in length from age 16 to age 18. For adults we continue this up until age 67 or until we no longer observe family behaviour. For children we calculate complexity in a similar way, starting with twelve-month sequences from age zero to one, followed by 24 month sequences from age zero to two, and so forth up to age 16.

Figure 1 depicts three examples of family trajectories for mothers as observed in our data. The Sequence Index Plot reveals the family state of each mother per month from age 16 to age 42. The table next to the Sequence Index Plots gives the family complexity at different time points, revealing how family complexity evolves over time. For example, Dorothy has a long and stable period of singlehood in her early age, which is why her family complexity is maximal stable or minimal complex (0 at month 49). However, it has increased to 6.31 in month 109 since she had experienced a transition to a union. In month 169, the value has decreased since she did not experience another transition – her family life stabilised. However, later in her life course she experienced two more transitions (from union to divorced and back to being in a union) which leads to a rise in family complexity. However, and despite having had experienced less transitions by then, Dorothy's family complexity was highest around month 109, since she then experienced a high level of uncertainty (covered in the complexity index through the entropy) as her periods in singlehood and in a union were about the same length. Similarly, the family complexity of Rose increases with transitions over time, before it decreases since her family life stabilizes in the form of a long-term union. Of the three chosen examples, her family life reaches highest levels of complexity since she experiences the most transitions between family states as well as many periods of similar length.

Figure 1. Exemplary *family trajectories of mothers, their children, and the complexity at different life course stages.*



The lower part of figure 1 depicts the early life courses of the children of Dorothy, Rose and Blanche – their month of birth is marked with the red lines in their mother's life courses. As described above and visible in the figure, the children's family life courses are fully based on their mothers' family lives (the section of the family life data transposed in our example is marked with a box in the mothers' life courses). However, the complexity measures reveal that this does not mean that their mothers' family complexity is mirrored in the children's complexity. Instead, we see how the children's family life complexity is characterised by different dynamics compared to their mother's. This is because we observe adults' family lives over a longer period and at different time points than their children's childhood. First, we already have information of adults' family lives before the respective child is born, and our observations of parents' family lives exceed the 16th birthday of the child. Secondly, the crucial factor is *when* family lives are complex: partnership lives of adults might be volatile before they have children, but they may settle down once they become parents. The relevant question to ask here is: How complex are family lives of parents *during* the childhood of their children?

Analytical Strategy

We use OLS linear regressions to estimate the age trends in family complexity by birth cohort, gender and parenthood status for adults. For children we estimate the age trends in family complexity twice: once based on mothers' family sequences and once based on fathers' family sequences. For adults we have birth cohorts spanning from 1910 to 2000 and from 1946 to 2018 for children.

For the analysis of children's family life complexity, we further create a dataset with simulated children of the childless adults in our data. This is done to compare the life course complexity of the real, observed children to simulated, 'fake' children. We can thus show whether and to what extent observed children's family complexity differently develops over cohorts compared to the family complexity of simulated children if childless individuals would have had children. This gives an indication of whether our results for the cohort trend of childrens' family complexity are due to a general trend during prime fertility age of adults. This would be the case if we find that observed and simulated children's family complexity has increased similarly across cohorts. We use propensity score matching to assign childless adults the age at first birth of a statistical twin who had at least one child.[5] Specifically, we use childlessness (yes/no) as a treatment variable to predict adults' complexity at age 16 and include gender, highest educational level, the age last observed, birth cohort as well as the total number of waves and the first and the last waves observed as predictors. Childless adults are matched to one nearest neighbour and receive their age at first birth.

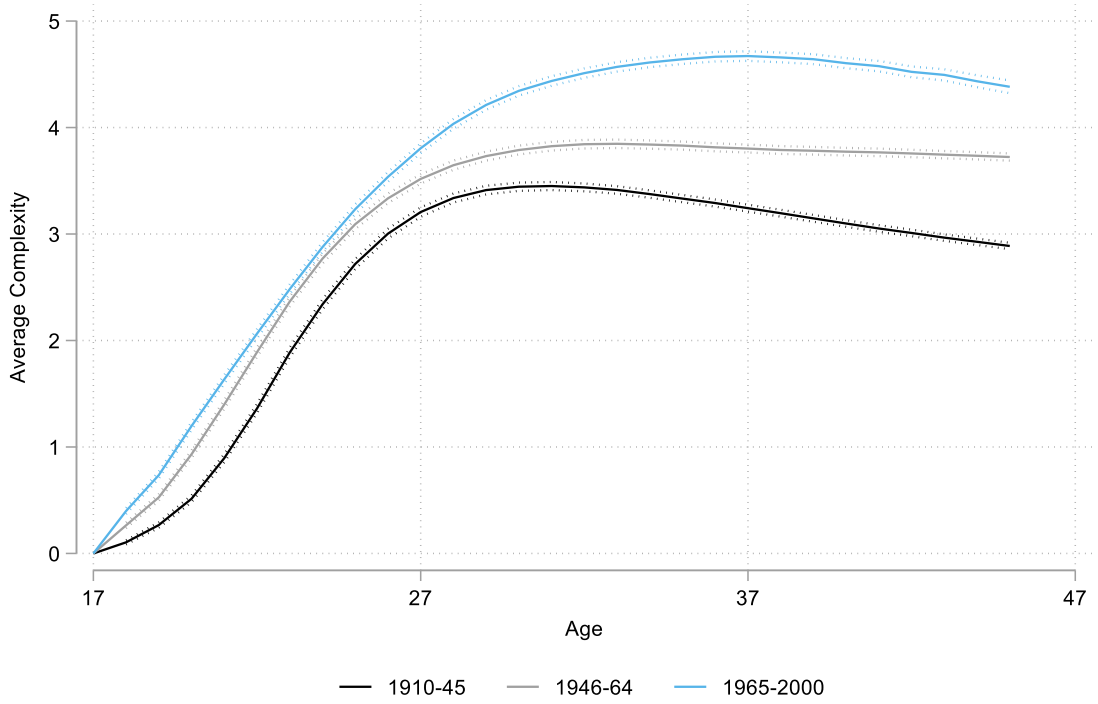
[5] We only include the births of biological children for this to not clone the birthdates of step or adopted children.

RESULTS

Adults' Family Complexity

Adults' family complexity across the life course is displayed in Figure 2 by birth cohort. In line with our first hypothesis, family complexity of the oldest cohort, those born in the years 1910-1945, is the least complex across the life course both in terms of level and growth. For the baby boomer cohort (1946-64), the average complexity of family lives is very similar to the level of the youngest cohort (1965-2000) up until age 27, but the growth of complexity is lower as adolescent up to the early 20s. From age 27 on, family complexity diverges. While complexity continues to grow for the youngest cohort, it sharply decreases for the baby boomers and family lives slowly become stable resulting in a much lower level of family complexity.

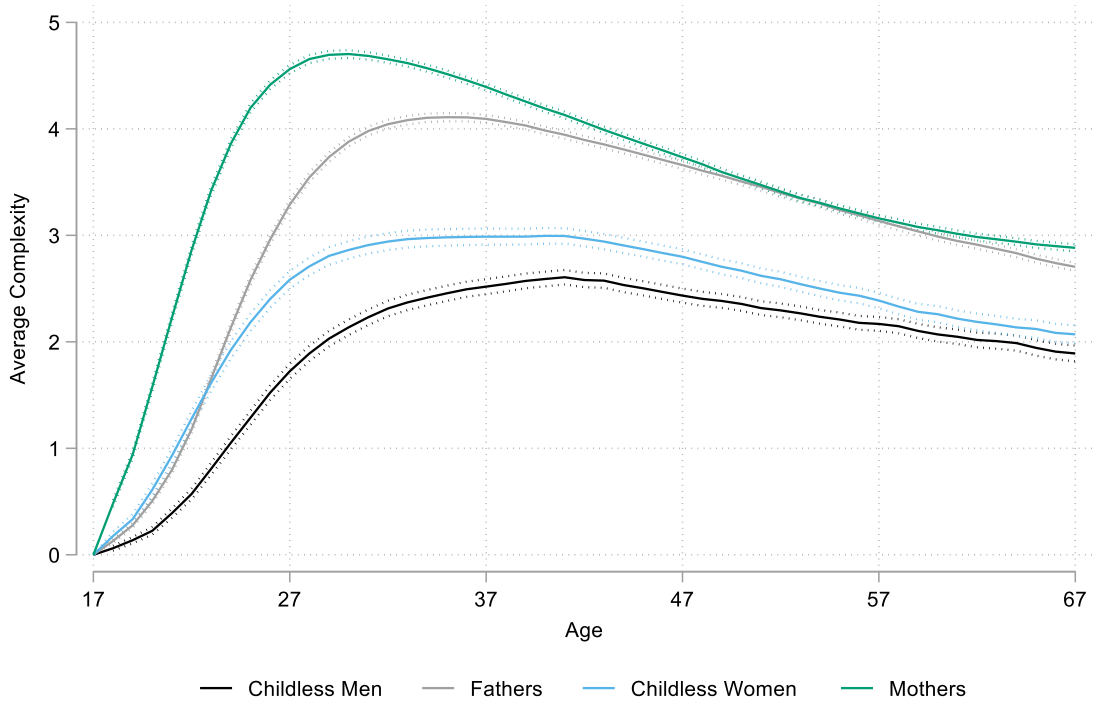
Figure 2: Adults' Family Complexity across the Life Course by Birth Cohort



OLS linear regressions based on authors' analysis sample from the UKHLS & BHPS.

Additionally, the age at the peak of family complexity over the life course increases across cohorts. While the highest level of complexity is around age of 30 for the oldest cohort, family complexity is highest in the early mid-30s for those born 1946-64 and highest in the late mid-30s for the youngest cohort. In line with this, the complexity of family lives stabilizes at older ages across cohorts. Whereas the average cumulative complexity declines for the oldest cohort from the early 30s on, for the youngest cohort complexity only declines after age 37 and at a slower rate.

Figure 3: Adults' Family Complexity across the Life Course by Gender and Parenthood Status

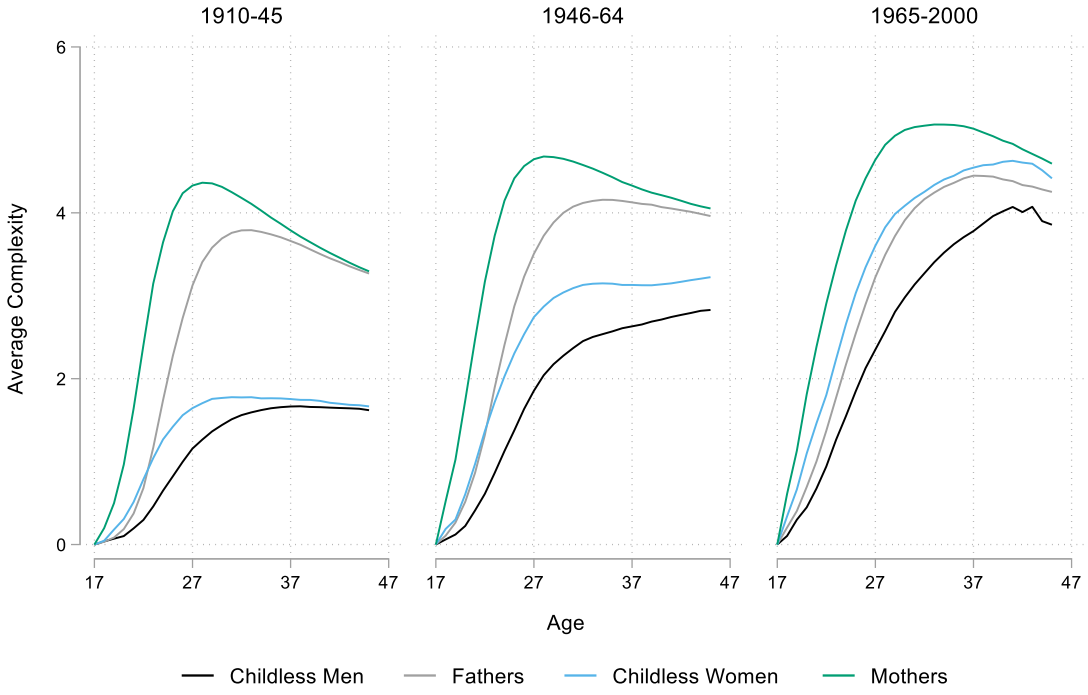


OLS linear regressions based on authors' analysis sample from the UKHLS & BHPS.

Family complexity across the life courses of childless men and women as well as mothers and fathers is displayed in Figure 3. We find that independently of parenthood status, women have a higher family life complexity on average at almost all ages over the life course compared to men (hypothesis 2 confirmed). In line with our hypothesis 3b, mothers and fathers exhibit higher levels of family complexity followed by childless women and childless men,

although with variation across the life course. For mothers, family complexity increases dramatically early in the life course. Before approximately age 22, childless women have somewhat more complex family lives compared to fathers and childless men due to a relatively steep early increase. However, after the early 20's father's family complexity continues to increase while the family complexity of childless women begins to stabilize and decrease. Family complexity for childless men is lowest across all the life course.

Figure 4: Adults' Family Complexity across the Life Course by Gender, Parenthood Status, and Birth Cohort



OLS linear regressions based on authors' analysis sample from the UKHLS & BHPS.

Figure 4 depicts that parenthood status differences have converged considerably across birth cohorts while differences by gender rather diverged slightly. Differences by parenthood status were most pronounced amongst our oldest birth cohort, followed by the baby boomer cohort. For both cohorts the complexity of family lives was highest and grew fastest among mothers and fathers followed by childless women and childless men. The decrease of these differences across cohorts is due to the much stronger rise of family complexity for childless

women and men compared to parents. For parents, the lower pronounced stabilisation of family complexity across cohorts after the peak of complexity at ages in the late 20s is notable.

Moreover, for both oldest cohorts' family complexity begins to stabilize and decrease for all groups by age 27. In contrast, family complexity continues to increase well past age 27 for our youngest birth cohort and parenthood status differences become relatively small. Although mothers continue to have the most complex family life courses, there are no differences between fathers and childless women roughly by age 30.

Gender differences in family have widened over cohorts mostly from around age 30 on, for both, parents and childless adults.

Children's Family Complexity

Figure 5a depicts the progress of the family complexity over the childhood from the children's perspective based on their mothers' or simulated mothers' ('childless women') family complexity by cohorts. Figure 5b shows from children's point of view their fathers' or simulated fathers' ('childless men') family complexity as they progress through childhood. The family complexity of the simulated children of childless adults indicates how the family complexity of such children would have developed over the first 16 years if these children would have been born. In contrast, the family complexity of the children of mothers and fathers corresponds to the dynamic in family life the children have indeed experienced.

Observed children. We find that the family complexity increases over the life course of not just adults, but also their children. Moreover, and in line with hypothesis 4a, our results show that family complexity for children has increased considerably across birth cohorts. For our oldest birth cohort of children, the baby boomers (1946-1964, family complexity remains relatively low. This corresponds with the notion that the complexity mothers' and fathers'

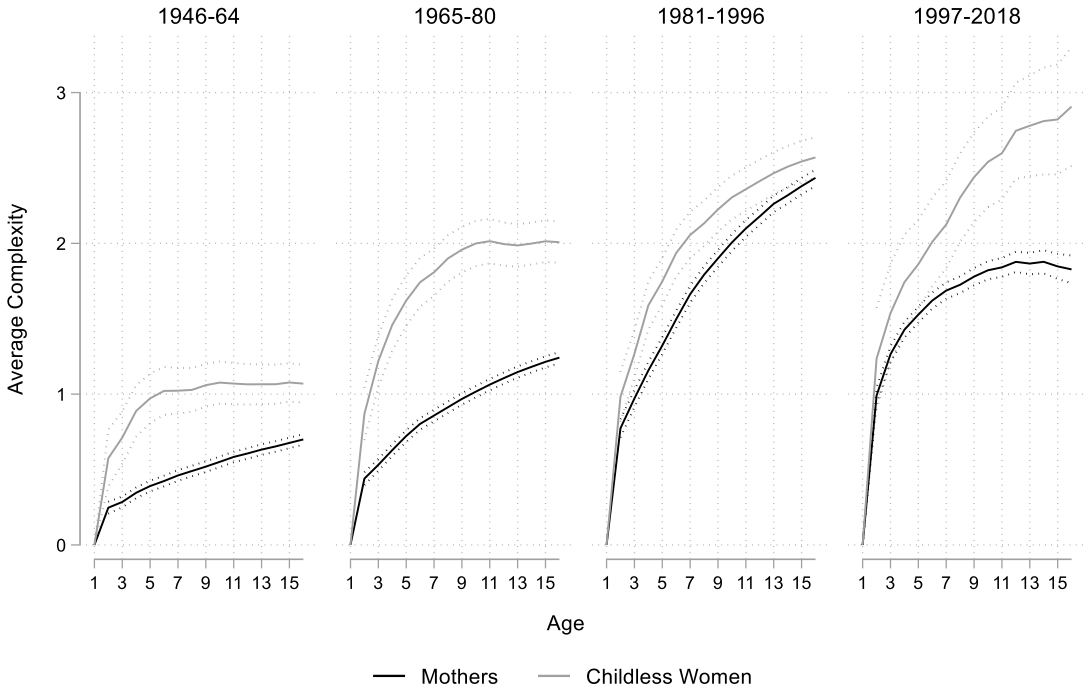
family life courses begin to stabilize when they enter parenthood. However, we see a large increase across birth cohorts. This is especially the case up until the cohort of children born between 1981 and 1996 (the Millennial cohort): Millennials experience on average the steepest growth of family complexity based on their mothers (and their fathers, see figure 5b) family lives. For all cohorts, family lives of mothers stabilize somewhat after age two of their children. But the stabilisation is strongest for the oldest cohort and shrinks over cohorts until the millennial cohort. This steady increase leads to millennials average family complexity reaching levels more than three times as high as those experienced by children in the baby boomer cohort.

For the youngest cohort (1997-2018) we observe a stronger stabilisation of family lives during late childhood compared to the millennials, leading to an on average lower level of family complexity at age 16. At the same time, however, the family complexity of children of the youngest cohorts increases more dramatically up until around age 6 indicating that these children experience the highest number of family transitions and unpredictability already at very young ages of the observed cohorts. Given that we only observe a modest increase of complexity for mothers and father across cohorts (figure 4), changing the perspective to children suggests that parents' family complexity has increased particularly after childbirth. Additionally, the family complexity increases at a much faster rate for the two youngest birth cohort during early childhood. For example, at age two children of the youngest cohorts are already exposed to an average level of family complexity that is not reached at any age for the oldest cohort.

For the observed children we find a very similar pattern when using fathers' family lives to calculate their children's family complexity (figure 5b). For all child cohorts except for the millennials, their mothers' family life course complexity reaches slightly higher levels at age 16 compared to their fathers'. This is in line with our overall observation of a higher

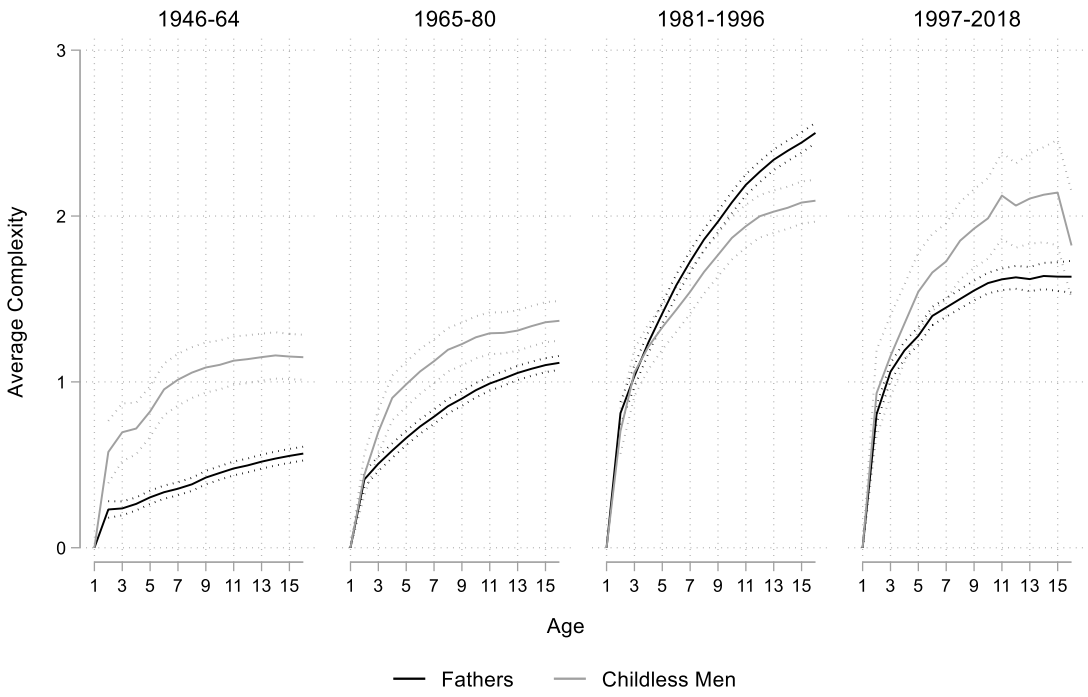
average family complexity of women compared to men. However, the increase in complexity between the baby boomer cohort and the millennials is even more extreme when applying fathers partnership lives.

Figure 5a: Children's Family Complexity across the Life Course by Birth Cohort (Mothers or Childless Women)



OLS linear regressions based on authors' analysis sample from the UKHLS and the BHPS sample.

Figure 5b: Children's Family Complexity across the Life Course by Birth Cohort (Fathers or Childless Men)



OLS linear regressions based on authors' analysis sample from the UKHLS and the BHPS sample.

Simulation. Comparing the family complexity of observed and simulated children we want to shed light on the question whether the observed cohort trend in childrens' family complexity might be due to an increase of family complexity during the prime fertility age of adults. In that case, we would observe a similar dynamic for the simulated compared to the observed children over cohorts.

Indeed, we find for mothers that the increase of family complexity of their children across cohorts is pretty much in line with an overall increase of complexity in family lives during prime fertility age of females. The simulated children of the matched childless women would have experienced similar or even larger increases across cohorts compared to the observed children. An exception might be the dynamic between the generation X of children (born between 1965-80) and the millennials: comparing both cohorts it seems like complexity has indeed increased to a higher extent for the observed children of mothers. This observation

becomes even more explicit for fathers (figure 5b). Also, for childrens family complexity based on their fathers' family life courses more general, it seems more like that the cohort trend is not due to an overall trend of rising partnership complexities during prime fertility age. Instead, the complexity of fathers increased to a higher extent *during the childhood* of their children over the cohorts compared to the one of childless men if they have had children. For the oldest cohort, simulated children of childless men would still have experienced higher levels of family complexity than observed children. However, for the 1965-1980 cohort we already find that complexity has increased to a higher extent for the observed children. This is even more the case for the millennials for which the level of family complexity for the real children based on their fathers' family lives exceeds the one of the simulated children.

Although our findings suggest that the increased exposure of children to family complexity may be partly a product of postponed childbearing, children do experience higher levels of complexity. The consequences of which warrant further study.

DISCUSSION

In this study, we assessed how family complexity evolved over the life course of adults in the United Kingdom, how it varied by birth cohort, gender, and parenthood status, and most importantly, how family complexity varied across the early life courses of children by birth cohort. We used rich retrospective data on partnership histories from the UK Household Longitudinal Study (UKHLS) and the British Household Panel Survey (BHPS) to reconstruct adults' family life courses and calculate their complexity for men and women born across the 20th Century. In addition, we transpose parents' family sequences to reflect what their children experience in their first 16 years of life and traced how children's experience of family complexity evolved across their early life course.

As would be expected by various theoretical accounts of family life course change, we found that the level and the growth of life course family complexity has increased across birth cohorts (hypothesis 1). In addition, we found that the level and growth of life course family complexity will be largest for women compared to men in general (hypothesis 2) and will be largest for mothers and fathers followed by childless women and men across birth cohorts (hypothesis 3b). Differences in family complexity over the life course by parenthood converges over cohorts mostly due to the sharp rise of family complexity for childless adults. On the other hand, differences by gender increased across cohorts, with mothers and childless women experiencing more complex family lives compared to their male peers at all ages, but increasingly from age 30 on.

However, most importantly, we demonstrated for the first time that the level and the growth of life course family complexity for children has increased dramatically across birth cohorts (hypothesis 4a). Parents' family lives become particularly more complex across cohorts during their children's early childhood.

We believe that our descriptive findings call for at least two types of follow-up research. First, a question arising from these trends in family complexity is which family states and transitions are the drivers behind these dynamics. For the increasing family complexity of childless adults it is most likely that for younger cohorts childlessness is actually less and less due to the lack of partners over the life course in general as was proposed by previous research (Jalovaara & Fasang, 2017; Mynarska et al., 2015; Raab & Struffolino, 2019). Rather, childless adults experience a more active partnership life later in the life course; their family complexity increases later compared to parents. Thus, the group of parents is becoming less selective across cohorts when it comes to the level of active partnership lives. On the other hand, the rising family complexity of children, mostly already at very young ages, is most likely based on increasing numbers of union dissolutions. However, it remains relevant for future research to reveal and quantify such drivers, for example by decomposing the complexity index (*reference to follow*).

Secondly, although it is important to document the extent that children are exposed to family complexity across their early life course, future research should address the consequences using a dynamic and holistic measure of family complexity as developed in this study. Recent evidence suggests that family complexity might result from structural disadvantage and a lack of socio-economic opportunities (Mills & Blossfeld, 2013a). McLanahan (2004) highlighted a polarization of low family complexity among economically resourceful families compared with increasing family complexity among economically deprived families in the United States and several European countries (McLanahan & Jacobsen, 2015). Family complexity may be negatively related to children's wellbeing solely due to negative socioeconomic selection. However, the numerous transitions and heightened unpredictability of complex family lives that younger birth cohorts of children experience may induce stress with negative effects on socioemotional behaviour, cognitive ability, and school

performance (Cavanagh & Fomby, 2019). This might depend more on the family complexity of the custodial parent following a parental union dissolution, on whether there are other relatives in the household such as grandparents or siblings that might be able to buffer volatility as well as vary across the life course stages of children. Similar to other papers in this field (e.g. Hiekel & Vidal, 2020), we focus on family complexity defined based on partnership lives. However, especially when considering the consequences of such rising family complexity for children, complexities related to fertility, such as the existence of step or half siblings in the families additional to other household members present or whether geographical moves and school changes occur after union dissolution might be considered as well.

In future work, we will assess the impact of children's family complexity on their grades and attitude towards schooling along their educational trajectories, contributing to the recent research on inequality in educational performance as well as inequality in opportunities. Thus, our methodological approach presents the first steps in pairing techniques developed in sequence analysis with longitudinal regression-based analyses for estimating the association between life course family complexity and children's wellbeing.

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APPENDIX

Table A1. Summary statistics: socio-demography for adults

Table A2. Summary statistics: socio-demography for children

Table A3. Summary statistics: family complexity for adults by gender and parenthood status

	Childless Men	Fathers	Childless Women	Mothers
Minimum	0.00	0.00	0.00	0.00
Maximum	26.73	38.98	33.34	33.64
Mean	1.88	2.99	2.34	3.54
25th percentile	0.00	0.00	0.00	0.00
Median	0.00	2.97	0.57	3.38
75th percentile	3.40	4.55	4.07	5.21
90th percentile	5.44	6.53	6.38	7.34

Table A4. Summary statistics: family complexity for children

	Mothers life course	**Fathers life course**
Minimum	0.00	0.00
Maximum	39.10	37.62
Mean	1.11	1.09
25th percentile	0.00	0.00
Median	0.00	0.00
75th percentile	0.00	0.00
90th percentile	5.34	5.25