

# Rushed into adulthood: Child marriage and women's work-family life courses in Egypt

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## ABSTRACT

Prevalent in the Global South, child marriage powerfully shapes women's work and family lives. Analyzing data from the Egypt Labor Market Panel Survey, we examine how child marriage influences the work-family life courses of Egyptian women between ages 6 and 30, to advance life course research in two crucial aspects. First, using multichannel sequence analysis, we identified six distinct work-family trajectories of Egyptian women who married as children and compared these with women who married as adults. Girl brides' work-family trajectories are mostly marked by early fertility and minimal labor force participation, particularly in the public sector. While some clusters combine private-sector work with early, frequent childbearing, most remain out of the labor force despite their education. In contrast, women who married as adults exhibit delayed fertility and greater participation in stable public-sector employment, suggesting that the timing of marriage and childbirth shapes sector-specific work opportunities. Second, we use a counterfactual approach to test key mechanisms—education (human capital) and childbirth timing (gender role)—through which child marriage is expected to shape women's work-family trajectories. While improved education increases girl brides' public-sector employment, its impact on family trajectories is minimal. Delayed fertility impacts women's family but not work trajectories. Our findings reflect critically on mainstream theories of, and interventions in, work-family life courses in the event of child marriage. They highlight the need to scrutinize the transition into “accelerated adulthood” as a distinctive feature of young adult life courses in the Global South, particularly among those affected by child marriage.

## 1. Introduction

Children's premature transitions into conventional adult roles can have lasting implications for their work and family lives (Elnakib et al., 2022; Yount et al., 2018). Child marriage is one such transition that primarily impacts young girls in the Global South (UNICEF, 2023). Early marriage and motherhood can restrict women's educational and employment participation and create challenges that differ from those encountered by women who marry as adults (Bengesai et al., 2021). They can also lead to a sequence of life events that do not follow life-course patterns typically observed in Western societies or regions with strict child marriage prohibitions. Addressing the socioeconomic consequences of child marriage, existing research primarily focuses on isolated life events or specific life stages, often highlighting the effects of singular transitions, such as leaving school or early childbearing

(Elnakib et al., 2022; Fan & Koski, 2022; Murphy-Graham et al., 2020). Yet, less is known about how child marriage shapes the interconnected and cumulative transitions throughout the entire course of work-family lives.

Child marriage, defined as marriage involving individuals, predominantly girls, under 18 years of age, is widely recognized as a major human rights violation and a key indicator of gender inequality (UNICEF, 2023). Despite global and national efforts to eradicate this issue, the practice persists in the Global South, and progress in reducing it has stagnated in the past decade. The prevalence of child marriage in the Middle East and North Africa (MENA) ranges from 2 % to 34 % (UNICEF, 2023). In Egypt, our focal context, rates of marriage before ages 18 and 15 have remained at 17 % and 4 %, respectively, since 2014 (UNICEF, 2023). Ongoing regional conflicts and humanitarian challenges have raised concerns over an escalation in child marriage rates,

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particularly among the crisis-affected and refugees. Over the next 5 years, 2.5 million child marriages are projected globally, with many likely to occur among displaced populations in the MENA region (Save the Children, 2020; UNICEF, 2023).

Research commonly draws on human capital (Becker, 1993) and gender role (Eagly, 1987) theories to understand women's work-family lives. Human capital theory highlights education as central to women's entry into paid work, while gender role theory emphasizes the influence of childbearing (Gaughan, 2002; Kramer & Kramer, 2016). These theories also inform mainstream interventions in child marriage that are designed to bolster girl brides' education and delay their childbearing (UNICEF, 2023). However, it is unclear how these theories fare in the face of the complexities of non-Western experiences and institutional settings. Child marriage forces young girls into adult roles, leading to life courses that diverge from the adolescence-to-adulthood progression typical in Western settings (Beyers & Seiffge-Krenke, 2010). In the West, increased education among women has delayed or prevented marriage and childbearing (Blom et al., 2023) and resulted in alternative partnership forms, such as living apart together and cohabitation (Blom et al., 2023; Coulter & Hu, 2017). In Egypt, however, marriage remains nearly universal, and child marriage continues to constrain women's education and economic participation (Crandall et al., 2016; Yount et al., 2018).

In this study, we move beyond the focus on "delayed adulthood" in life course research (Dhillon & Yousef, 2009; Krafft & Assaad, 2020) to examine women's premature transition to adulthood due to child marriage. We address two research questions. First, how does child marriage affect the sequencing and timing of work and family life events? We use multichannel sequence analysis to identify distinct clusters of work-family life courses based on shared patterns of education/employment, marriage, and childbirth. These clusters capture the varying life paths of women affected by child marriage from childhood to early adulthood, which we then compare with those married as adults. Second, how do education and reproductive timing influence these life courses? We develop a novel counterfactual analysis to explore how the work-family life courses of girl brides would unfold had they not been subject to disrupted education and early childbearing, thus testing key assumptions underlying mainstream theories and interventions aimed at mitigating the life-course consequences of child marriage.

Our attention to how child marriage shapes women's work-family trajectories enriches life-course theories by focusing on "accelerated transitions" to adulthood. They reveal how early marriage and parenthood disrupt "normative" educational and career progressions, leading to life paths that differ from those unaffected by child marriage. Our focus on Egypt helps extend Western theories by illustrating how the country's distinctive social, cultural, and economic realities configure women's work and family lives. Such insights are crucial for understanding the role of child marriage in maintaining gender inequality in the Global South.

## 2. Life course theory and child marriage in Egypt

Work-family trajectories can be seen as a series of life events or transitions (Elder & Johnson, 2002). These events signify major changes in roles and responsibilities, such as completing education, giving birth, and getting married, with marriage traditionally viewed as a gateway to socially accepted sexual relationships and childbearing in Egypt (Krafft & Assaad, 2020). The significance of each transition is shaped by the path dependence between life events. For example, (higher) education paves the way for career development and employment stability

(Abouelenin & Hu, 2023; Duta et al., 2021), and motherhood, whether chosen or circumstantial, can significantly reconfigure women's work-family roles and priorities (Kahn et al., 2014).

Age-related social norms set the expected timeline for life events. Traditionally, adolescence is the time when individuals begin to develop aspirations and acquire skills for adulthood (Beyers & Seiffge-Krenke, 2010). When child marriage accelerates this transition, it can truncate or entirely bypass this developmental period, leading women to miss out on key developmental milestones, such as obtaining a degree and entering the workforce (Yount et al., 2018). Research has examined the impact of child marriage on socioeconomic and health outcomes (Wodon et al., 2017; Yount et al., 2018), but a gap remains in understanding the entire sequence of transitions that women experience due to child marriage, including the nature, order, and timing of work and family events.

Child marriage can play a powerful role in shaping women's work-family trajectories. In Egypt, childbearing is expected to begin shortly after marriage (Zalak & Goujon, 2017). The timing of marriage, whether early or late, determines the timing of childbirth (Salem, 2016). Child marriage can thus precipitate women's early transition into motherhood, a shift that may limit opportunities to pursue or return to education (Wodon et al., 2017). In turn, a lack of education limits women's human capital development, which often confines them to low-paying, unskilled work or results in long-term unemployment (Korber & Oesch, 2019). Cultural expectations around household responsibilities, introduced early in child marriage and reinforced by the absence of institutional support, place significant time constraints on women and may push many towards part-time or informal employment (Elnakib et al., 2022; Salem, 2016). This sequence of intertwined work-family events can diminish women's autonomy and restrict their power to negotiate family planning decisions and contraceptive use, which gives rise to further frequent childbirths (Yount et al., 2018).

While traditional life course theories situated in Western settings emphasize predictable and normative work-family transitions (Díaz, 2022; Korber & Oesch, 2019), child marriage could result in alternative work-family trajectories that deviate from those of women who marry as adults. Our *first objective*, therefore, is to systematically map the work-family life courses of Egyptian women, focusing on the sequence and timing of key life events, and comparing women who have and those who have not experienced child marriage.

## 3. Rethinking key mechanisms from the Global South

The mechanisms underlying how child marriage impacts women's work-family life courses remain relatively understudied. Mainstream explanations emphasize two key "turning points" through which child marriage alters women's life courses—disrupted education and early childbirth (UNICEF, 2023; World Bank, 2008), which are typically understood through human capital (Becker, 1993) and gender role theories (Eagly, 1987; Eagly & Wood, 2012). These perspectives also inform key interventions in child marriage, including bolstering girl brides' education and fertility control, promulgated by national and international organizations. Focusing on Egypt, our study seeks to untangle these mechanisms, test their salience in explaining the impact of child marriage on women's work-family life courses, and explore potential alternative explanations in a non-Western context.

### 3.1. Human capital, gender, and work in Egypt

According to human capital theory, education is a key investment that enhances labor market outcomes (Becker, 1993). The theory posits

that education imparts the knowledge and skills needed for employment (Abouelenin & Hu, 2023; Gaughan, 2002; Korber & Oesch, 2019). In Western countries, this mechanism is often substantiated by evidence that greater educational attainment tends to entail improved employment prospects, greater job stability, and enhanced lifetime earnings (Korber & Oesch, 2019; Manzoni, 2012; Rouvroye & Liefbroer, 2023). The typical educational pathway in Egypt involves completing secondary schooling by the age of 17, which is generally the minimum requirement for public-sector employment. Child marriage may curtail, interrupt, or entirely preclude women's educational pursuits, leaving them without the qualifications required for stable employment (Wodon et al., 2017). Should human capital theory apply, the presence or absence of education would be a primary driver of diverging work trajectories between women who have and those who have not experienced child marriage. While the overall level of female labor force participation is low in Egypt, the institutional setup of the Egyptian education system and labor market may play a powerful role in shaping how human capital theory plays out and what kind of divergence we observe in the women's work trajectories due to child marriage.

Child marriage can disrupt girls' education through a range of economic and social pressures. In contexts where parents are unable or unwilling to invest in girls' education, child marriage often functions as a cost-saving mechanism, which can help reduce both the financial burden of educating daughters and the transaction costs associated with marriage (Corno & Voena, 2023). Kin marriage is a common practice that reinforces these strategies by maintaining property and wealth within the family (Salem & Shah, 2019). Human capital theory argues that sustained investment in education is critical for developing skills and future labor market participation, but these investments are often interrupted by child marriage. Once married, girls are usually expected to relocate to their husbands' homes, often far from their schools, and the physical and time burdens imposed by household responsibilities can make it difficult for them to remain in or return to education.

The structure of Egypt's labor market is characterized by a distinct divide between the public and private sectors. Historically, the public sector has been the primary employer of educated women because it provides jobs that are considered socially acceptable and ensure greater job stability (Barsoum & Abdalla, 2020). Public-sector jobs are also typically formal and include access to social insurance, whereas private-sector jobs are usually informal and lack such protections (Assaad & Krafft, 2021). Egypt's education system has been closely tied to public-sector employment with secondary qualifications serving as a direct pathway into state jobs (Barsoum & Abdalla, 2020). However, economic liberalization policies of the 1990s and subsequent reduction in public-sector opportunities have increased competition and left the private sector as the primary alternative (Assaad & Krafft, 2021; Barsoum & Abdalla, 2020). Without a comprehensive welfare state, private-sector jobs are often precarious and offer less stability and economic security (Assaad & Krafft, 2021; Buyukkececi et al., 2023). The private sector, however, does offer employment opportunities to women who have received little education.

The public-private sector divide in educational requirements suggests a potential sectoral stratification in work trajectories between women who have and those who have not experienced child marriage. Women affected by child marriage often pursue vocational tracks that align with marital responsibilities and lack credentials for public-sector jobs (Assaad & Krafft, 2021). While technical and general secondary education is necessary for entering higher education in Egypt, shorter vocational tracks offer skills for home production or private-sector work, making them more likely paths for women who take up family roles from a young age. Moreover, women's educational participation is influenced by broader socioeconomic background, including the education and public-sector employment of parents and other family members (Abouelenin & Hu, 2023). Where child marriage is the norm, there is often an intergenerational transmission of low educational expectations and limited access to public-sector jobs.

Based on the above theoretical and contextual discussion, we expect education to serve as an important intermediary in shaping the work trajectories of Egyptian women affected by child marriage. Compared with women who marry as adults, we expect women subject to child marriage to have a lower level of labor force participation. For girl brides who do enter the workforce, they may begin work at a younger age, either in home-based or informal private-sector roles, as these jobs do not enforce the public sector's stringent educational requirements and minimum entry age of 18 (Barsoum & Abdalla, 2020). Their employment will likely be more irregular, reflecting the potential instability and informality of private-sector work.

### 3.2. Women's family life course in Egypt

Gender role theory highlights the socially constructed association between gender and work-family roles (Eagly, 1987; Eagly & Wood, 2012). Over the past decades, departing from the tradition that firmly anchored women's roles in the family, many Western societies have experienced a diversification in women's roles, characterized by women's increased participation in education and paid work and delaying age at first marriage and childbirth (Eisenberg-Guyot et al., 2020; Hu & Qian, 2023). Although these trends have penetrated the Egyptian society to some extent, child marriage in Egypt continues to be rooted in specific cultural and economic structures that reinforce women's domestic roles (Yount et al., 2018).

Child marriage can directly influence birth patterns, with early and frequent childbearing being the expected norm for girl brides. Since societal norms in Egypt strictly prohibit premarital sex, marriage becomes the immediate entry into sexual and reproductive roles (Crandall et al., 2016). For women affected by child marriage, this often results in closely spaced and frequent pregnancies driven by societal pressures to quickly demonstrate fertility and secure male heirs (Crandall et al., 2016). These cultural expectations mean that delaying first pregnancy is rarely considered, with less than 1 % of married adolescent girls in Egypt having used any form of birth control before their first child (Aziz et al., 2021). As a result, women who marry as children are often constrained in their ability to envision or pursue roles beyond motherhood and domestic life, whereas women who marry as adults have more space to explore alternative gender roles and cultivate broader ambitions.

Family planning policies in Egypt often fail to effectively reach remote rural communities where child marriage is prevalent. Significant gaps persist in both the availability and acceptance of contraception, and very few have access to healthcare facilities that offer long-acting contraceptive methods (Aziz et al., 2021). Moreover, only a small proportion of villages have access to government clinics staffed with female doctors. Even when women express a desire to use contraception or delay childbirth, they can be overruled by the husband and extended family members who dictate reproductive decisions based on cultural ideals that prioritize large families (Elnakib et al., 2022; Molitoris et al., 2023). For girl brides, their young age and limited agency can make it difficult to negotiate family planning or decide when and how many children to have (Molitoris et al., 2023).

We expect women who marry as children to experience a more compressed timeline of life events, with fertility beginning at an age typically dedicated to education or employment. This overlap between family-building and potential educational or career opportunities could lead to a prioritization of family responsibilities while education or work is delayed or abandoned. As a result, women affected by child marriage are likely to have children at a younger age, in quick succession, and in larger numbers, potentially placing them on a different and accelerated family trajectory compared to women who marry later. Should women affected by child marriage enter the labor force, their work activities would likely take place alongside their childrearing responsibilities, and the prioritization of their domestic responsibilities means they are likely to undertake private-sector, temporary, and casual work to minimize the potential impact of work on their family roles.

In this study, we seek to tease out the roles of education and reproductive timing in shaping the work-family life courses of women affected by child marriage. By posing critical “what-if” questions, we explore alternative realities: What would women’s work-family trajectories look like if child marriage did not limit their education? How would their work-family life courses unfold differently had they delayed childbirth? Our *second objective* is to understand the extent to which key mechanisms—disrupted education and early motherhood—may help explain the distinctive life courses of Egyptian women affected by child marriage.

## 4. Method

### 4.1. Data and sample

We used data from three waves (2006, 2012, and 2018) of the Egypt Labor Market Panel Survey (ELMPS). The ELMPS is a nationally representative survey conducted jointly by the Egyptian Central Agency for Public Mobilization and Statistics and the Economic Research Forum. It aims to track households interviewed in previous waves and locate any individuals who have left these households to form or join new ones (Assaad et al., 2019). To compensate for attrition, each wave includes a refresher sample of approximately 3000 households (Assaad et al., 2019). Researchers have previously employed this dataset to investigate a range of life events and transitions (Abouelenin & Hu, 2023; Assaad & Krafft, 2021; Buyukkececi et al., 2023; Salem, 2016). The ELMPS is particularly suited for our analysis as it offers comprehensive retrospective data on women’s education, marriage, labor market participation, and fertility histories.

We first limited our analytical sample to ever-married women aged 15–59, the only group who completed the fertility questionnaire and supplied life history data. As premarital sex is strictly prohibited in Egypt, the survey does not capture data on non-marital childbirth. We then restricted our sample to women observed across the 2006, 2012, and 2018 waves, which allowed us to pool information across all three waves to construct a comprehensive picture of work and family events and transitions for each woman. We relied primarily on the 2018 retrospective life-history data, which made significant progress in accurately capturing both unemployment and those out of the labor force (Assaad et al., 2019), and supplemented any missing data from earlier waves. Following the United Nations definition (UNICEF, 2023), child marriage was identified as any marriage occurring before the age of 18. After excluding 181 women with missing data on key variables, our final analytic sample comprised 5459 women, of whom 1514 (27.7 %) experienced child marriage and 3945 (72.3 %) did not.

### 4.2. Work and family life-course states

The ELMPS provides detailed information on women’s work histories, including the start and end years of each job, employment sector, and type (permanent, temporary/short-term, intermittent/casual, seasonal). For each woman, we developed annual work and family life trajectories spanning a 25-year period, from ages 6–30. Six work states were defined: (1) out of the labor force/unemployed (OLF), (2) in education, (3) private-sector employment (seasonal/intermittent), (4) private-sector work (permanent/temporary), (5) public-sector employment (permanent/temporary), and (6) missing. The OLF state includes women not engaged in paid work or actively seeking employment. Accounting for the characteristics of the Egyptian labor market, we distinguished between private- and public-sector employment. Employment within the private sector was further classified as either seasonal or intermittent, often more informal and lacking contracts or social insurance, as opposed to permanent or temporary work that offers more job stability and formality (Assaad & Krafft, 2021). We did not further distinguish permanent and temporary work within each sector due to small numbers in each category and to maintain a manageable

number of states for the analysis.

Women’s marital and fertility histories in the ELMPS were derived from the start and end dates of each marriage and the birth year of each child. We categorized women’s family life into eight states based on marital status, distinguishing between kin and non-kin marriages, and the number of children: (1) single, (2) married – kin, (3) married – non-kin, (4) married, 1 child, (5) married, 2 children, (6) married, 3 children, (7) married, 4 + children, and (8) missing. We did not include a state for cohabitation, as it is not socially acceptable in Egypt for women to reside with partners outside of marriage (Krafft & Assaad, 2020). Moreover, we capped the number of children at four because fewer than 1 % of women in the non-child marriage group and approximately 3 % in the child marriage group had five or more children. Because of small numbers (< 1%), divorced and widowed women were combined into the “single” category. A “missing” state was assigned to cases with missing work or family data, accounting for fewer than 1 % of the total person-year observations.

### 4.3. Analytic strategy

We conducted our analysis in two steps. The first aimed to map out Egyptian women’s work and family life-course trajectories, identifying subgroups with similar paths, and comparing those in the child marriage group with their non-child marriage counterparts. To achieve this, we used multichannel sequence analysis (MSA) and cluster analysis. Compared with traditional single-channel sequence analysis, MSA considers the sequence and timing of key events across multiple life domains (Gabadinho et al., 2011; Gauthier et al., 2010). It highlights how changes in one area, such as education and work, are closely linked to changes in other areas, including marriage and fertility (Aisenbrey & Fasang, 2017; Buyukkececi et al., 2023; Eisenberg-Guyot et al., 2020).

To characterize the work and family life-course trajectories of women in the child marriage sample and those in the non-child marriage sample, we employed Optimal Matching (OM) to each subsample separately. OM measures the dissimilarity between sequences by calculating the cost needed to transform one sequence into another (Abbott & Tsay, 2000). This involves operations such as substitution, insertion, or deletion of a state, each with a specific assigned cost. In our analysis, we set the substitution cost at 2 and the indel cost at 1 to account for both the timing and order of events in women’s life courses (Aisenbrey & Fasang, 2010). Given the potential impact of indel and substitution costs (Mikolai & Lyons-Amos, 2017), we conducted sensitivity checks by adjusting indel costs to 0.5 and 1.5, and testing different substitution matrices, including a constant matrix and one reflecting the frequency of transitions between states, which yielded consistent results.

Following the initial clustering of work and family life courses using Ward’s method, the results were analyzed through Partitioning Around Medoids (PAM) to further refine our clusters (Buyukkececi et al., 2023; Studer, 2013). To establish the optimal number of clusters in both subsamples, we employed the average silhouette width (ASW). ASW is a metric that compares the average distances within clusters to those between clusters (Studer, 2013). Silhouette widths vary from –1, denoting low coherence within a cluster, to 1, signifying high internal coherence. In addition to ASW, we also assessed the substantive salience of introducing additional clusters. This involved examining whether new clusters provided significant distinctions from the existing ones identified. All analyses were weighted to ensure the representativeness of results. For the MSA and cluster analysis, we used several R packages: TraMineR, TraMineRExtras, WeightedCluster, and Ecodist (Gabadinho et al., 2011; Goslee & Urban, 2007; Studer, 2013).

In the second step, we specifically tested the key mechanisms—i.e., education and fertility timing as key intermediaries—through which child marriage is expected to shape women’s work-family life trajectories, using a counterfactual approach. This involved creating hypothetical scenarios within the child marriage subsample by reweighting the distribution of the focal variables, namely education (years of



schooling) and childbirth (age at first birth) using entropy balancing (Hainmueller & Xu, 2013). Specifically, we adjusted the weights of each observation within the child marriage subsample such that the overall distributional properties of these variables (i.e., mean, variance, and skewness) match those in the non-child marriage subsample. The process ensures that the entire distribution of the child marriage group reflects the characteristics of the non-child marriage group with respect to education and childbirth timing. We reweighted the distributions of education and childbirth timing in separate scenarios: the first scenario adjusted the distribution of education in the child marriage group to match that of the non-child marriage group, and the second scenario adjusted the distribution of the timing of first childbirth to explore the effects of delayed childbirth. We could not jointly reweight both education and childbirth timing in our analysis due to the very small number of cases in the child marriage group who both delayed childbirth and attained higher education. Future studies with larger samples could more reliably carry out this joint analysis. The reweighting process for our counterfactual analysis was performed using the *ebalance* package in Stata (Hainmueller & Xu, 2013). We then re-ran the MSA and cluster analysis with the newly generated weights to identify the hypothetical patterns of women's work-family trajectories in the child marriage group had they not faced educational disruptions or early childbirth due to child marriage. Further robustness checks reweighting the non-child marriage group to match the child marriage group yielded consistent findings.

Our supplementary analysis shows that women who are assigned higher counterfactual weights in the educational intervention have slightly higher family socioeconomic status, such as parental education, fathers' public-sector employment, and wealth; in the fertility timing intervention, those assigned higher and lower counterfactual weights have similar socioeconomic characteristics that typically shape selection into child marriage (Supplementary Table S1). These results suggest that while family socioeconomic background has little bearing on girl brides' fertility timing, it plays a role in shaping their educational participation. While we focus on how education directly shapes girl brides' work-family life courses here, future research could expand our scope to examine a broader range of socioeconomic characteristics that indirectly influence girl brides' life courses, arguably, through shaping their educational participation. It is also important to note that the counterfactual findings should be interpreted at the aggregate rather than the individual level.

## 5. Results

### 5.1. Work-family life courses: Child marriage vs. non-child marriage

We first present the work-family life-course patterns for the child marriage group. Given our focus on the life-course impact of child marriage, we then discuss how work-family life courses for the non-child marriage group differ from those for the child marriage group.

#### 5.1.1. Child marriage group

Fig. 1 presents the state distribution plots for the work-family trajectories among Egyptian women who married as children, showing the proportion of women in each state between 6 and 30 years of age within each cluster. The left panels show the family trajectories, and the right ones show the corresponding work trajectories. The plots are color-coded to represent various states, including employment status and sector, marital status, and childbirth. While our main analysis focuses on state distribution plots, we also present relative frequency plots (Fasang & Liao, 2014) in the Appendix to provide further details on the timing and sequences of life events (Figure A1). Our analysis suggests a six-cluster solution as the optimal grouping (ASW = 0.27). The

five-cluster solution omitted key work-family trajectories, while seven- to ten-cluster solutions resulted in lower ASWs and small clusters, without revealing substantively new trajectories (Supplementary Figures S2–S3).

Across the clusters, several commonalities exist, particularly the dominance of non-participation in the labor force and limited educational attainment. Clusters 1, 2, 3, and 4 are characterized by women being predominantly OLF, with most exiting education before or just after completing primary school. These child marriage clusters differ in marriage and fertility trajectories—Clusters 1 and 4 show later childbirth, while Clusters 2 and 3 are marked by earlier fertility. By contrast, Cluster 6 is distinctive for its stronger educational engagement and women participating in more varied work; Cluster 5, though small, stands out for women's higher labor force participation rate post-marriage. The small size of Cluster 5 (5 %) highlights the overall low labor force participation among women who married as children.

Accounting for over half of the child marriage sample, Clusters 2 (25.5 %) and 3 (21.7 %) both combine being OLF with early childbearing, with most women in these clusters having their first child by age 18. However, the clusters diverge in their fertility patterns. In Cluster 2, women tend to have more children, with almost all having four or more by their late twenties. This contrasts with Cluster 3, where the number of children peaks at three by the same age. Both Clusters 2 and 3 are mainly characterized by non-kin marriages.

Beating the odds of fertility timing, Cluster 1 (8.6 %) is characterized by later childbirth, typically in the early twenties, and fewer overall births compared to the other clusters in the child marriage sample. Similarly, Cluster 4 (16.1 %) also sees women delaying childbirth but with a slightly higher number of total births by age 30. The key difference between Clusters 1 and 4 lies in the type of marriage. In Cluster 1, all women are in non-kin marriages, while in Cluster 4, 66 % of women are married to blood relatives. The prevalence of kin marriages in Cluster 4 happens alongside the higher overall fertility observed in this group. Common across both clusters, however, is women's noticeable absence from the labor force, with almost all being OLF.

The majority of women in Cluster 5 (5 %) combine stable, long-term private-sector employment, either in permanent or temporary roles, with early and frequent childbearing. In this group, work and family life events tend to overlap (Appendix Figure A1). Many of the women begin working in the private sector before the age of 10, when they would typically be completing primary school education, and continue throughout adolescence and into their twenties. Given the informal nature of private-sector employment in Egypt, these women who enter the labor force at a very young age likely undertake unpaid work within family-run or home-based businesses. At the same time, they also juggle childrearing and family responsibilities. This simultaneity suggests that informal, home-based employment may offer the flexibility to accommodate family roles.

The final child marriage work-family profile, Cluster 6, combines sustained education with early childbirth. Most women in this group have their first child by age 17, with more frequent births occurring from their mid-twenties onwards. By age 30, nearly all have at least two children, and over half have three or more children. The majority in this cluster remain in education until completing at least secondary school by age 17. Afterward, a small proportion take up varied forms of employment, including both temporary and permanent roles in the public and private sectors, as well as seasonal and intermittent work in the private sector. Despite being the most educated group, most women in Cluster 6 remain OLF.

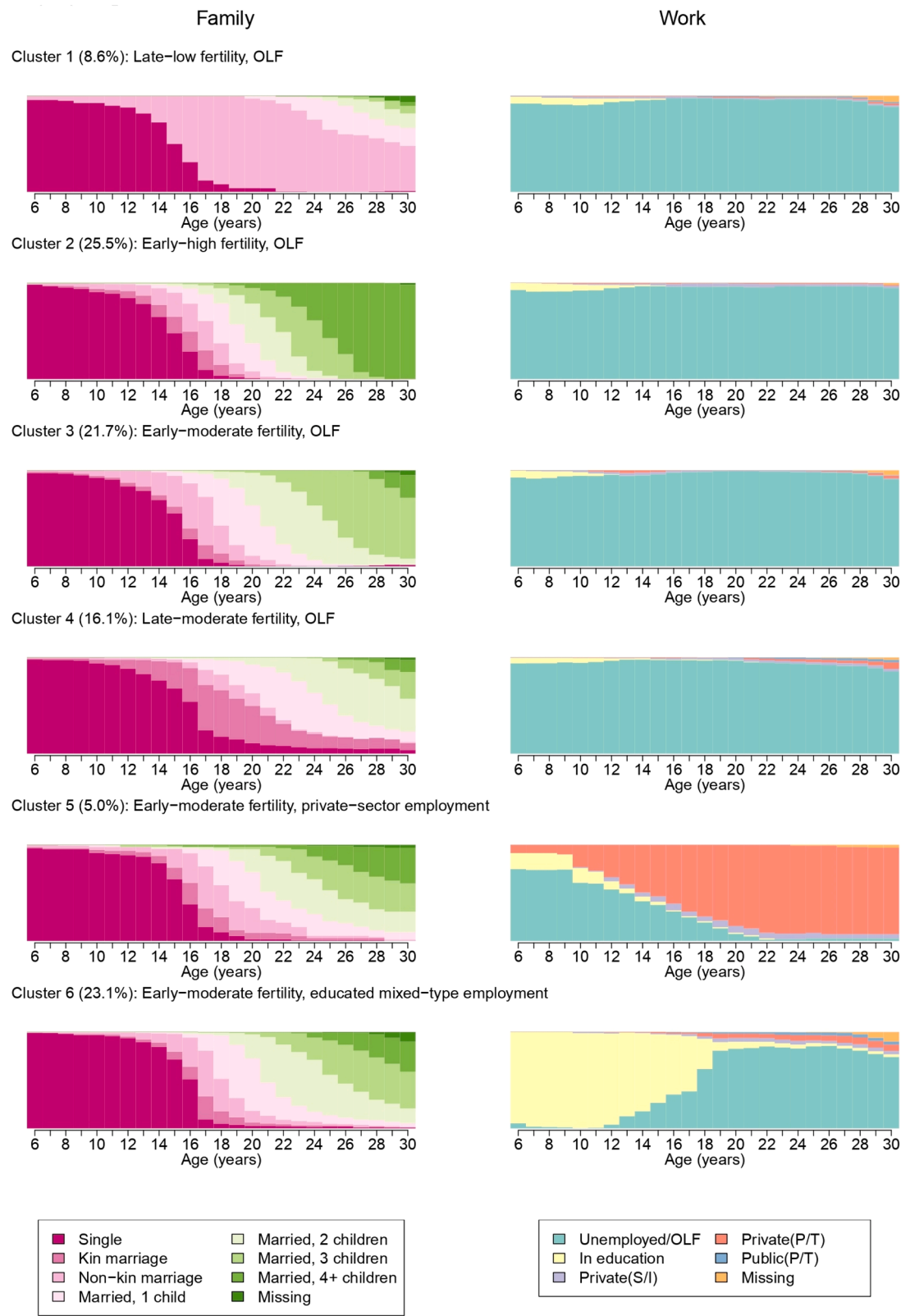
#### 5.1.2. Difference in the non-child marriage group

Our cluster analysis identified a six-cluster solution (ASW = 0.20) as the optimal grouping for work-family life courses within the non-child

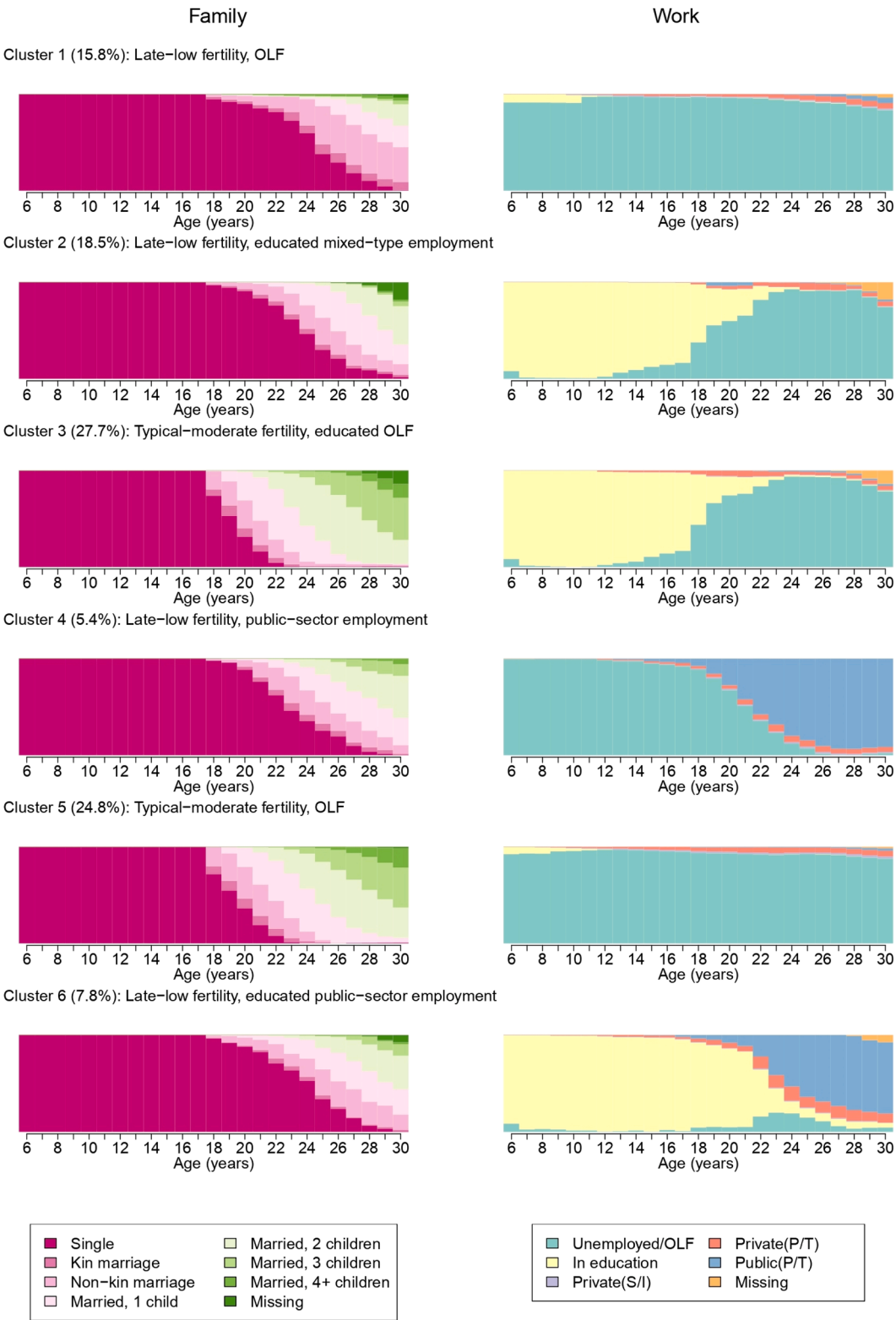
marriage sample (Supplementary Figures S4–S5). Beyond six clusters, no additional distinct work-family trajectories emerged. Fig. 2 presents the state distribution plots for the work-family trajectories among Egyptian women who married as adults (see Appendix Figure A2 for

relative frequency plots).

Compared with the child marriage clusters, the non-child marriage clusters are marked by later marriage and fertility, lower total fertility, and higher educational attainment, with most women completing



**Fig. 1.** State distribution plots of women's work-family life-course trajectories in the child marriage group. *Note.* OLF = Out of the labor force, P/T = Permanent/Temporary, S/I = Seasonal/Intermittent. Cluster sizes are shown in parentheses.

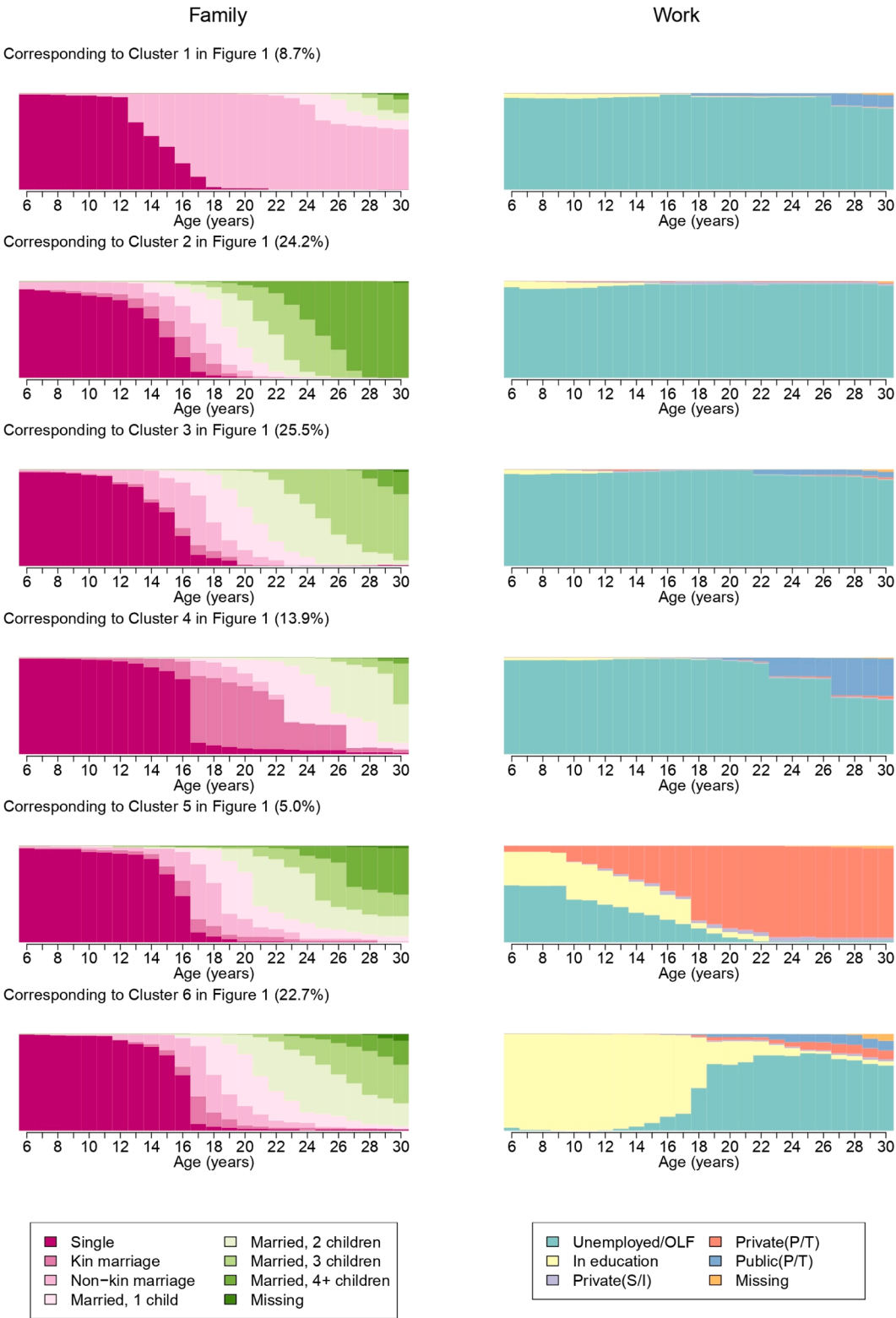


**Fig. 2.** State distribution plots of women's work-family life-course trajectories in the non-child marriage group. *Note.* OLF = Out of the labor force, P/T = Permanent/Temporary, S/I = Seasonal/Intermittent. Cluster sizes are shown in parentheses.

secondary school and some obtaining university or postgraduate degrees. Employment is also more prevalent in the non-child marriage clusters, particularly in stable public-sector roles as opposed to more precarious private-sector jobs.

For women who marry as adults, Clusters 3 and 5 experience earlier marriage and more frequent childbearing, with significant variation in

whether the women pursue education. In contrast, Clusters 1, 2, 4, and 6 are marked by delayed marriage and childbirth, but differ in their work and educational paths. Women in Clusters 2 and 3 remain in education before staying out of the labor force, while some others (Cluster 6) transition into employment, and some do not engage in either (Cluster 1).

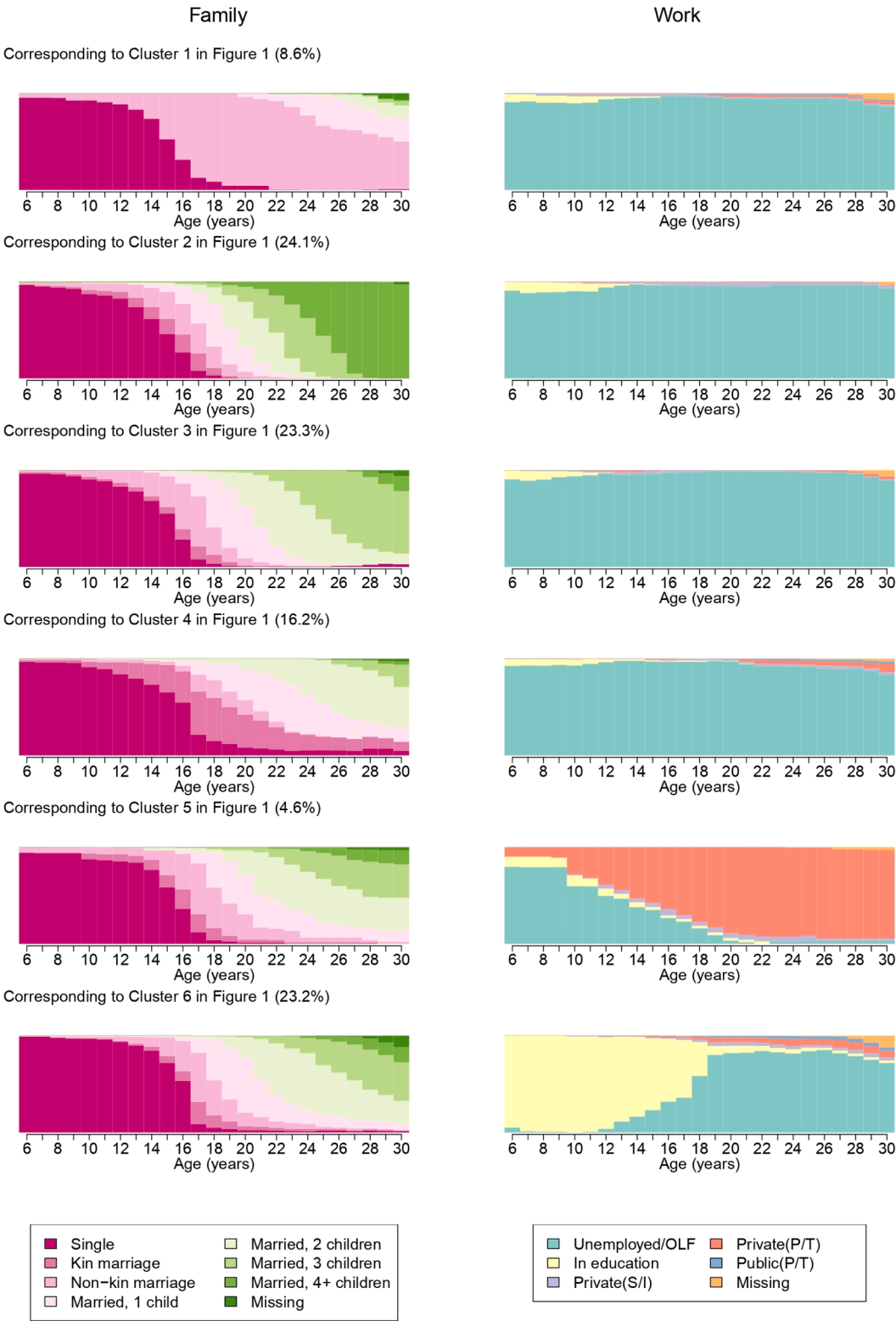


**Fig. 3.** Counterfactual state distribution plots of women’s work-family life-course trajectories in the child marriage group, with the distribution of years of schooling reweighted to match that in the non-child marriage group. *Note.* OLF = Out of the labor force, P/T = Permanent/Temporary, S/I = Seasonal/Intermittent. In the counterfactual scenario, the mean, variance, and skewness of years of schooling for women in the child marriage group were reweighted using entropy balancing to match those for women in the non-child marriage group (see [Supplementary Table S2](#)). Cluster sizes are shown in parentheses.



For women in Clusters 3 (27.7 %) and 5 (24.8 %) in the non-child marriage group, who marry at the typical age in Egypt between 20 and 22 (Assaad et al., 2021), relatively frequent childbirth goes along with being OLF, irrespective of whether the women remained in

education (Cluster 3) or not (Cluster 5) throughout their adolescence and young adulthood. In both clusters, family demands, particularly the frequent childbirths in early twenties, seem to prevent the women from entering the workforce. The large size of Cluster 5, the biggest in the



**Fig. 4.** Counterfactual state distribution plots of women’s work-family life-course trajectories in the child marriage group, with the distribution of age at first childbirth reweighted to match that in the non-child marriage group. *Note.* OLF = Out of the labor force, P/T = Permanent/Temporary, S/I = Seasonal/Intermittent. In the counterfactual scenario, the mean, variance, and skewness of age at first birth for women in the child marriage group were reweighted using entropy balancing to match those for women in the non-child marriage group (see [Supplementary Table S2](#)). Cluster sizes are shown in parentheses.

sample, reflects that the combination of relatively early marriage, frequent childbirths, and staying OLF is the most common work-family trajectory among Egyptian women who marry as adults.

As observed in Clusters 1, 2, 4, and 6, delayed marriage tends to coincide with either remaining OLF or securing stable public-sector employment. Specifically, in Cluster 1 (15.8 %), women typically marry in their late twenties, and nearly half remain childless by age 30. Despite delaying both marriage and motherhood, most women in this cluster remain OLF, indicating that reduced family responsibilities alone do not necessarily encourage labor force participation.

Cluster 2 (18.5 %) exhibits a delay in marriage and childbirth, as well as a higher level of educational engagement. Most women in this cluster complete secondary school, but only a small proportion move into public- or private-sector employment, with the rest remaining OLF despite their qualifications. Notably, there is minimal overlap between education and family life, as most women only enter marriage and begin childbearing after completing their education. The life courses of women in this cluster suggest that education and delayed childbirth do not necessarily lead to Egyptian women's labor force participation.

Clusters 4 (5.4 %) and 6 (7.8 %) also share delayed marriage and childbirth but diverge significantly in their work pathways. In Cluster 6, most women obtain university or postgraduate degrees before transitioning into stable, long-term public-sector jobs. The postponement of marriage and childbearing allows these women to potentially invest more time in educational and professional development, creating a mutually reinforcing cycle whereby delaying marriage and fertility enables career growth and career stability in turn supports family planning. In contrast, women in Cluster 4 also secure public-sector employment but follow a less traditional route. Here, most women do not pursue higher education to qualify for public-sector roles, implying that factors beyond education, such as family networks or nepotism (Barsoum, 2014), may play a role in obtaining public-sector employment for this group.

## 5.2. Counterfactual analysis: Exploring the impact of education and childbirth timing

To examine the roles of education (human capital) and fertility time (gendered family roles) in shaping the work-family life courses of women affected by child marriage, we analyze two counterfactual scenarios by reweighting the distributions of years of schooling and the timing of first childbirth, respectively, in the child marriage group to resemble those in the non-child marriage group (Supplementary Table S2). Based on the reweighted samples, we repeat the MSA and cluster analyses. The ASW shows that the six-cluster solution best fits the reweighted data in both counterfactual scenarios, as further reducing or increasing the number of clusters does not generate additional substantive insights (Supplementary Figures S6–S9). The six-cluster solution also facilitates comparing the counterfactual work-family life courses with those reported in the preceding sections.

Fig. 3 illustrates the counterfactual work-family life-course patterns for women affected by child marriage had they been similarly educated as those in the non-child marriage group. Compared with the clusters in Fig. 1, intervening in education hardly changes the relative sizes of the six clusters, nor does it change the family trajectories within each of the clusters. Instead, changes are primarily observed in the women's work trajectories in Clusters 1, 3, 4, 5, and 6. In Cluster 1, "late-low fertility, OLF," intervening in education would have increased women's employment in the public sector, from fewer than 2 % of women in the

original sample to around 9 % in the counterfactual sample at the age of 30. This shift would be accompanied by a decrease in intermittent or seasonal work in the private sector, suggesting a move towards more stable, long-term employment. In Cluster 3, "early-moderate fertility, OLF," bolstering women's education would be associated with a small increase in their participation in diverse types of employment, including both public- and private-sector roles. In Cluster 4, "late-moderate fertility, OLF," the proportion of women entering public-sector employment would be substantially increased, with most starting in their early twenties, alongside a decrease in private-sector employment. In Cluster 5, "early-moderate fertility, private-sector employment," intervention in education would substantially lengthen women's educational participation and mainly delay, rather than alter, their private-sector employment. Finally, in Cluster 6, "early-moderate fertility, educated mixed-type employment," women would spend more time in education, with some continuing until their mid-twenties; there would be a slightly higher proportion of women in public-sector employment, and private -sector intermittent and seasonal work would be replaced by private -sector permanent and temporary employment.

Fig. 4 presents the counterfactual work-family life-course patterns had the timing of first birth for women in child marriage been the same as that for women in the non-child marriage group. Compared with the clusters in Fig. 1, delaying the timing of first childbirth would change the relative sizes of some of the clusters. Specifically, we observe a decrease in the sizes of early and moderate-high fertility clusters (i.e., 2 and 5). Delaying first childbirth would also reconfigure the family life courses within some of the clusters. In Clusters 5 (early-moderate fertility, private-sector employment) and 6 (early-moderate fertility, educated mixed-type employment), delaying the women's first birth would have a cascading impact that leads to delays in their subsequent births, which substantially reduces their total number of births. Delaying first birth, however, has minimal impact on the work trajectories of women affected by child marriage. The only changes are seen in Clusters 1 and 4, where seasonal and intermittent work are replaced by private-sector permanent and temporary positions, resulting in a slight increase in overall private-sector employment.

Our counterfactual analyses highlight a disconnection between interventions in education and childbirth timing when it comes to shaping the work-family trajectories of women affected by child marriage. While improving women's education influences their work trajectories, these shifts do not extend into their family lives. Family and fertility trajectories remain largely consistent, even with substantial advancements in education. Similarly, postponing first childbirth affects family trajectories but has a limited impact on women's employment outcomes. This suggests that these life domains operate independently and altering one does not easily disrupt the established dynamics of the other.

## 6. Discussion

In the Global South, child marriage remains a pervasive issue that presents significant barriers to safeguarding basic human rights and achieving gender equality (UNICEF, 2023). While much research has reported snapshots of child marriage's short- and long-term impacts on women's well-being and life prospects (Elnakib et al., 2022; Fan & Koski, 2022; Murphy-Graham et al., 2020), we still lack an understanding of the impact of child marriage on women's holistic work-family life-course trajectories, as well as the nature and mechanisms of child marriage's cascading impacts throughout women's lives.

Meanwhile, in Western societies, a long tradition of research has adopted a life course perspective to highlight and disentangle the processes involved in shaping women's work-family life courses (Damaske & Frech, 2016; Fasang & Aisenbrey, 2022; Korber & Oesch, 2019; McMunn et al., 2015; Rouvroye & Liefbroer, 2023). This work has typically examined how human capital and cultural expectations surrounding the timing and nature of marriage, fertility, and employment influence women's life courses from early adolescence to adulthood (Damaske & Frech, 2016; Fasang & Aisenbrey, 2022; Mikolai & Lyons-Amos, 2017; Rouvroye & Liefbroer, 2023). To date, however, these frameworks remain grounded in Western experiences, institutional structures, and sociocultural norms; their salience in the Global South, especially for women affected by child marriage, has been underexplored.

Against this backdrop, our study moves beyond a Western context to explore the life courses of Egyptian women, focusing on the impact of child marriage on women's work-family life trajectories. It advances life-course research by (1) identifying distinct work-family trajectories of women who experienced child marriage and comparing them to those who married as adults, and (2) developing a novel counterfactual approach to test key theoretical mechanisms, namely, human capital (education) and gender role (childbirth timing), through which child marriage may alter women's work-family trajectories.

### 6.1. Beyond snapshots: Child marriage and women's work-family life courses

Our findings reveal diverging destinies in the work-family trajectories between women who have and those who have not experienced child marriage. Egyptian women who were affected by child marriage, many married to their blood kin, tend to start having children at a young age (< 18) and typically have three or more children by their late twenties. Their work trajectories are characterized by truncated education and unemployment. Among those who do work, most concentrate in the private sector, including both temporary and permanent roles as well as seasonal work. While cultural norms expect girl brides to give birth to children soon after marriage and prioritize their family responsibilities, a small proportion of the girl brides are seen to juggle family and work responsibilities by undertaking private-sector jobs, such as home-based agriculture, that offer relatively flexible hours but lack access to social insurance. Our findings further reveal notable diversity in the work-family life courses of women affected by child marriage. For example, when examining the trajectories and the timing and sequencing of life events, nearly one in four women managed to continue their education (Cluster 6), about one in twelve had a relatively small number of children despite early marriage (Cluster 1), and a small group secured consistent, long-term private-sector employment (Cluster 5).

By comparison, women in the non-child marriage group typically leave school and begin childbearing later, usually in their twenties, and have fewer children overall. In Western contexts, (higher) education and postponing childbirth are typically thought to enhance women's labor force participation. In Egypt, however, only a small proportion of women, even if free from child marriage, manage to make the transition into stable employment after completing their education. Among those who do make this transition, they are usually from the non-child marriage group and typically maintain employment in the public sector. These divergent work-family trajectories appear to reflect the tight coupling between education and public-sector employment in Egypt (Abouelenin & Hu, 2023; Barsoum, 2014). Within this institutional

configuration, child marriage thus contributes to a form of sectoral stratification in women's employment outcomes.

Going beyond isolated snapshots of work-family events, our findings show that child marriage makes a notable difference in the sequence and interrelation of work and family events for Egyptian women. In the child marriage group, a small subset of women, particularly those who sustain long-term employment, follow a pattern where key life milestones such as work, marriage, and motherhood overlap rather than occur sequentially. These women often begin working at a young age and continue working through major family events, including marriage and childbirth. In contrast, women in the non-child marriage group experience more clearly defined transitions, with education preceding marriage and motherhood often leading to a withdrawal from employment. For the small subset of girl brides who engage in both work and family roles, the overlapping work-family trajectories create a distinctive life-course "double bind." Marriage accelerates their entry into adult responsibilities, requiring them to juggle work and family demands simultaneously, unlike their non-child marriage counterparts, who typically navigate these stages more gradually. While the girl brides' dual work-family roles are similar to those in the non-child marriage group and their Western counterparts, their early entry into both spheres lacks the separation and progression seen in the work-family trajectories of women who marry as adults. Instead, everything converges at once, resulting in an accelerated, compressed, and potentially demanding life course.

### 6.2. Rethinking key mechanisms and interventions

We focus on two major mechanisms through which child marriage may impact women's work-family life courses—human capital (education) and gender role (childbirth) (Becker, 1993; Eagly & Wood, 2012). These theoretical perspectives are widely used to understand women's work-family life courses in Western societies (Buchmann & DiPrete, 2006; Fasang & Aisenbrey, 2022). Testing these theories in a Southern context is important not only for assessing how well they fare outside the sociocultural and institutional settings in which they emerged, but also because investing in education and delaying childbearing are key interventions promulgated by national and international organizations in the event of child marriage (UNICEF, 2023). Through novel counterfactual analyses, we have explored critical "what if" scenarios—i.e., child marriage does not entail educational disruption or early childbirth—and their potential to reconfigure women's work-family life courses.

Comparing Figs. 3 and 4 with Figs. 1 and 2, although the counterfactual interventions in education and timing of childbirth bring girl brides' work-family trajectories closer to those for women not affected by child marriage, they do not close the gaps between the two groups in terms of, for example, the higher rate and more stable trajectories of public-sector employment in the latter. Human capital theories posit that investment in education bolsters labor market outcomes. Our results indicate that, given equal educational opportunities as women who have not experienced child marriage, women affected by child marriage would likely experience a shift in work trajectories. Specifically in the Egyptian labor market, there would be an increase in public-sector employment and a decrease in seasonal private-sector work, indicating a movement towards more formal and stable employment. Our findings further show that intervening in education makes no difference in the family trajectories of women affected by child marriage. This is not surprising in the Egyptian context, where education is intended to enhance, rather than displace, women's family role in terms of, for

example, their capacity for childrearing and bolstering their children's upward social mobility (Salem, 2016).

Gender role theories posit that the timing of childbirth significantly influences women's family and work life courses. Had we delayed the timing of first childbirth for girl brides to match that of women in the non-child marriage group, women affected by child marriage would have fewer children by 30. Delaying first birth would also see women affected by child marriage staying longer in education and engaging in a more diverse range of employment types. Nevertheless, such engagement is structurally constrained: delaying childbirth does little to bolster girl brides' engagement in public-sector employment, partly because third-party childcare remains limited, costly, and socially discouraged, which makes it difficult for women to (re)enter the labor force.

Women's lives in Western societies today follow more varied and less well-defined paths than in the past. This is partly because modern institutions, especially the family and labor market, no longer enforce a single dominant sequence of life events, a process that is often described as the "de-standardization" of the individual life course (McMunn et al., 2015). Historically, the standard life course centered on the male breadwinner–female caregiver model. In contrast, Western theories now recognize diverse work-family lives which move beyond full-time caregiving and unemployment to include varied forms and durations of paid work, partnerships, and parenting (Damaske & Frech, 2016; McMunn et al., 2015). Women's life courses have become more individualized, in part due to the growing acceptance of cohabitation and delayed motherhood or voluntary childlessness (Buchmann & DiPrete, 2006; Fasang & Aisenbrey, 2017, 2022). Men's and women's life courses have partially converged, as more women have entered paid work despite men's caregiving roles remaining limited and mothers continuing to face disadvantages at work. Differences also exist by educational attainment, where highly educated women are more likely to sustain stable full-time careers and adopt non-traditional family arrangements compared to their less educated counterparts (Damaske & Frech, 2016). Thus, across many Western European and North American contexts, the combination of more flexible gender norms and human capital accumulation makes alternative work-family trajectories possible for women.

In contrast, the Egyptian context differs in several ways that challenge the foundational assumptions of Western theories. First, our results suggest that women's work-family life courses are shaped not only by their own education or fertility timing, but also strongly by the socioeconomic position of their families, particularly the characteristics (education, occupation, and sector) of parents and spouses (Supplementary Tables S3–S4). In the Global South, including Egypt, this calls for moving beyond a focus on women's individual resources, as is often the case in Western research, to consider the role of resource transfer in the extended family. Second, Egypt historically developed an education system closely tied to public-sector employment, which encouraged women's education without fundamentally challenging the patriarchal familial institution. Following neoliberal reforms and the decline of formal public-sector jobs, women's education no longer offers a guaranteed path into the labor market. Without specific institutional support, work that is incompatible with traditional family roles goes against gender expectations that continue to position men as primary earners. This requires rethinking theoretical assumptions about the role of education. Where human capital accumulation is not primarily channelled toward bolstering women's employment, investments in education alone may do little to alter gendered work-family life courses in Egypt. Tied to this, our findings suggest that interventions aimed at

delaying fertility, including greater support for and access to family planning programs, could reduce Egyptian women's childbirths and help postpone gendered family responsibilities, particularly in the event of child marriage, which could ease immediate pressures on girl brides to take on domestic roles and create space for alternative life course trajectories.

### 6.3. Limitations and future directions

The limitations of our study suggest important directions for future research. First, given historical changes in labor market configurations and sociocultural norms, future research could explore cohort differences in the impact of child marriage on women's work-family life courses. For instance, women who reached adulthood during periods of political or economic change in Egypt may face different educational and employment opportunities and challenges compared to those who matured in more stable times (Buyukkececi et al., 2023). Second, while our analysis focused on annual intervals in women's life course, due to data limitations, future research could collect and analyze data that capture women's work and family dynamics across finer intervals to provide a more nuanced picture of their life trajectories. Third, although our counterfactual analysis sheds light on the potential effectiveness of hypothetical interventions in education and timing of childbirth, future research, with a larger sample, could expand on our approach by incorporating a wider range of factors, such as women's family background, access to social networks, and other institutional barriers, to examine how these variables, and their interactions, shape both their exposure to child marriage and their subsequent work-family trajectories. Finally, future research could leverage experimental designs to more fully assess the effectiveness of actual interventions.

Despite these limitations, this study is the first to detail and map out the work-family life courses of women affected by child marriage in Egypt. Overall, our findings demonstrate the value of critically scrutinizing how mainstream assumptions and theories of and interventions in work-family life course from the West play out in a Southern context. They highlight the role of Egypt's distinctive institutional and socio-cultural settings in configuring the ways in which education and fertility constitute crucial mechanisms through which child marriage shapes women's work-family life courses. The findings bring to the fore "accelerated transition into adulthood" as a characterizing feature of young adult life courses in the Global South, particularly among those affected by child marriage.

### Ethics approval

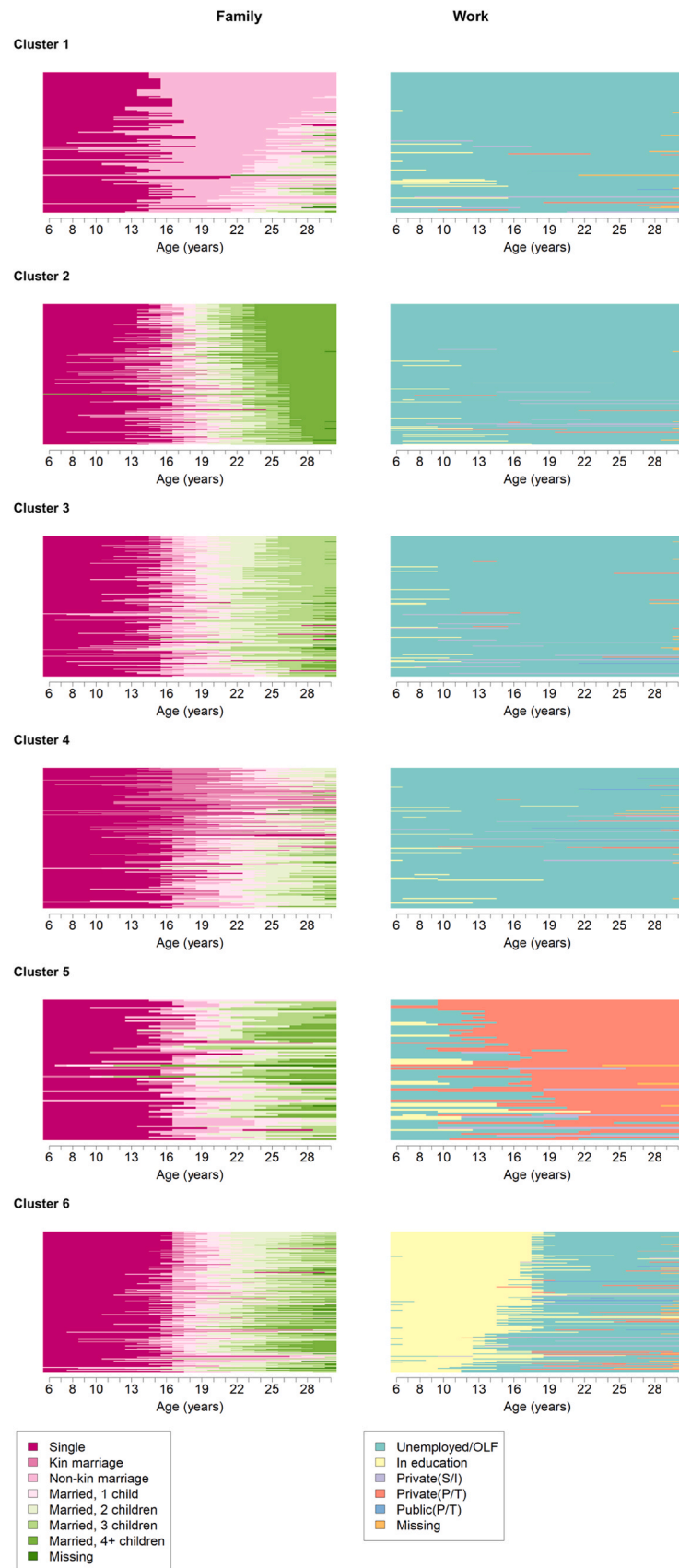
This study is based on the analysis of secondary survey data collected by the Economic Research Forum. The data were anonymized, and institutional ethical approval was not required.

### CRediT authorship contribution statement

**Mariam Abouelenin:** Writing – original draft, Formal analysis, Conceptualization. **Yang Hu:** Writing – review & editing, Methodology, Conceptualization.

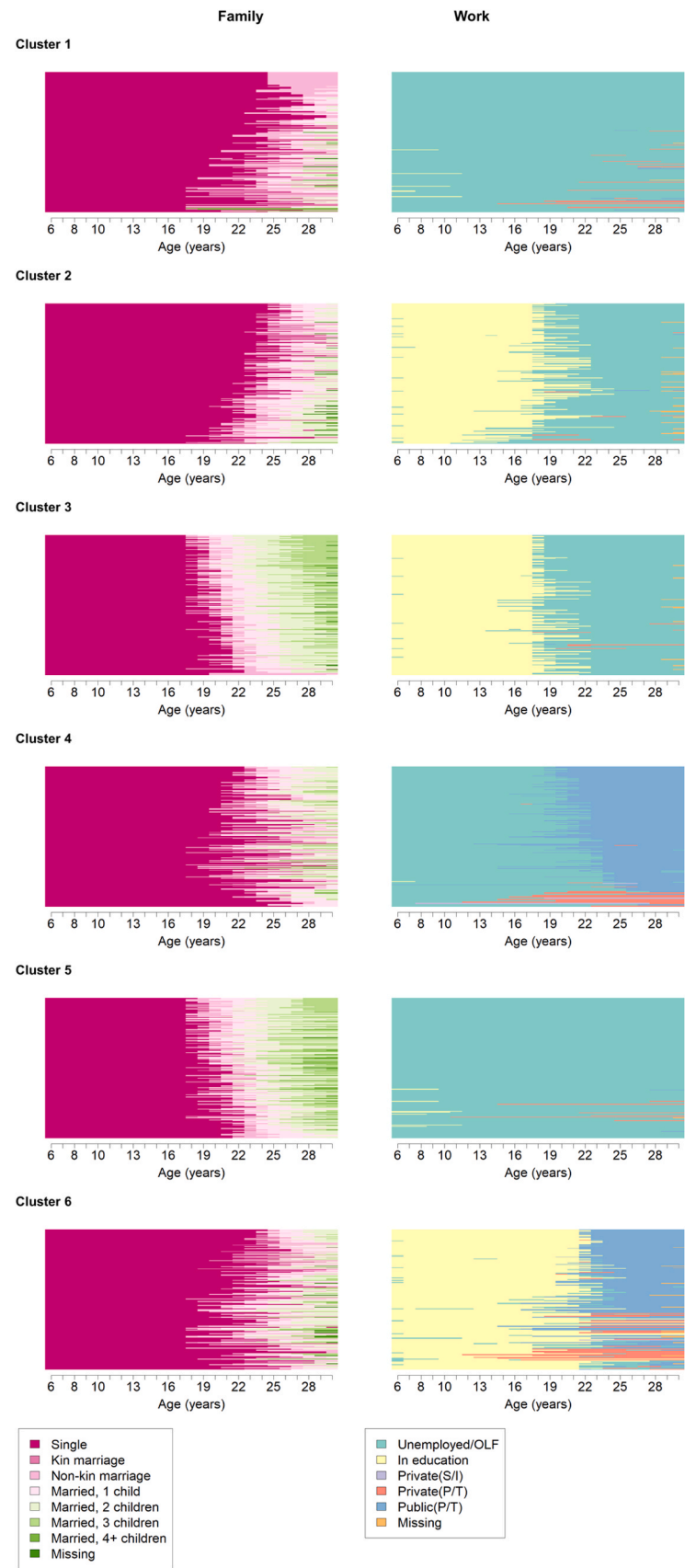
### Declaration of Competing Interest

The authors have no conflicts of interest to declare.



**Figure A1.** Relative frequency plots of women's work-family life-course trajectories in the child marriage group. *Note.* OLF = Out of the labor force, P/T = Permanent/Temporary, S/I = Seasonal/Intermittent. The y-axis denotes 0–150 individual sequences that represent 100 % of each cluster





**Figure A2.** Relative frequency plots of women's work-family life-course trajectories in the non-child marriage group. *Note.* OLF = Out of the labor force, P/T = Permanent/Temporary, S/I = Seasonal/Intermittent. The y-axis denotes 0–150 individual sequences that represent 100 % of each cluster

## Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.alcr.2025.100687](https://doi.org/10.1016/j.alcr.2025.100687).

## Data availability

The data analyzed are obtained from the Economic Research Forum ([www.erfdataportal.com](http://www.erfdataportal.com)). Restrictions apply to the availability of these data, which were used under license for this study. The authors are solely responsible for the analysis and interpretation of the data.

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