Childlessness or Delayed Fertility? Stable Relationships as the Basis for Future Parenthood

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Short Abstract

Several recent studies concentrate on paths leading to permanent childlessness and they find unexpectedly a plurality of trajectories leading both men and women to end their reproductive life without children. What remains unexplored, however, is to understand whether there are some peculiarities in the early childless' life course that may distinguish them from the group of those who eventually have children, but at later stages of their life course.

This study tries to fill this gap and compare the early life trajectories of women and men who reach the end of their reproductive life without children (at age 45 and 50 respectively) from those who become parents after the age of 30 for women and 35 for men, with particular attention on the union/relationship histories and the working career. The sample comprises 3,900 individuals born between 1916 and 1971, interviewed in Multipurpose Survey on Families, Social Subjects, and Life Cycle (2016).

By employing sequence analysis and cluster analysis we identify 6 clusters for women and 3 clusters for men. For women, two clusters seem predictive of late parenthood for women and both are characterized by a long period spent in engagement, in the early stages of the life course.

Keywords: childlessness, delayed fertility, life course, sequence analysis, data-mining models

Background and aim of the study

Recent studies evidence that fertility postponement is one major driver of fertility decline and that since the cohorts born in the 1940s the proportion of women who become mother before the age of 30s has steadily declined (Beaujouan, 2023). In parallel, among the same cohorts, the prevalence of childlessness has also boomed in many European countries (Kreyenfeld and Konietzka, 2017). Fertility postponement and childlessness have been commonly studied as two different phenomena, with their own paradigms and explanations, but it is undeniable that the postponers - who have children in the later stage of their lives - and the permanent childless, made the same decision not to have children in the early stage of their life course. In several cases, the process leading to permanent childlessness can be itself the result of a continuous delay of parenthood until the age when parenthood is either no longer possible from biological reasons or no longer desirable from a social point of view (Tanturri and Mencarini, 2008).

In this perspective, several recent studies concentrate on paths leading to permanent childlessness and they find unexpectedly a plurality of trajectories leading both men and women to end their reproductive life without children (Jalovaara and Fasang, 2017; Tocchioni, 2018; Tocchioni et al., 2022). What remains unexplored, however, is to understand whether there are some peculiarities in the early childless' life course that may distinguish them from the group of those who eventually have children at later stages of their life course. From previous studies indeed it is not clear whether the postponers' life courses differ from the childless' ones since the beginning or rather they present similar sequences of circumstances.

This study tries to fill this gap and to aims to analyze and compare the life trajectories of the childless with those of late parents, in order to identify common or distinct life patterns, with particular attention on two processes that are considered important for planning childbearing: the union/relationship histories and the working career. The focus is both on men and women separately as previous literature shows that the paths leading to childlessness differ by gender: we therefore differentiate women and men who reach the end of their reproductive life without children (at age 45 and 50 respectively) from those who become parents after the age of 30 for women and 35 for men. This study is based on a sample of Italian individuals as Italy is an interesting case of persistent low fertility, booming childlessness prevalence and extremely delayed parenthood.

Data

This study relies on data from the most recent Multipurpose Survey on Families, Social Subjects, and Life Cycle conducted by the Italian National Institute of Statistics (ISTAT) in 2016. This source is particularly valuable for the present study as it contains a detailed series of retrospective questions that allows to reconstruct on a monthly basis individual's reproductive, work, and union histories.
The analyses include women aged at least 45 and men aged at least 50 at the time of the interview, that is, individuals who have completed their reproductive period. We selected both definitively childless individuals, who at the end of their reproductive age do not have any biological, adopted, foster, or stepchildren children (including those of a cohabiting partner), and those who did not have a child until the age of 30 for women and of 35 for men, but who become parents lately. The life histories of both childless individuals and parents were truncated at age 30 or 35 to make them comparable. The resulting sample comprises 3,900 individuals (2,331 women and 1,569 men) born between 1916 and 1971. In the analysis, we account for the weighting of observations using the individual weights provided by ISTAT for each sample unit. The use of weighting in these analyses corrects for representativity bias.

Methods

For each individual in the sample, we created a reconstructed individual sequence of states month by month, from the age of 16 until the age of 30 for women or 35 for men. The resulting sequence for each individual consists of eight possible states, delineated by the combination of four states representing union histories (*single, in a non-cohabitating relationship, cohabitating, married*) and two states representing employment histories (*unemployed, employed*).
By employing sequence analysis and cluster analysis, we compare and group individuals' histories based on the timing, occurrence, and ordering of events. The analyses were conducted separately for women and men. The Optimal Matching algorithm with unit costs for insertion/deletion and substitution costs derived from observed transition rates was applied to the sample, initially ignoring whether each individual was childless or not. After calculating pairwise distances, a Ward clustering algorithm was employed to identify groups of similar union histories.
A multinomial logistic regression illustrates how these clusters diverge in terms of key socio-demographic characteristics (sex, education level, geographical region of residence, cohort, number of siblings, parents' separation, limitation in the daily activities), individual opinions (on cohabiting without marriage, on the necessity of having children for women's fulfillment), the degree of complexity of the trajectories and the information available on whether childlessness is permanent or rather individuals will have children at later ages.
Subsequently, we focused on the female sample, which exhibited a greater variety of life trajectory patterns. Using a logistic regression model with the response variable indicating whether a woman remained childless by the end of her reproductive life, we assess whether belonging to one of the identified clusters is a good predictor of future parenthood. Stepwise selection (in both directions) was applied to the variables.
Finally, we adopte a predictive approach, evaluating the possibility of forecasting in advance which women are more likely to remain childless. Our objective is to identify early predictors of childlessness by utilizing information on women's socio-demographic characteristics, personal opinions, and their employment and union histories, as reconstructed from previous sequence analyses. Various data-mining models were evaluated and compared based on key performance metrics, including classification error rates, false positive and false negative rates and ROC curves.

Results

Cluster analysis led to the identification of various profiles representing typical longitudinal work and union trajectories among the childless and future parents. To evaluate the optimal clustering, the Average Silhouette Width (ASW) was used. Based on this evaluation, a 6-cluster solution was selected for women and a 3-cluster solution for men.
In Figure 1, we present the state distribution plots for each of the six clusters identified through cluster analysis for women and the three clusters identified for men. The clusters differ with respect to the number and timing of employments and unions entered into and dissolved, as well as the type of union observed. The most interesting result of this cluster analysis concerns the female sample and is the presence of two clusters that seem predictive of late parenthood for women (clusters 2 and 6 in Figure 1 *Women*): indeed, over 70% of women belonging to these cluster had a child after the age of 30s. Both clusters are characterized by a long period spent in engagement, in the early stages of the life course. Cluster 2 consists of women who were employed during their relationship and who started their career early. For these women, the engagement period typically precedes cohabitation or, in most cases, marriage.
Cluster 6, conversely, comprises (mostly high educated) women who were in couple, but not employed during the relationship.

The results of the logistic model, presented in Table 1, confirm that belonging to the second or sixth cluster (compared to the first cluster) decreases the likelihood of a woman concluding her reproductive life

without children. The results of this model also suggest that, given other conditions are equal, belonging to a specific cluster has a more significant impact than belonging to a particular cohort. Furthermore, women with separated parents and those with limitations in performing activities typically carried out by individuals (at the time of the interview) have a higher probability of remaining childless by the end of their reproductive period. Lastly, opinions regarding female satisfaction also play a crucial role in distinguishing between childless individuals and postponers. Specifically, women who agree with the statement "A woman is fulfilled only if she has children?" have approximately a 60% lower probability of remaining childless compared to those who disagree.

Preliminary results of the data mining models evidence that having a stable long-term relationship in the early phase of the life course is a crucial predictor that distinguishes late mothers from childless women. There may be factors leading a woman to delay marriage or cohabitation, such as an ongoing educational career or a job or situation that does not allow for sufficient economic/work stability, resulting in a postponement of the birth of the first child, which nevertheless occurs later. For men, this dynamic is not evident. Interestingly, our approach in a further study could be useful also to predict future reproductive behaviour, using previous life course sequences.

Table 1: Logistic Regression Model for Remaining Childless by the End of the Reproductive Life (Stepwise Selection), only women.

	Dependent variable: Remaining Childless · 100			
	Variables	Odds Ratios	CI	*p*-value
Intercept		2.444	1.762 — 3.403	**<0.001**
Cluster Membership	2	0.549	0.357 — 0.833	**0.005**
(ref: 1)	3	0.821	0.659 — 1.022	0.078
	4	1.255	0.863 — 1.826	0.234
	5	2.376	1.615 — 3.535	**<0.001**
	6	0.476	0.324 — 0.692	**<0.001**
Cohort	(1916,1936]	0.731	0.493 — 1.081	0.117
(ref: (1956,1961])	(1936,1946]	0.855	0.596 — 1.225	0.393
	(1946,1956]	1.284	0.919 — 1.795	0.143
	(1961,1966]	1.031	0.741 — 1.434	0.857
	(1966,1971]	0.819	0.597 — 1.123	0.215
Parents' separation	Yes	1.581	1.014 — 2.486	**0.045**
(ref: No)				
Limitations	Yes	1.529	1.189 — 1.973	**0.001**
(ref: No)				
Opinion of children import. for women's fulfillment	Agree	0.396	0.295 — 0.528	**<0.001**
(ref: Disagree)				
Complexity · 100		0.890	0.868 — 0.912	**<0.001**
Observations	2117			
R^2 Tjur	0.114			

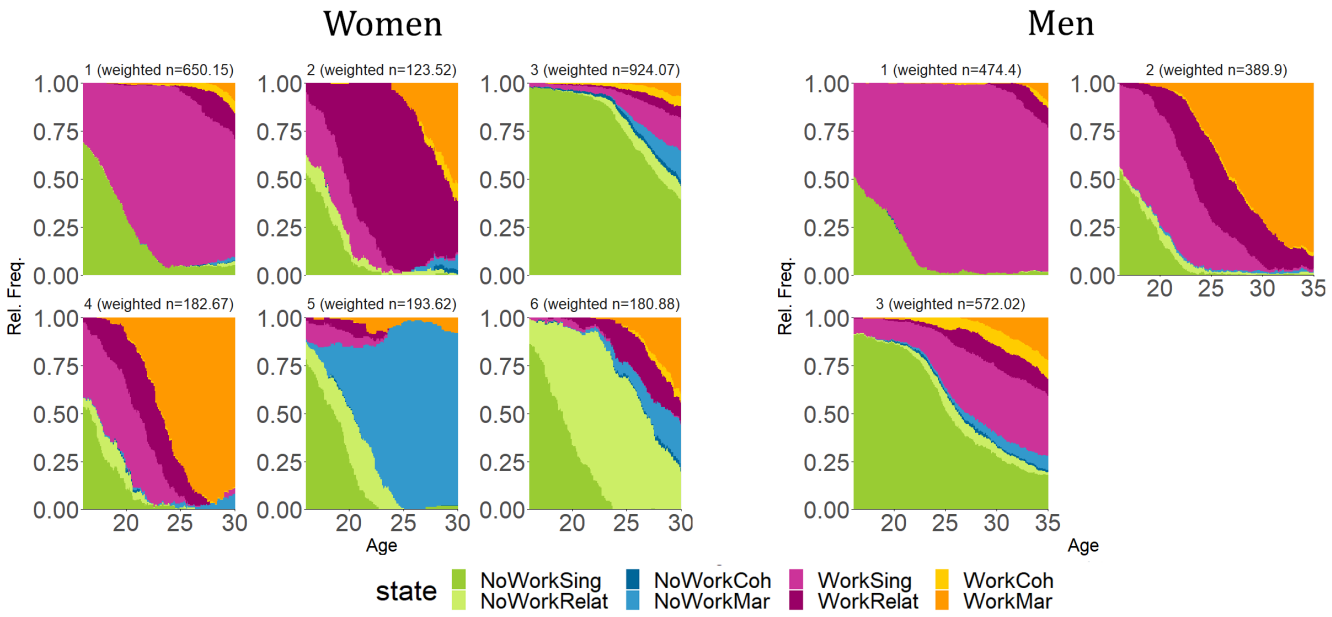

Figure 1: State distribution plot representing life-course trajectories of women and men by cluster membership. Six-cluster solution obtained by OM(Trate) for women and three-cluster for men. The x-axis shows age in years from 16 to 30 for women and from 16 to 35 for men.

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