

Family Formation Trajectories of World War II Survivors

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1 Introduction

This paper looks at the life and family formation trajectories of European citizens who have been directly affected by World War II. Using data from the SHARE survey, it is explored if and what effect the first-hand experience of the war lasting from 1939 to 1945 with 60–70 million fatalities and 11–20 million displaced has on family formation patterns.

2 Method

The data on family states is derived from the SHARELIFE data, the third wave of SHARE which is a recurrent survey collecting data on the life history of people over 50 (Börsch-Supan, 2017). The second question of the accommodation section of the survey, Question AC002, asks for special events in the accommodation history. The following allowed answers to the question were considered related to war: “Evacuated or relocated during a war”, “Lived in a prisoner of war camp”, “Lived in a concentration camp”. The full set of surveyed individuals was reduced to individuals who mentioned the preceding events in their accommodation history. In addition, individuals born after 1944 were excluded to ensure that the war experienced refers to World War II (WWII). In addition, the geographical scope was limited to Austria, Germany, The Netherlands, Italy, France, Switzerland, Belgium, the Czech Republic, and Poland. This is motivated both by the geographical scope of the war as well as by the small number of eligible people from other countries, e.g., Spain.

The final selection encompasses 1114 individuals born between 1910 and 1944 from nine countries with an equal amount of male and female participants. The majority of participants are from Germany, Belgium, Italy and the Netherlands with a relatively even split between genders (cf. Table 1).

Country	Female	Male	Total
Austria	25	38	63
Belgium	88	84	172
Czech Republic	18	11	29
France	98	78	176
Germany	148	155	303
Italy	57	75	132
Netherlands	65	65	130
Poland	42	41	83
Switzerland	16	10	26
Σ	557	557	1114

Table 1: Distribution of participants in the final selection on countries and gender.



Figure 1: Distribution of ages in 1944.

Regarding the three events which directly relate the individuals to WWII, 1011 participants experienced evacuation or relocation, with a relatively equal split between genders. Only eight women and 21 men reported time in a concentration camp. Perhaps unsurprisingly, a gender split is observed regarding time spent as prisoner of war which only 11 women report to have experienced compared to 103 men, primarily from Germany and Austria. Only 42 participants report more than one extraordinary event tying them to WWII, with 70% of them reporting both evacuation and imprisonment. No individual reported all three events.

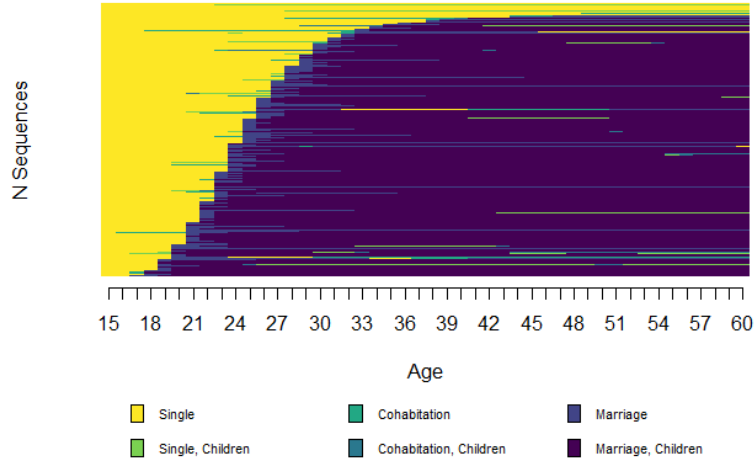
Figure 1 depicts the distribution of ages in 1944, right before the end of WWII in 1945. About half of the participants are ten or younger in 1944, i.e., experienced WWII as young children. The age range of 20 to 25 is slightly underrepresented among women. It should be noted that due to the nature of the survey, i.e., interviewing people older than 50, those who did not survive the war are not part of the sample.

3 Sequence Description

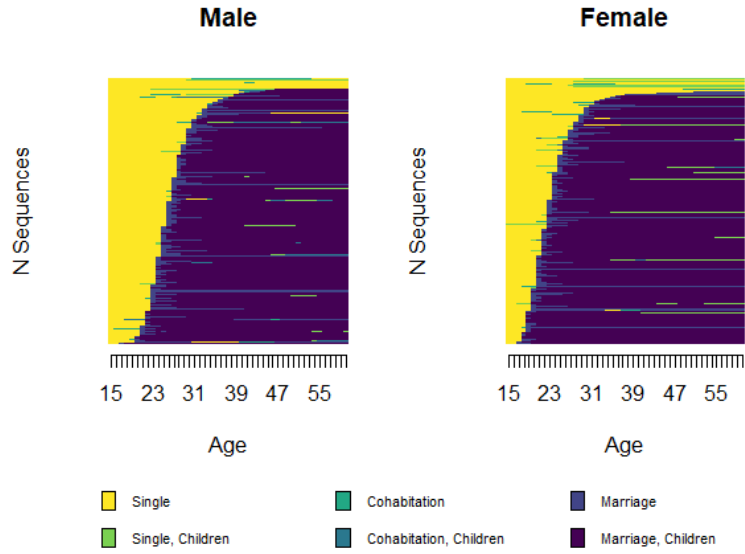
The time frame of interest covers ages 15 to 60 and considers six different mutually exclusive family states: 1. single (SNC), 2. single with children (SC), i.e., parenthood without cohabitation with second parent, 3. cohabitation with a partner (SNC), 4. cohabitation with a partner and children (SC), 5. marriage (MNC), and 6. marriage with children (MC). The long range of the time frame is motivated by the fact that some comparatively many sequences change even in later years. As Figures 2a and 2b illustrate, the vast majority of sequences are stable and follow “traditional” family formation patterns of marriage in the 20s, and parenthood after one or two years of marriage (Fasang and Raab, 2014). The figures also show that ca. 10% of the sequences are comparatively unstable with very early non-marital parenthood or repeated marriage. There is also a significant number of individuals that do not enter any form of family at all.

Figure 3a shows that past the age of 23, over 50% of the group is married, either with children or without. The proportion of individuals with children outside of marriage increases strongly in the mid-thirties and continues to increase until 60, the highest age still part of the observation window. A relatively stable proportion of marriages remain without children. However, as Figure 3b illustrates, over 25% of the sequences can be summarized through patterns of marriage with children or singlehood.

In Figure 4, 100 representative sequence medoids are plotted and the distance within the medoid groups. Most of these medoids reflect differences in marriage and parenthood age, but not state changes after that. The bar diagram on the right of the figure shows that most of these groups are very stable with a lot of the distance mass within the group. However, each group consistently exhibits large, significant outliers which are very dissimilar to the sequence medoids, possibly due to post-marriage changes. This is in line with the observation from above that there is a subgroup of around 10% of the sample that deviates from the traditional family formation trajectory. Interestingly, very early marriages are particularly stable in this sample and exhibit the lowest entropy values.

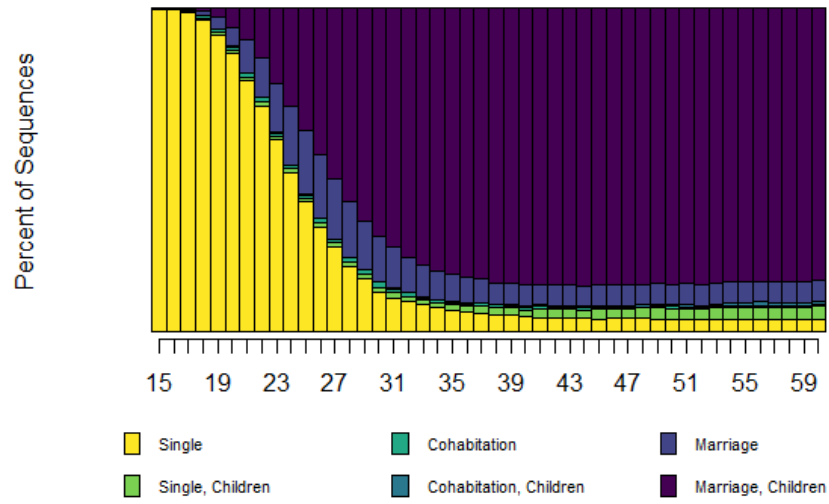


(a) Total

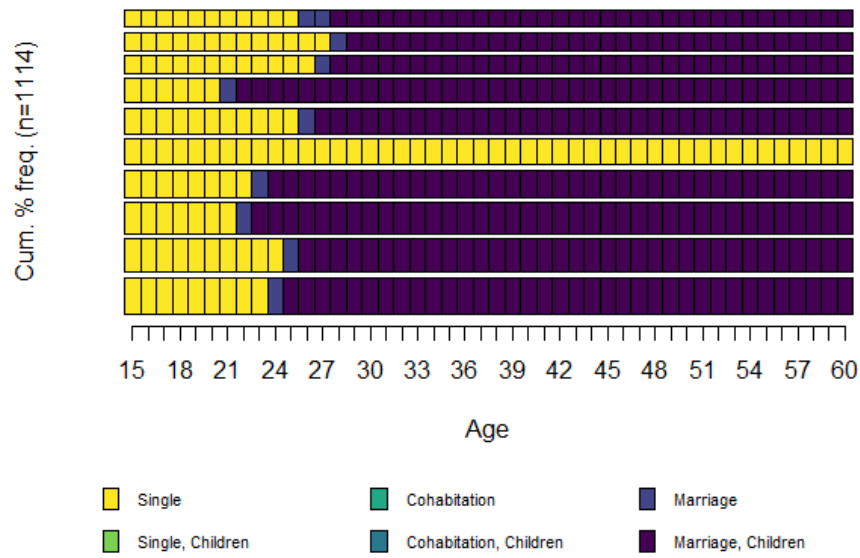


(b) Per gender

Figure 2: Index of 10 most common sequences of people affected by WWII



(a) Sequence State Distribution



(b) Sequence Frequency Plot

Figure 3: Sequence Summaries

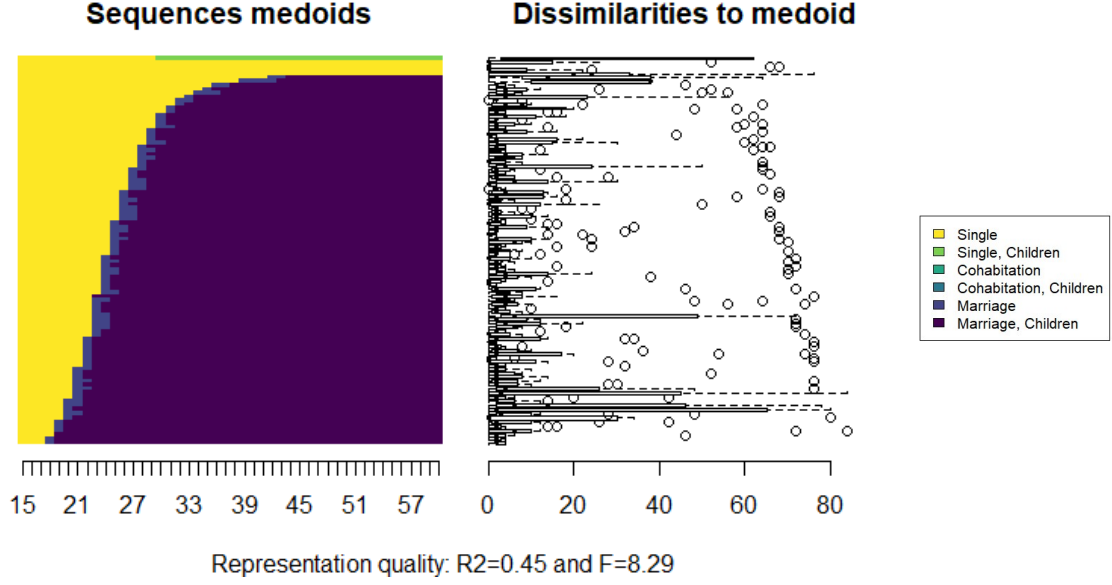


Figure 4: Sequence Medoids and Dissimilarities

4 Cluster Analysis

A wide range of clustering techniques are tested: optimal matching, centroid matching, longest common subsequence, and longest prefix.

Centroid clustering appears to overfit detailed particularities of the data and suggests a four cluster solution where one cluster represents only a single individual that changes frequently between states. It is therefore not helpful in interpreting the data and not presented here. Using longest common subsequence or longest prefix sequence matching yields a clustering that is very strict with respect to marriage age. People who married at 22 are in a different cluster than those married at 23 whereas those that remained single throughout their life are grouped in another cluster together with those that after families in their late twenties. It, too, is not helpful in interpreting the data and not included in this presentation.

Optimal matching was based on three different distance metrics: first, a distance metric giving equal weight to insertion/deletion (indel) costs and substitution costs; second, a metric emphasizing substitution over indel costs, implicitly giving more weight to timing over order; and a third metric based on theory-consistent substitution costs which focuses on state transitions. Under all clustering techniques, the three metrics do not result in significantly different clusters with respect to number of clusters, cluster membership, and cluster size. When using the second and third distance metric, there are minor differences regarding whether a particular sequence belongs to an early traditional family formation cluster or a later traditional family formation cluster. This, however, concerns less than 5% of the sequences. Therefore, the results presented in the following section are based only on optimal matching

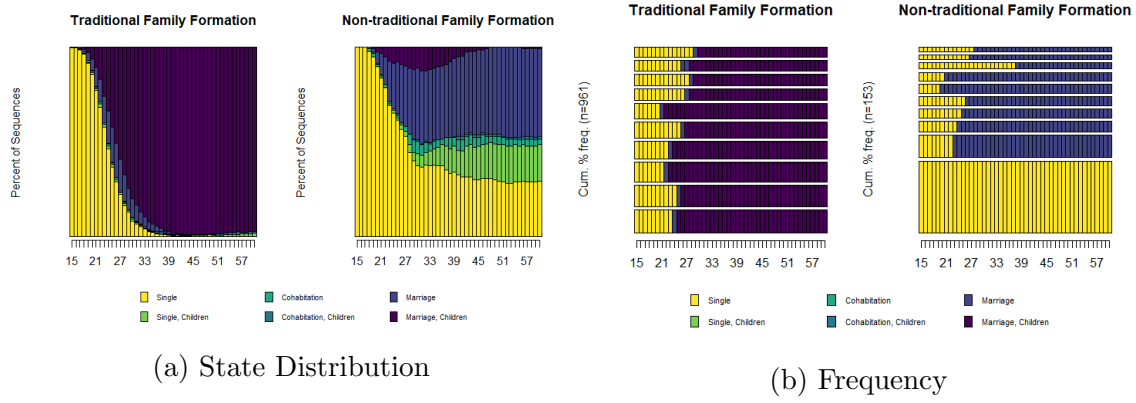


Figure 5: Solution using two clusters

using the equal weight distance metric because it does not give preference to order nor timing. The remaining results are not reported separately to avoid repetition.

Using the Ward’s minimum variance method with squared dissimilarities¹ and a range of evaluation criteria, an optimal solution with two clusters with an average silhouette width (ASW) of 0.7085 is suggested. However, as will be seen below, it is worthwhile discussing the two next-best solutions with five (ASW: 0.4520) and four (ASW: 0.42856) clusters as these provide valuable insight into the patterns within the data.

Using only two distinct clusters results in one cluster with a comparatively stable family formation trajectory and one “remaining” cluster where both childless marriages, singles without children and unmarried parenthood is grouped. Figure 5 details their distributions. Table 2 shows how the nine countries are distributed among the two clusters. Individuals from the Czech Republic and Austria are significantly more likely to follow non-traditional family formation patterns. This is due to a high number of childless single Czechs in the sample as well as a high number of childless married Austrians.

Using four clusters yields a more detailed picture than just two clusters. Figure 6 shows how, in comparison to the two cluster solution in Figure 5, the traditional family formation cluster encompassing 86% of the sequences is split into early family formation with marriage before age 25 and later family formation in the late twenties or early thirties. The smaller non-traditional cluster splits in two smaller clusters. One covers childless marriages whereas the other covers singles and sequences that change between states a lot. In particular, Figure 6b details how most of the individuals remain single throughout their life whereas others have children outside of marriage and others marry and separate again. The characterization of these clusters is further supported by the mean time spent in each state within clusters which

¹Compare the discussion on the help page to the `hclust` command in R.

	Traditional Family Formation	Non-traditional Family Formation
Austria	0.75	0.25
Belgium	0.83	0.17
Czech Republic	0.72	0.28
France	0.87	0.13
Germany	0.90	0.10
Italy	0.90	0.10
Netherlands	0.82	0.18
Poland	0.94	0.06
Switzerland	0.81	0.19

Table 2: Share of country membership per cluster for two-cluster solution

is shown in Figure 6c. Individuals in the early marriage cluster also have children within marriage earlier.

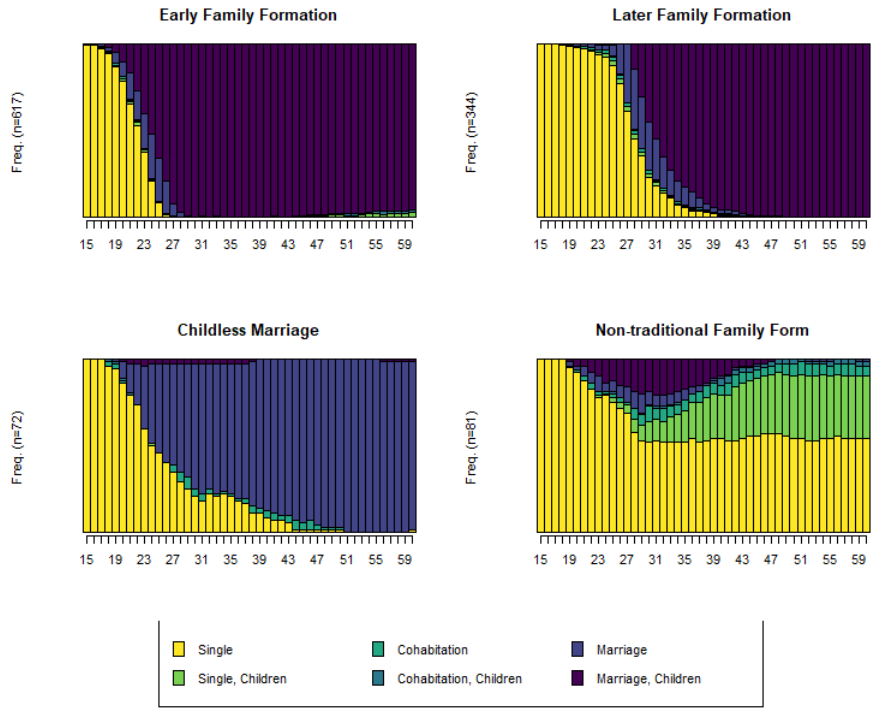
	Early F.F.	Later F.F.	Childless Marriage	Childless Individuals	Non-traditional Parenthood
Female	0.66	0.19	0.06	0.04	0.04
Male	0.45	0.43	0.07	0.04	0.01

F.F.: Family Formation

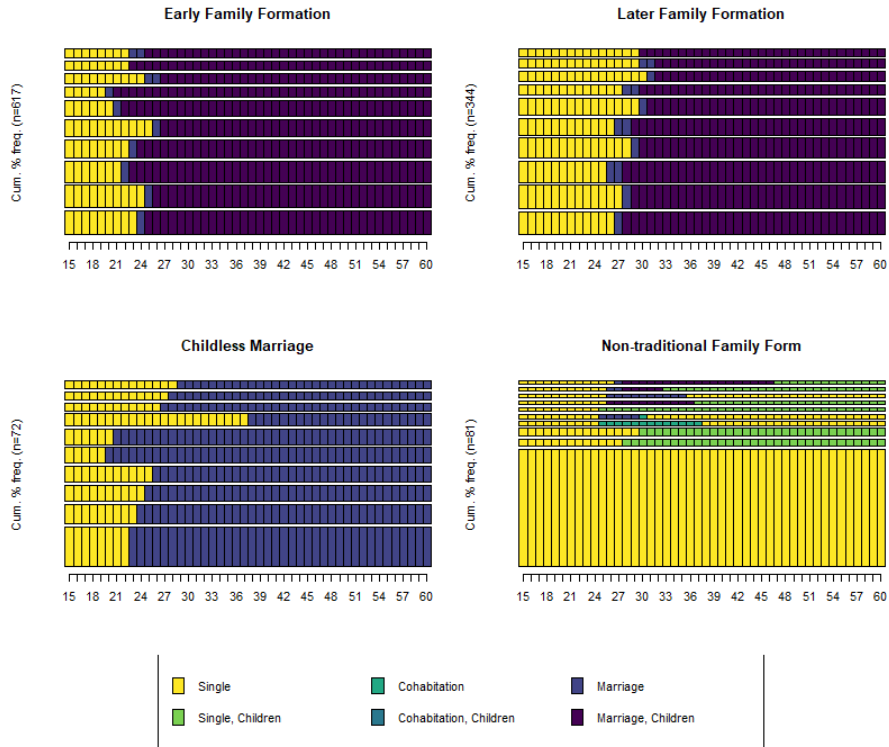
Table 3: Cluster membership by gender for five clusters

The five cluster solution detailed in Figure 7 implies a further split of the non-traditional family form cluster in the four cluster solution. It further splits the individuals into groups with and without children where individuals remaining single without children and individuals in childless cohabitation, or individuals in short, childless marriages represent one cluster. The fifth cluster encompasses individuals who have children outside of marriage and parents who cease to be married at some point in their life. This is further supported by the mean time plot in Figure 7c.

When looking at the cluster membership per gender in Table 3, it is clear that women are more likely to be in the early family formation cluster whereas men are more likely to start families later. Women are also more likely to be in non-traditional parenthood forms, e.g., as single parents or potentially as widows. War does seem to have some small effects on family formation as Table 4 details. People who experienced WWII as adults aged 21 to 35 were slightly more likely to be in childless marriages but were not more likely to be in a non-traditional family form as either single or non-married parent. People who experienced the war as young children from 1 to 10 were very likely to marry and have children early but were also more likely to have a non-traditional family type.

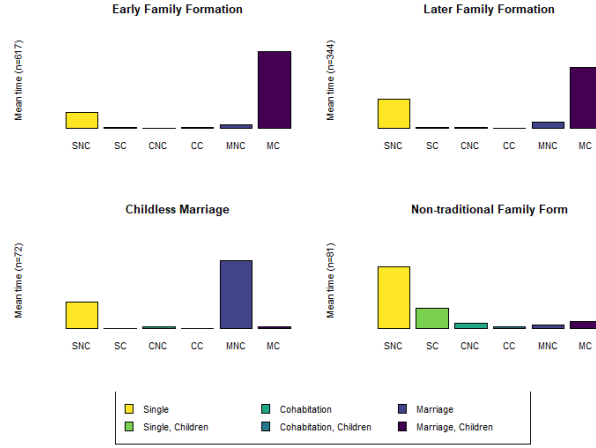


(a) Sequence State Distribution



(b) Sequence Frequency

Figure 6: Solution using four clusters



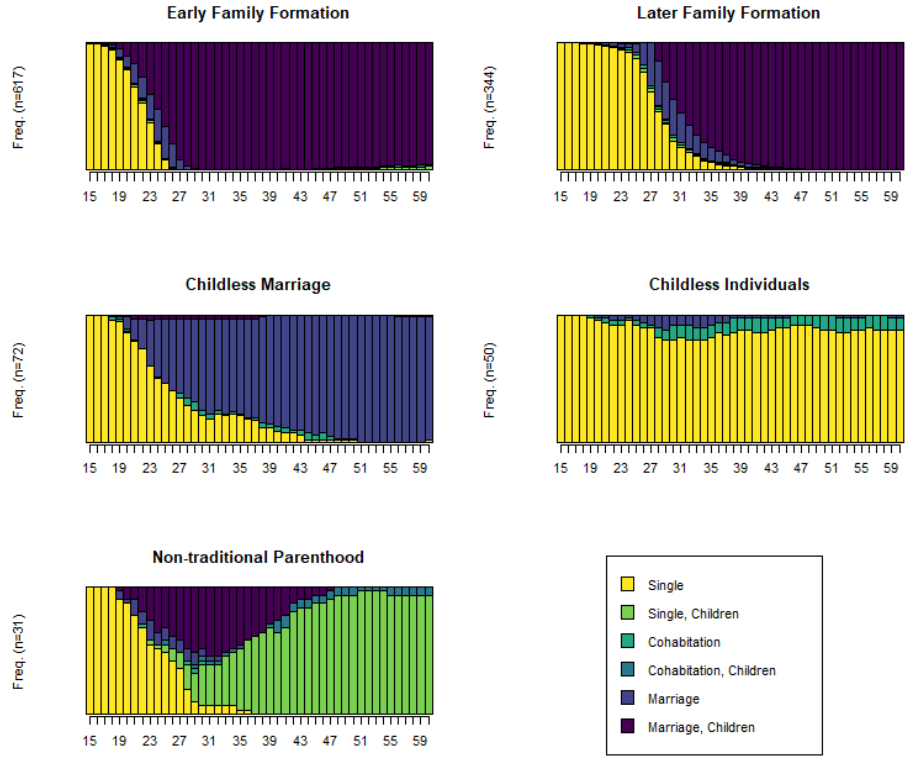
(c) Mean time spent in each state

Figure 6: Solution using four clusters (cont.)

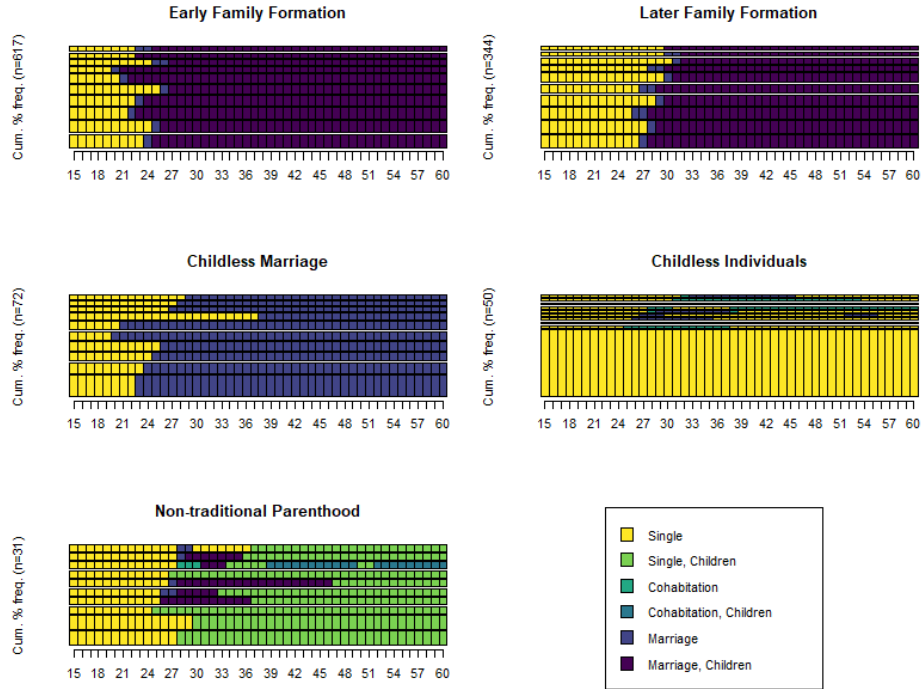
Age in 1944	Early F.F.	Later F.F.	Childless Marriage	Non-traditional Family Form
0–5	0.56	0.28	0.05	0.11
6–10	0.59	0.28	0.07	0.06
11–15	0.55	0.33	0.06	0.06
16–20	0.53	0.35	0.05	0.06
21–35	0.49	0.33	0.12	0.05

F.F.: Family Formation

Table 4: Cluster membership by age in 1944 for four clusters



(a) Sequence State Distribution



(b) Sequence Frequency

Figure 7: Solution using five clusters



(c) Mean time spent in each state

Figure 7: Solution using five clusters (cont.)

5 Conclusion

This analysis of the family formation trajectories of people directly affected by World War II suggest a small impact of the war experiences on the formation patterns. People who were experienced the war as adults were more likely to be in childless marriages which is not observed in later generations. Young adults around the beginning of the war are not more likely to enter marriage, contrary to popular belief about marriage before enlistment. Quite the opposite, later generations born during the war are the ones marrying early with very stable family states throughout their lives. These later generations, on the other hand, are also more likely to enter non-traditional family forms. Whether this is a result of their war experience as young children is not straightforward.

The significant, Monte Carlo simulated results of Chi-squared tests of the effect of the specific war experience (evacuation, POW, concentration camp) on cluster membership in the five cluster solution are very interesting. Individuals who were in concentration camps are more likely to be in the childless individual or non-traditional parenthood clusters than those who were not. Same as people who were taken as prisoners of war, they are also more likely to be in the later family formation cluster. It should be noted that the number of individuals with such experiences are extremely small such that the robustness and significance of these results can be doubted. Nonetheless, more sophisticated analysis such as regression on cluster membership may be able to uncover less obvious and more robust relationships between WWII, war experiences and family formation.

References

- Börsch-Supan, A. (2017). *Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 3 SHARELIFE*. Data set. Release version: 6.0.0. DOI: 10.6103/SHARE.w3.600.
- Fasang, A. E. and M. Raab (2014). “Beyond transmission: Intergenerational patterns of family formation among middle-class American families”. In: *Demography* 51.5, pp. 1703–1728.