Advances in Life Course Research 17 (2012) 1–10

Contents lists available at SciVerse ScienceDirect

Advances in Life Course Research

journal homepage: www.elsevier.com/locate/alcr

Intergenerational transmission of behavioural patterns: How similar are parents' and children's demographic trajectories?

Aart C. Liefbroer [a,b,*], Cees H. Elzinga [a]

[a] Department of Sociology, VU University Amsterdam, The Netherlands
[b] Netherlands Interdisciplinary Demographic Institute, The Hague, The Netherlands

ARTICLE INFO

Article history:
Received 29 May 2011
Received in revised form 10 January 2012
Accepted 10 January 2012

Keywords:
Sequence analysis
Young adulthood
Cohort change
Intergenerational transmission
Demographic trajectories

ABSTRACT

This study examines whether intergenerational continuity exists in the demographic trajectories of parents and children during young adulthood. A new indicator to measure similarity, based on the idea that trajectories are more similar, the more subtrajectories they have in common, is compared to a similarity indicator based on optimal matching. Using data on parents and children from the NSFH, it is shown that intergenerational transmission of demographic trajectories exists, despite the dramatic changes in such trajectories in the last half-century. Continuities in demographic patterns across generations to a large extent result from continuities in general societal processes that structure the life course, but processes that operate within the family itself are important as well. Substantive and methodological implications of the findings are discussed.

1. Introduction

The extent to which behaviours are transmitted from parents to children is of key interest to social scientists, because the level of intergenerational transmission can be viewed as an indicator of the openness of a society and of the ability of the family system to transmit preferred behaviour to the next generation. Intergenerational transmission has been studied with regard to topics like educational attainment (Mare & Maralani, 2006), fertility (Barber, 2001), union formation (Thornton, 1991) and divorce (Diekmann & Engelhardt, 1999; Wolfinger, 1999). Most of this research has focused on the intergenerational transmission of specific behaviours rather than behavioural *patterns*. This is unfortunate, because it is likely that parents will not just try to transmit specific behaviours to their children, but will rather try to transmit their 'way of life'. If so, one would expect continuities in the behavioural trajectories of parents and their children. However, little is known about the extent to which trajectories of parents and children resemble each other.

Major reasons for this state of affairs are the lack of appropriate data and the lack of appropriate methods. In order to study the transmission of behavioural trajectories, information is needed on the timing of major events in the lives of both parents and children. Such data are rarely collected. In addition, methods are needed that allow the level of similarity of the trajectories to be assessed. In this article, we explore the usefulness of sequence analytic methods to estimate the level of similarity between behavioural trajectories of parents and children (Elzinga, 2005). To do so, we use data on the family life trajectories of parents and children in the National Survey of Families and Households (NSFH).

After a brief discussion of the reasons why intergenerational transmission of demographic trajectories is likely, our methods to estimate the level of intergenerational transmission are introduced, followed by a discussion of the data used to illustrate our methods. Next, empirical estimates of the level of intergenerational transmission are presented, and it is examined whether the extent of this

* Corresponding author at: Netherlands Interdisciplinary Demographic Institute, Department of Social Demography, Lange Houtstraat 19, 2502 AR The Hague, The Netherlands. Tel.: +31 70 3565230; fax: +31 70 3647187.
E-mail address: liefbroer@nidi.nl (A.C. Liefbroer).

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doi:10.1016/j.alcr.2012.01.002

transmission varies across relevant subpopulations. The main results and implications are discussed in the concluding section.

2. Background

The process by which young adults gain independence from their family of origin and constitute a family of their own has changed considerably (Arnett, 2004; Buchmann, 1989; Goldscheider & Goldscheider, 1999; Modell, 1989; Mouw, 2005). Over the last decades, we have witnessed postponement of marriage and parenthood (Kohler, Billari, & Ortega, 2002; Schoen & Canudas-Romo, 2005), an increase in ‘‘new’’ living arrangements like unmarried cohabitation (Bumpass & Lu, 2000; Goldscheider, 1997) and an increase in dissolutions of both marital and non-marital unions (Teachman, 2004). As a result, the demographic life course of today's young adults differs substantially from that of their parents (Elzinga & Liefbroer, 2007; Fussell & Furstenberg, 2005; Shanahan, 2000; Wu & Li, 2005). These profound changes raise the question whether intergenerational continuity in demographic trajectories still exists. It could be argued that parental trajectories are no longer useful to orient young adults in their own transition to adulthood since youths are more likely to seek guidance from cultural scripts diffused by the media and within youth cultures. In addition, in a society that emphasizes the importance of autonomy, children may want to assert their autonomy with regard to crucially important decisions concerning family life.

At the same time, a number of empirical and theoretical arguments can be given to suggest that intergenerational transmission of demographic trajectories is likely, even within individualized societies. Empirical research that focuses on the transmission of the occurrence and timing of specific demographic events suggests intergenerational continuity in the timing of these events (Amato, 1996; Barber, 2000, 2001; Diekmann & Engelhardt, 1999; Furstenberg, Levine, & Brooks-Gunn, 1990; Wolfinger, 1999). Furthermore, research shows that family-life trajectories of parents influence several aspects of their children's trajectories, like entry into unmarried cohabitation and marriage (Thornton, 1991) and the timing and number of divorces (Wolfinger, 2000). At the same time, a number of important theoretical mechanisms that link the demographic trajectories of parents and children have been suggested. First, similarities in the trajectories of parents and children can be attributed to *socialization* processes (Amato, 1996; Glass, Bengtson, & Dunham, 1986; Grusec, Goodnow, & Kuczynski, 2000). Children are thought to behave like their parents because they adopt the same set of values and attitudes that their parents adhere to. Intergenerational transmission of attitudes and values has been shown to occur with regard to divorce (Kapinus, 2004), gender role ideology (Moen, Erickson, & Dempster-McClain, 1997), intentions towards marriage and parenthood (Starrels & Holm, 2000), and attitudes towards family formation (Axinn & Thornton, 1993, 1996). In addition, parental values and attitudes have been shown to affect young adults' decisions about leaving the parental home (Goldscheider & Goldscheider, 1993), choosing between married or unmarried cohabitation (Axinn & Thornton, 1993; Barber, Axinn, & Thornton, 2002) and the timing of marriage and parenthood (Barber, 2000; Barber et al., 2002). Second, *status inheritance* or the intergenerational provision of opportunities has been suggested as an alternative mechanism producing similarities in behavioural patterns (Glass et al., 1986; Kalmijn, Liefbroer, van Poppel, & van Solinge, 2006; Moen et al., 1997). Here the basic idea is that parents and children act similar because they are exposed to similar opportunity structures. A third transmission mechanism that could lead to similarity between parents and children in their demographic trajectories is genetic inheritance. For example, Kohler, Rodgers, and Christenen (1999) suggest that there might be a genetic transmission of fertility patterns. Based on these potential mechanisms, the key hypothesis to be explored is that *demographic trajectories of parents and their children are more similar than the trajectories of arbitrary, non-related persons from the parent- and the child-generation*.

3. Measuring similarities between trajectories

Establishing (dis-)similarity between trajectories or sequences of parents and children amounts to comparing pairs of sequences and it is not immediately obvious how to do this. The best-known technique of sequence comparison, ‘‘optimal matching’’ (OM), was introduced into the social sciences by Abbott and Forrest (1986). Using OM amounts to quantifying distance between a pair of sequences as the minimal cost or weight of a series of edit operations that is necessary to create identical sequences. Hence, the first step in applying OM consists of specifying the cost of the admissible edit operations: insertion, deletion and substitution. As these costs may vary per state or combinations of states, such a specification has the form of a square (symmetric) matrix. Over the last decade, many methods to construct such matrices have been proposed (see, e.g. Gauthier, Widmer, Bucher, & Notredame, 2009). Aassve, Billari, and Piccarreta (2007) provide a recent application of OM in demography, and accessible introductions are provided by Abbott and Tsay (2000), Billari (2001), Brüderl and Scherer (2005) and Martin and Wiggins (2011). However, the use of OM has been seriously contested (Elzinga, 2003; Settersten & Mayer, 1997; Wu, 2000). The distances generated by OM are thought to be quite sensitive to the sequences having different lengths. This is a potential drawback if demographic trajectories are being observed for different periods of time. In addition, the edit operations required to determine OM-distance have no clear substantive interpretation in social science research. OM determines the distance between two demographic trajectories by counting the minimum number of deletions, insertions or substitutions necessary to equalize them. However, it is hard to imagine deleting or substituting demographic states. In response to these criticisms, Elzinga (2003, 2005) developed an alternative method to measure similarity between trajectories. In this article, both methods are compared. Given that Elzinga's method is less well-known than OM, the main principles of the former approach will briefly be presented in a relatively non-technical manner (see Elzinga, 2005 and Elzinga, Rahmann, & Wang, 2008 for details and algorithms).

This approach to similarity starts from the assumption that the level of similarity between two objects depends on the number of features they share; the more features shared, the more similar they are. On the other hand, if the number of features shared is small compared to the total number of features of either object, similarity is small. If no features are shared, there is no similarity and if all features are shared, i.e. if the objects are identical, similarity is maximal. So, quantifying or measuring similarity amounts to establishing the number and weight of the relevant features of both objects and the number and weight of those shared. For a rigorous treatment of the concept of similarity, the reader is referred to Chen, Ma, and Zhang (2009) or Elzinga, Wang, Lin, and Kumar (2011).

In the present context, the relevant objects are sequences of states that summarize demographic trajectories. An example would be a demographic trajectory of a child represented by a sequence x = "H S C", denoting a spell "H" (living in the parental home), followed by a spell "S" (living single), and a spell "C" (unmarried cohabitation). Such a sequence consists of subsequences. For example, the trajectory x = "H S C" consists of the 1-long subsequences "H", "S" and "C", the 2-long subsequences "H S", "H C" and "S C" and the 3-long subsequence "H S C" itself. Elzinga (2003, 2005) proposed to consider these subsequences as the relevant features of the trajectories and to represent the trajectories as vectors in a "feature-space": a space that is spanned by as many dimensions as there are possible subsequences that can be created from the available set of states. For example, and for the sake of simplicity assuming that we only use the states {H,S,C}, we could fix the order of the set of all subsequences and construct the vector representation $x = (x_1, x_2, \ldots)$ of the trajectory x = "H S C" as shown in Box 1.

So, whenever a particular subsequence, a particular feature, is possessed by the trajectory, the corresponding coordinate of the representing vector is set to 1 and if it is absent, the coordinate is set to 0. The number of features possessed by this specific sequence is easily counted to equal 7. However, this number also equals the product of the representing vector with itself: $\mathbf{x}'\mathbf{x} = \sum x_i \cdot x_i$. Now, suppose that we have observed a demographic trajectory of the parent of this child as well, represented by y = "H S H" (as shown in Box 1).

The reader can easily verify that the number of features possessed by trajectory y amounts to $\mathbf{y}'\mathbf{y} = \sum y_i \cdot y_i = 6$ and that the number of features shared by the trajectories of parent and child, i.e. the number of common subsequences, equals $\mathbf{x}'\mathbf{y} = \sum x_i \cdot y_i = 3$. With this vector-representation, quantifying similarity is straightforward: it is the number of subsequences shared relative to the number of subsequences of either sequence, the latter quantity taken as the geometric mean of the separate quantities:

$$0 \leq s(x, y) = \frac{\mathbf{x}'\mathbf{y}}{\sqrt{\mathbf{x}'\mathbf{x} \cdot \mathbf{y}'\mathbf{y}}} \leq 1 \qquad (1)$$

Clearly, if the trajectories of parents and children do not share any subsequences, $\mathbf{x}'\mathbf{y} = 0$ and $s(x,y) = 0$, and when x and y are identical, $s(x,y) = 1$. In our example, $s(x,y) = .463$. An approximate interpretation of this number is "percentage of shared subsequences"; approximate, since the denominator of $s(x,y)$ is a geometric mean. Geometrically, $s(x,y)$ denotes the cosine of the angle between the representing vectors: the more similar, the smaller the angle and therefore the bigger the cosine of that angle.

The above vector representation can be easily modified to accommodate weighing of the subsequences in various ways. A first kind of weighing is obtained by using the number of times that a specific subsequence occurs rather than just whether the subsequence occurs at all as its coordinate values. For example, for the trajectory z = "H S H S", this would generate the representation (partially) shown in Box 1.

With this weighing, the interpretation of a vector product would amount to the total number of matches obtained when each embedding of a subsequence of one trajectory is compared to the embeddings of subsequences of another trajectory. In the social sciences, this makes sense since repetition of states (like living arrangements or employment statuses), and therefore of subsequences, often occurs and is substantially meaningful. A second kind of weighing is obtained by including durations as weights. For example, the trajectory w = "H/4 S/2 C/3" would then give rise to the final representation presented in Box 1.

In the above representation, subsequences are weighed according the "time spent" in these subsequences.

In the present paper, we combined both ways of weighing subsequences: each subsequence is weighed simultaneously by embedding frequency and by duration and, when confusion might arise, we will refer to this similarity measure by writing s_{ED} to remind the reader of the Embeddings and the Duration and to discern it from similarity s_{OM} based on OM-distances.

Box 1. Alternative vector representations of demographic trajectories (see text for details).

Subs.	H	S	C	H H	H S	H C	S H	S S	S C	C H	C S	C C	H H H	...	H S H	H S C	...
x	1	1	1	0	1	1	0	0	1	0	0	0	0	...	0	1	...
y	1	1	0	1	1	0	1	0	0	0	0	0	0	...	1	0	...
z	2	2	0	1	3	0	1	1	0	0	0	0	0	...	1	0	...
w	4	2	3	0	6	7	0	0	5	0	0	0	0	...	1	9	...

To illustrate some effects of sequencing and duration, we take 4 small toy-sequence:

$$\begin{array}{lllll} v & = & H/18 & H/15 & \\ w & = & H/18 & S/1 & H/15 \\ y & = & H/17 & C/2 & \\ z & = & H/18 & C/1 & H/15 \end{array}$$

and calculated the similarity matrix as shown below:

$$S_{ED} = \begin{pmatrix} 1.0 & & & \\ .72 & 1.0 & & \\ .99 & .72 & 1.0 & \\ .34 & .42 & .24 & 1.0 \end{pmatrix}$$

Recent demographic applications of this similarity measure s_{ED} can be found in Elzinga and Liefbroer (2007), Bras, Liefbroer, and Elzinga (2010), and Berghammer (2010).

As we have just seen, defining a similarity on the basis of a vector representation is quite natural and easy and its interpretation, both numerically and geometrically, is straightforward. To define a similarity related to OM is however not so straightforward as the distances that OM generates are *not* distances between points in a *vector space*. Assuming that similarity is monotone with proximity, the complement of distance, a common approach is to define similarity between two trajectories as

$$s_{OM}(x,y) = 1 - \frac{d_{OM}(x,y)}{\max d_{OM}} \tag{2}$$

where $d_{OM}(x,y)$ denotes the OM-distance between the trajectories and $d_{OM}(x,y)$ refers to the maximum distance found in the dataset. Clearly, this similarity measure satisfies $0 \leq s_{OM} \leq 1$. At the same time, it has to be kept in mind that, because of this data-driven normalization, it is difficult to compare OM similarity-values across different applications or even different datasets.

For each parent–child dyad, similarity s of their demographic trajectories can be calculated and average values of these similarities can be used to test our hypothesis on the similarity of demographic trajectories of parents and children. Software to calculate both subsequence-based similarities and distance and OM-distance is available from the second author (CHESA 3.1[1]) and from Gabadinho, Ritschard, Müller, and Studer (2011) (TraMinR[2]). From Brzinsky-Fay, Kohler, and Luniak (2006), a specialised Stata-module for OM is available.

As outlined above, theoretically, the value of similarity index s can vary between 0 and 1. In reality, these two extremes will hardly ever be observed. What – in practice – constitutes a low and what constitutes a high level of similarity is hard to answer in general terms. In our view, empirical examples are needed to offer insights into the issue. For instance, given that cohorts that made the transition to adulthood in the 1950s and 1960s are often thought to have experienced this transition in a highly standardized fashion, the average similarity of the demographic trajectories of members of these cohorts could constitute a kind of 'benchmark' of what is a 'high' level of similarity of demographic trajectories. Given that cohorts that made the transition to adulthood in more recent years are thought to have experienced this transition in a much more destandardized way, the average similarity of trajectories of members of these more recent cohorts could provide insight into what constitutes a 'low' level of similarity of demographic trajectories. In the empirical part of this paper, we will use estimates of the average similarity of the demographic trajectories in the parental and in the children generation as benchmarks of what could constitute high and low levels of similarity, respectively.

When we calculate the similarity between all trajectories that are available in our data, the result is a square symmetric similarity matrix S in which we discern four kinds of coefficients as illustrated in the matrix

$$S = \begin{pmatrix} 1 & \cdots & pp & pc & \cdots & nr \\ \vdots & \ddots & \vdots & \vdots & \ddots & \vdots \\ pp & \cdots & 1 & nr & \cdots & pc \\ pc & \cdots & nr & 1 & \cdots & cc \\ \vdots & \ddots & \vdots & \vdots & \ddots & \vdots \\ nr & \cdots & pc & cc & \cdots & 1 \end{pmatrix}$$

In the upper left part of the matrix, we find the similarities between the trajectories of all pairs of parents, the "pp-dyads", The lower-right part of the matrix contains the similarities between the trajectories of all pairs of children, the "cc-dyads". The upper-right and lower-left parts are identical and contain similarities between trajectories of parents and children. However, most of these pairs consist of nonrelated parents and children, the "nr-dyads". It is only on the diagonal of these upper-right and lower-left submatrices that we find similarities between parents and their own children; the "pc-dyads".

A similarity index s can be calculated for each pc-dyad. However, this value in itself is not sufficient to assess the extent of intergenerational transmission of demographic trajectories. An example may illustrate this. Suppose that the average similarity index $\bar{s}$ for pc-dyads is 0.35. At face value, one could argue that this constitutes a reasonable level of resemblance of the trajectories of parents and children. However, suppose that the average $\bar{s}$ for nr-dyads also equals 0.35. In that case, actual pc-dyads do not resemble each other more than nr-dyads (i.e. dyads consisting of any person from the parental generation and any person from the children generation). Our conclusion should then be that the similarity of actual pc-dyads results from general societal processes that produce intergenerational stability and change in the family-life experiences of subsequent cohorts. Therefore, we will compare the average similarity index $\bar{s}$ of pc-dyads and nr-dyads to assess whether similarity between parents and children is due to family-specific factors or simply the result of societal-level factors that differently affect subsequent birth cohorts.

[1] http://home.fsw.vu.nl/ch.elzinga/.
[2] http://mephisto.unige.ch/traminer/.

4. Methods

4.1. Data

Although collecting event-history data has become quite common, few studies have collected such data on multiple generations within a family. In this study, we use one of those rare surveys, the National Survey of Families and Households (NSFH) (Sweet, Bumpass, & Call, 1988; Wright, 2003). The NSFH has a number of attractive features. It is a large-scale representative survey of families living in the USA. This allows one to get a picture of the process of intergenerational transmission in society-at-large, rather than in a specific subpopulation only. In addition, data were collected independently from parents and children. This reduces reporting bias that would occur if data were collected on both generations from either a parent or a child.

The first wave of the NSFH was conducted in 1987/1988, based on a sample of housing units drawn from 100 areas. Within housing units one household member was randomly selected to be the main respondent. The third wave was conducted in 2001–2003. In that wave (as in wave 2) independent information from the main respondent and a so-called focal child was collected. In wave 3, focal children were between 18 and 34 years old. In wave 3, 4822 interviews were conducted with main respondents and 1952 interviews were conducted with focal children. However, the number of parent–child dyads on which information is available is smaller, because not all parents of focal children responded in wave 3 and we limited the analysis to biological children only. In all, 1430 parent–child dyads were available for analysis. For both parents and children, we constructed demographic trajectories between the ages of 15 and 30. However, only 351 children were observed until age 30. All others were censored at some point between age 18 and age 30. To examine how robust our similarity measures are to right censoring, we perform most analyses both on the full set of 1430 parent–child dyads and on the restricted set of 351 parent–child dyads for which complete information is available.

4.2. Construction of demographic trajectories

To construct the demographic trajectories of parents and children, the demographic 'status' of each respondent in each month between the ages of 15 and 30 was ascertained. We used 8 distinct states as described in Table 1.

Table 1
Demographic positions that people can occupy during young adulthood.

Number	Symbol	Description
1	H	Living in the parental home
2	S	Living alone, i.e. without parents, partner or children
3	C	Cohabiting unmarried
4	M	Married
5	HK	Living in the parental home with child(ren)
6	SK	Living without parents or partner, but with child(ren)
7	CK	Cohabiting unmarried with child(ren)
8	MK	Married with child(ren)

These eight states consist of a cross-classification of four types of living arrangements (with parents, single, cohabiting, and married) with the presence or absence of own children. If respondents were cohabiting or married and lived with parents at the same time, they were classified as cohabiting or married. If respondents who had children divorced or separated, it depended on with whom the child(ren) lived, whether respondents were classified as single without children or as single with children (lone parent).

4.3. Additional measures

To test whether similarity in demographic trajectories between parents and children depends on the social background of the parent–child dyads involved, a number of social background characteristics are included in the regression analyses. The background variables included are *race* (white versus non-white), *urbanisation* (living in a SMSA area versus not living in a SMSA area), *educational attainment* of the parent (in number of years of education attained), *church frequency* of the parent (in number of church visits per week), and *gender composition of the parent–child dyad* (mother–daughter, mother–son, father–daughter or father–son).

4.4. Analytic approach

To test our hypothesis on the intergenerational transmission of demographic patterns, the average similarity between pc-dyads is compared to the average similarity of nr-dyads. If the level of similarity between actual parents and children is the same as that between pairs of nonrelated parents and children, it is concluded that – on average – intergenerational transmission does not occur. If, however, the trajectories of pc-dyads are more similar than those of nr-dyads, this suggests that some overall level of intergenerational transmission occurs. We use bootstrapping to assess the significance of differences between averaged similarity indices. In addition to the similarity of pc-dyads and nr-dyads, the average similarity of demographic trajectories among the parental and children generations, respectively, is also calculated. These figures will allow us to get a first impression of what constitutes a relatively high and what constitutes a relatively low level of similarity. These analyses will be presented both for the full set of 1430 dyads and for the restricted set of 351 dyads in which children have been observed until the age of 30.

Next, we will examine to what extent parent–child similarities in demographic trajectories vary by social background. OLS regression analysis is used to examine whether $\bar{s}$ varies by race, gender of the pc-dyad, level of urbanisation, frequency of church visit and level of education. Finally, we examine the consequences for our similarity measure if the difference between unmarried cohabitation and marriage is disregarded. It could be that a major reason for a low level of similarity in trajectories between parents and children results from the fact that unmarried cohabitation is much more popular among the younger generation than among the older. If so, one would expect that the level of similarity between parents and children increases if marriage and cohabitation are both coded as one state, viz., 'in a union'.

5. Results

5.1. Differences in demographic trajectories between parents and children

The demographic trajectories of young adults changed considerably between the two generations. Parents were born between 1923 and 1968 (*Mean* = 1950), and the large majority of them entered adulthood during a period in which entry into marriage and entry into parenthood occurred at a relatively young age and during which unmarried cohabitation was uncommon. Their children were born between 1968 and 1984 (*Mean* = 1976), and entered adulthood during a period in which marriage and parenthood were postponed and unmarried cohabitation became increasingly popular. To illustrate how much different the trajectories of the two generations are, we present the trajectories (*without taking duration of states into account*) that are followed by at least 2% of either generation. This information is solely based on pc-pairs of which we had information on the full 180 months since their 18th birthday.

The last two columns of Table 2 show the fractions of respondents in each generation that follow each of the trajectories shown. From Table 2, it is clear that the trajectories of the children are much more diversified than those of their parents. Note that in the parent generation, just two trajectories (H M MK and H S M MK) make up almost 55% of all trajectories. Among children, these two trajectories cover less than 10% of the trajectories. Among children, there is a wide variety of different trajectories, some implying postponement of family formation (e.g. H S), and some implying an increase in popularity of unmarried cohabitation (e.g. H S C M MK). What is striking is that almost two-thirds of the children follow trajectories that are shared by less than two percent of all children, e.g. complex trajectories that include cohabitation, return to the parental home and union dissolution. These differences between parents and children partly derive from the fact that all parents at one stage of their life experienced childbirth whereas this is not necessarily true for their children. However, these differences between parents and children are also in agreement with what is known from other studies that document a trend towards differentiation and de-standardization of life courses of young adults (Buchmann & Kriesi, 2011; Elzinga & Liefbroer, 2007; Fussell & Furstenberg, 2005; Mouw, 2005; Shanahan, 2000; Wu and Li, 2005).

The results presented in Table 2 suggest that demographic trajectories of members of the parental generation are much more similar than demographic trajectories of members of the children's generation. However, in Table 2, no information on the duration spent in each state was included. To examine the differences in levels of similarity in more detail and to increase our insight in what constitutes a 'low' and what a 'high' level of similarity, the average similarity of trajectories of parent–parent dyads and child–child dyads was calculated, using both s_{OM}, as defined in Eq. (2), and s_{ED} as defined in Eq. (1). Results for the subset of parents and children in which children have been observed for the full 180 months between ages 15 and 30 are presented in Table 3.

Although the numerical values are different for s_{OM} and s_{ED}, both measures show that similarity among the parent-generation, the pp-pairs, is much higher than among the child-generation, the cc-pairs. This is as expected, because (a) all pp-dyads have in common that the parents have had a child at some stage of their life, whereas the same is not true for the children represented in the cc-dyads, and (b) de-standardization of the life course has impacted the children's generation to a much larger extent than the parental generation.

5.2. Testing the intergenerational transmission hypothesis

We argued that, to establish intergenerational transmission of family-life trajectories, similarities between trajectories of parents and children should, on average, be larger than similarities between trajectories of unrelated parents and children. To test this hypothesis, the average similarity $\bar{s}$ was calculated for both sets of pairs (see last two rows in Table 3). The average similarity, calculated with s_{ED} is 0.19 for nr-dyads, and 0.24 for actual parent–child pairs and this pattern is, in a qualitative sense, replicated with s_{OM}. The similarity between trajectories of

Table 2
Demographic trajectories (durations ignored) that cover the full 15 years and are generated by at least 2% of the individuals in the cohort (*N* = 351).

Trajectories						Children	Parents
H	S					.043	–
H	M	MK				.046	.313
H	S	M				.026	–
H	C	M	MK			.031	–
H	S	H	S			.031	–
H	S	M	MK			.054	.245
H	M	MK	SK			–	.023
H	S	C	M			.048	–
H	S	H	M	MK		.028	.071
H	S	C	M	MK		.040	–
H	S	H	S	M	MK	–	.023
Miscellaneous						.650	.322

Trajectories that are followed by less than 2% of the parents or the children are classified as "Miscellaneous".

Table 3
Average similarity of demographic trajectories, confined to the 351 pairs with children's trajectories that covered 180 months.

Pairs	$\bar{s}_{OM}$	*sd*	$\bar{s}_{ED}$	*sd*
pp	.52	.13	.45	.17
cc	.38	.07	.18	.07
nr	.36	.09	.19	.07
pc	.40	.21	.24	.25

Notes: There are 4 kinds of trajectory-pairs: pp, pairs consisting of parents only; cc, pairs consisting of children only; nr, pairs consisting of non-related parents and children; pc, pairs consisting of a parent and his or her own child. There are two kinds of similarity measures: OM-based ($\bar{s}_{OM}$) and subsequence based ($\bar{s}_{ED}$). For the OM-algorithm, we set the cost of all insertions and deletions to 1 and the cost of all substitutions to 2.

pc-pairs is higher than the similarity between trajectories of nr-dyads Although the difference seems relatively small for either of the two similarity measures, the results from bootstrapping (e.g. Efron & Tibshirani, 1998) from the nr-pairs show that it is highly unlikely that the nr- and pc-results have been sampled from the same population: the probability of drawing a bootstrap-sample from the nr-pairs with an average equal to or exceeding 0.24 equals less than 0.01. This demonstrates that, in agreement with our hypothesis, intergenerational transmission of demographic patterns occurs, even during a period in which the trajectories of young adults have undergone rapid differentiation and de-standardization. In addition, these estimates suggest that similarity in demographic trajectories across generations is weaker than similarity within the parental generation, but quite comparable to that within the children's generation. More importantly, comparing the average similarity of pc-pairs and nr-pairs suggests that, measured with s_{ED}, 79 percent ((0.19/0.24) × 100) of the similarity between actual parents and children results from general societal continuities in demographic trajectories across generations, whereas about one fifth of the similarity can be attributed to transmission processes that are family-specific. Measured with s_{OM}, the latter fraction drops to one tenth but, as explained above, the normalization of s_{OM} is arbitrary and data-dependent.

5.3. Comparing parent–child trajectories with unequal length

In Table 3, calculations of similarity were restricted to only those parent–child dyads, in which the children had been observed for the whole period between ages 15 and 30. However, many children have been observed for less than the full 15 years between the ages of 15 and 30. To examine the sensitivity of these similarity estimates to right censoring, we recalculated the similarity measures presented in Table 3 for the full set of 1430 pairs of parents and children. The resulting similarity measures are presented in Table 4.

For similarity measure s_{ED}, the results for the full sample are quite comparable to those of the non-censored sample: the similarity between trajectories of parents (pp-pairs) is larger than that between the trajectories of children (cc-pairs), and unrelated parents and children (nr-pairs) are less similar than related parents and children (pc-pairs). However, s_{OM} leads to the surprising conclusion that trajectories of the children generation (cc-pairs) are *more* similar to each other than trajectories of the parents generation (pp-pairs). This finding seems clearly at odds with the empirical results presented in Tables 2 and 3 and with theoretical expectations and it cannot be explained by differences in normalization since the very same data-dependent normalization constant was used for *all* pairs of sequences of the extended data-set. It suggests that s_{OM} cannot properly deal with sequences of unequal lengths.

Table 4
Average similarity of demographic trajectories of all 1430 pairs of parents and children, regardless of the length of the children's trajectories.

Pairs	$\bar{s}_{OM}$	*sd*	$\bar{s}_{ED}$	*sd*
pp	.46	.11	.35	.16
cc	.47	.11	.25	.11
nr	.30	.08	.15	.07
pc	.33	.17	.19	.20

Notes: There are 4 kinds of trajectory-pairs: pp, pairs consisting of parents only; cc, pairs consisting of children only; nr, pairs consisting of non-related parents and children; pc, pairs consisting of a parent and his or her own child. There are two kinds of similarity measures: OM-based ($\bar{s}_{OM}$) and subsequence based ($\bar{s}_{ED}$). For the OM-algorithm, we set the cost of all insertions and deletions to 1 and the cost of all substitutions to 2. On average, the children's trajectories span 126.15 months (*sd*: 45.33 months, minimum 43 months).

5.4. Social background and similarities between parents and children

Next, it was examined whether parent–child similarity varied by social background by regressing our similarity measures s_{ED} and s_{OM} on a number of background characteristics. Regression analyses were performed both on the restricted sample of parents and children with full information on the children's trajectories between the ages of 15 and 30, and on the full sample that included children with censored trajectories. The results are presented in Table 5.

Similarity of demographic trajectories of parents and children is higher among white respondents than among non-whites, suggesting that the change in life courses between subsequent generations is smaller among whites than among non-whites. Similarity is equally high in metropolitan areas as in non-metropolitan ones. Similarity in demographic trajectories is higher if parents have a high level of education than if parents have a relatively low level of educational attainment. One reason for this could be that educational enrolment strongly structures the timing of demographic events, and if both parent and child have a high level of education, then the synchronisation of events in their life courses will probably be high. If the parent has

Table 5
Regression analyses of level of similarity of pc-dyads on selected background characteristics, by type of sample and type of similarity index.

	Parent–child dyads with uncensored child trajectories (N = 351)		All parent–child dyads (N = 1430)	
	$\bar{s}_{ED}$	$\bar{s}_{OM}$	$\bar{s}_{ED}$	$\bar{s}_{OM}$
White[a]	.13*	.11*	.05†	.06*
SMSA area[b]	.08	.01	.02	.03
Educational attainment parent	.12*	.14*	.16**	.20*
Frequency of church visit parent	.17**	.13*	.12**	.06*
Mother–son dyad[c]	−.12*	−.15*	−.06*	−.05†
Father–daughter dyad[c]	.17**	.10*	.10**	.10**
Father–son dyad[c]	−.02	.02	.07*	.09**
R^2	.13	.12	.07	.08

[a] Reference category: non-whites.
[b] Reference category: non-SMSA area.
[c] Reference category: mother–daughter dyad.
† $p < .10$.
* $p < .05$.
** $p < .01$.

only limited educational attainment, he or she will probably have experienced major demographic transitions much earlier than his or her child has. Parent–child similarity is also higher if parents are frequent churchgoers than if parents never or hardly ever attend church services. This could result from higher normative pressure among religious people to conform to family ideals that emphasize marriage and childbearing, or from the fact that religious parents are more highly motivated to transmit their family-life ideals to their children. Finally, the gender composition of the parent–child dyad has a clear effect on the level of similarity of family-life trajectories of parents and children. However, the effect does not conform to our expectation. Similarity is highest for father–daughter dyads and lowest for mother–son dyads. Father–son and mother–daughter dyads occupy an intermediate position. This unexpected pattern could be due to the fact that men, on average, experience union formation and childbearing a few years later than women. This is true both for the generation of parents and that of children. However, sons and daughters have postponed the transitions of union formation and childbearing relative to their parents. As a result, the timing of these important transitions in the lives of daughters comes to resemble that in the lives of their fathers, resulting in a relatively high similarity in the life courses of fathers and daughters. At the same time, the postponement experienced by sons increases the dissimilarity between their trajectories and those of their mothers.

Overall, the same pattern of results is observed for s_{ED} and s_{OM}, and for the full sample and the restricted sample of parents and children who both have been observed for the full observation period of 15 years.

5.5. Consequences of disregarding unmarried cohabitation

To increase our insight in the usefulness of the proposed similarity index, and in its sensitivity to detect potentially important factors contributing to intergenerational transmission, attention was paid to the role of unmarried cohabitation in creating (dis-)similarities in trajectories. The results in Table 2 showed that unmarried cohabitation is much more common among the children generation than among the parental generation. This suggests that the emergence of unmarried cohabitation could be an important factor accounting for the relatively low similarity in the trajectories of parent–child dyads. To examine this, we recalculated similarity measure s_{ED} for the subset of 351 parents and children for whom full information on trajectories between the ages of 15 and 30 were available, assuming that there is no difference between unmarried cohabitation and marriage. In practice, this implied that spells of unmarried cohabitation were recoded into spells of marriage. In Fig. 1, the average similarity scores for both analyses are compared. The results show that the average similarity of demographic trajectories is higher if unmarried cohabitation is disregarded (and treated as marriage) than if unmarried cohabitation is treated as a separate stage in the family-life course. This effect is smallest among parent-parent dyads (an increase in $\bar{s}$ from 0.44 to 0.48), reflecting the low prevalence of unmarried cohabitation among these older cohorts. The increase in $\bar{s}$ is larger for each of the other three measures. For instance, the increase is almost 0.08 for parent–child pairs. If spells of unmarried cohabitation are treated as marriage spells, the similarity of demographic trajectories of parents and children clearly increases. This attests to the important role of unmarried cohabitation in creating discontinuity in the trajectories of subsequent generations.

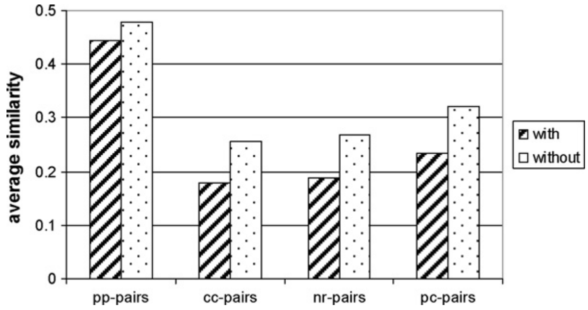

Fig. 1. A comparison of similarities in demographic trajectories with and without taking unmarried cohabitation into account ($N = 351$). *Note*: There are 4 kinds of trajectory-pairs: pp-pairs consisting of parents only, cc-pairs consisting of children only, nr-pairs consisting of non-related parents and children and pc-pairs consisting of a parent and his or her own child.

6. Discussion

Research on intergenerational transmission tends to focus on the transmission of specific behaviours from parents to children. This article started from the contention that it is important to study the intergenerational transmission of behavioural *patterns* as well. In recent decades, demographic trajectories have changed considerably, particularly as a result of the postponement of marriage and childbearing and the increase in the occurrence of unmarried cohabitation and union dissolution. Against this background, this paper compares two methods to examine similarity in demographic trajectories of parents and children and explores how strong this similarity is.

The results show that intergenerational transmission of demographic trajectories occurs despite major changes in the incidence and timing of family-related events across generations. A comparison of the average similarity of parent–child pairs with that of dyads consisting of unrelated persons from the parental and children generations shows that the similarity of the latter group is about 20 per cent lower than that of parent–child pairs. This suggests that 80 percent of the intergenerational continuity in demographic trajectories results from continuities in general societal processes that structure the transition to adulthood. About one-fifth of this intergenerational continuity can be attributed to processes that operate within the family itself.

At the same time, our results confirm earlier research that shows that the transition to adulthood among recent birth cohorts differs strongly from the transition to adulthood experienced by the generation of their parents. The average similarity of demographic trajectories of dyads from the parental generation was much higher than that of dyads of the children generation, confirming that a de-standardization of the early demographic life course has occurred. Still, intergenerational continuity in demographic trajectories is observed.

How can our findings on inter-cohort change and intergenerational transmission within the family be reconciled? From a social change perspective, the family change that has been witnessed over the last decades can be viewed a prime example of cohort replacement (Ryder, 1965). Younger cohorts behave differently from older ones. If such a process occurs, it can be expected that the behavioural examples of the older generation do not have a strong influence on the behaviour of the younger generation. At the same time, the socialization perspective would argue that parents influence their children in multiple ways and thus that some influence of the parental home would be visible, even in times of rapid social change. Our results suggest that both perspectives are true. Intergenerational transmission of demographic trajectories occurs, even in times of rapid social change, but its effect is rather limited.

Our subgroup analyses showed that intergenerational continuity is stronger for father–son than for mother–daughter dyads and stronger for dyads if the parent was highly religious and had a high level of education than for dyads in which the parent had the opposite characteristics. These findings suggest that both values and socio-economic factors might be important in creating intergenerational continuities in demographic patterns.

To study similarity in demographic trajectories, we compared the well-known OM-indicator with an indicator recently developed by Elzinga (2003, 2005) and Elzinga and Liefbroer (2007). The results of our analyses show that both measures led to the same kind of conclusions, with one important exception. If children's trajectories are allowed to have unequal length due to censoring, the OM-derived measure suggests that the similarity between trajectories in the children's generation is higher than between the parental generation. This is in contrast with the results of the other analyses and runs counter to theoretical expectations. We suspect that this is an artefact of the fact that OM suffers from problems in handling unequally long trajectories. The subsequence-based similarity indicator developed by Elzinga (2005), on the other hand, seems to behave as expected even if trajectories have unequal length. Both the general analyses and the subgroup analyses showed patterns of results that are in line with expectations about changes in similarity between different cohorts and about differences in levels of intergenerational continuity across different subgroups.

Finally, we would like to point out some of the limitations of our study and potentially interesting avenues for future research. First, this analysis does not offer a causal analysis of the factors that influence the transmission of demographic trajectories. To do so, measurements taken at the start of young adulthood of both parents and children would be ideal. Second, the data used here are only illustrative of processes of intergenerational transmission of demographic trajectories, as the non-response among parent–child dyads is relatively high. In addition, the fact that data on the demographic careers of parents are collected at a relatively late age could have led to parents 'streamlining' their careers and thus to an underestimation of diversity in the life courses of the parental generation. Third, an interesting issue for further research is to study the interplay between demographic careers on the one hand and educational and occupational careers on the other hand. Interesting questions would be to what extent these careers are interrelated and whether similarities in the demographic trajectories of parents and children be explained by similarities in their educational and occupational trajectories.

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